AN ECONOMETRIC ANALYSIS OF TRADE AND ECONOMIC GROWTH IN TANZANIA: EVIDENCE FROM TIME SERIES DATA

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ABSTRACT
This article investigates the relationship between trade and economic growth in Tanzania for the period from 1970 to 2016. The article utilises the Autoregressive Distributed Lag Model known as the ARDL bounds testing to co-integration. In this article, it utilises a general-to-specific technique using the Ordinary Least Square (OLS) method on estimates, to come up with significant variables. Foreign direct investment, population growth and exchange rates were added to the model as explanatory variables. The empirical evidence confirms the existence of a long-run relationship between selected variables, implying that in the long-run, all variables can move together. The empirical results of the analysis reveal that exports, imports, foreign direct investment and exchange rates have a robust and significant influence on economic growth in Tanzania. However, population growth seems to have less insignificance compared to the other variables. As far as policy is concerned, the government should revisit trade policy measures to control imports and minimise trade deficit. This will in turn lead to momentous economic growth.

Keywords: Economic growth, trade, time series, econometric analysis, Tanzania.

INTRODUCTION

International competitiveness between countries has traditionally been assessed based on exports and market shares. Thus, an increasing part of international trade involves the importation of intermediates to be integrated into the export of final and further processed intermediate goods (Wastyn & Sleuwaegen, 2013). Therefore, a country's exports not only reflect the embodied technology and relative endowments which characterise its domestic production activities, but also the technology and factor endowments of the partner countries from which a partner country imports intermediate goods (Moussiegt *et al*., 2012; Wastyn & Sleuwaegen, 2013). Several economic theories have tried to identify various channels which could facilitate growth effects. Apart from trade being regarded as an engine for growth, it is also believed to promote the efficient allocation of resources and allow a country to realise the economies of scale (Busse & Königer, 2012). With this, the role of trade on economic growth has received considerable attention and several studies have been conducted to determine the causal relationship between trade and economic grow (Makki & Somwaru, 2004). In Tanzania, however, the sector has not received as much attention and it is difficult to find studies which quantify the subject sufficiently. It is against this background that this article sought to analyse the relationship between trade and economic growth in Tanzania for the period from 1970 to 2016. The rest of the article is organised in five sections. The introduction is provided in Section 1.0, while Section 2.0 gives a brief picture of trade performance in Tanzania. Section 3.0 presents a survey of literature together with theoretical models, while, methodology, analysis and empirical findings are discussed in Section 4.0. The final part, Section 5.0, consists of the conclusion and policy recommendations.

TRADE PERFORMANCE IN TANZANIA

Tanzania noted an increase in total trade of US$ 20.6 billion in 2015 from US$ 19.7 billion in 2014, an approximate of 4.57% increase. The increase in total trade was facilitated by the increase of imports from US$ 12.8 billion in 2014 to US$ 14.7 billion in 2015, which is an increase of almost 15.32%. This further led to an increase in trade deficit by almost 51% from US$ 5.8 billion in 2014 to US$ 8.9 billion in 2015. India, China, EU and Kenya were noted as the main trading partners (EAC, 2015). Tanzania also observed an increase in imports by 16.6% from 12.8 billion in 2014 to US$ 14.7 billion in 2015. By 2015, Tanzania's main import

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countries were China, India and EU which recorded import values of US$ 2.9 billion, US$ 2.7 billion and US$ 1.8 billion, respectively. These imports included mainly petroleum products, motor vehicles, wheat bran, pharmaceuticals, chemical products, electrical equipment and machinery.

On the other hand, Tanzania recorded a 15.27% decrease in exports from US$ 6,909.6 million in 2014 to US$ 5,854.25 million in 2015. It is difficult to quantify the causes of the huge percentage decrease in exports but since there was a presidential election in 2015, the perceived instability during elections may have scared away some traders. Nevertheless, the major exports were gold, cashew nuts, precious metals, tobacco, coffee, sesame oil and yellow tuna. The exports amounted to US$ 1.1 billion. Of these, US$ 833 million's worth of exports were destined for India and SADC, respectively. Exports to COMESA countries and Japan were 5.85% and 3.94% of total exports, respectively. In 2015, the volume of re-exports increased from US$ 1.2 billion in 2014 to US$ 2.0 billion. The share of re-exports to total exports increased by 17.3%, from 2014 to 2015. The re-exported products among other things included light vessels, fire-floats, motor vehicles, electrical equipment, spare parts, mineral fuels, fertiliser and machinery parts (EAC, 2015). Figure 1 shows the value of exports and imports in Tanzania between 1970 and 2016. Likewise, in the beginning of 2017, Tanzania registered a surplus balance of payment of US$ 636.7 million, though the country recorded a drop of its exports and imports. This was a significant recovery from a deficit of US$ 183.9 million in 2016. The surplus was a result of current account, which narrowed by half to a deficit of $1.6 billion due to a fall in imports. The annual import bill decreased to US$ 7.8 billion in 2017 from the US$ 9.3 billion recorded in 2016 (BoT, 2017).

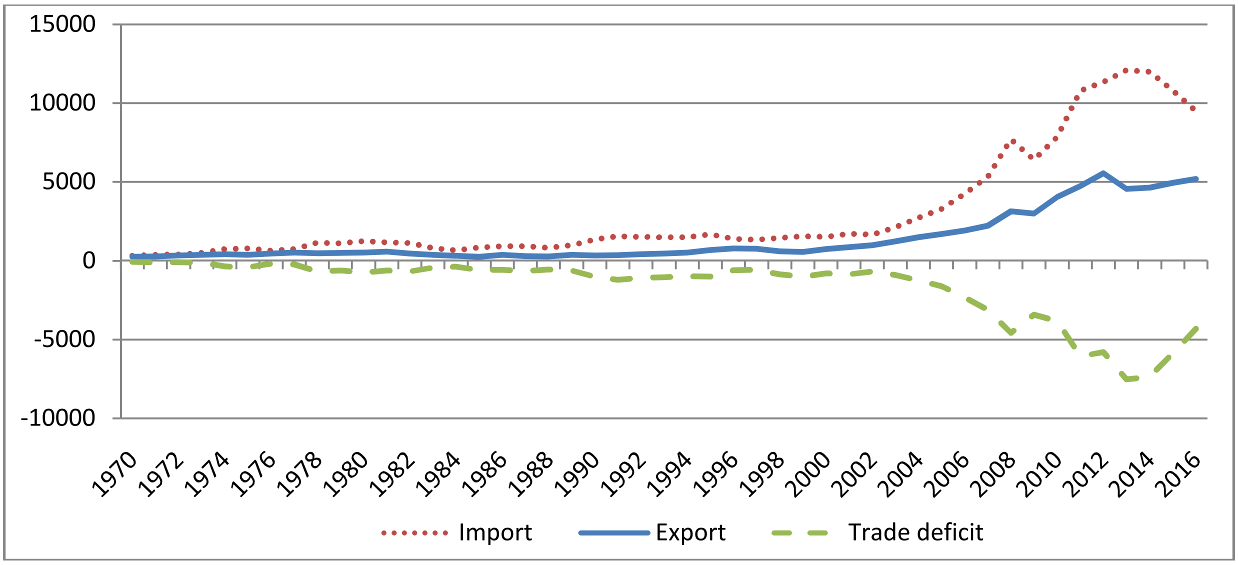

Figure 1: Tanzania's Exports and Imports (US$ at current price in millions)

LITERATURE SURVEY

Theoretical Models: International trade theories

Among the pioneers of trade theories are Ricardo and Heckscher-Ohlin (H-O), both of whom concentrated on the determinants of global production. The Ricardo Model investigated the association between technology and production location of multinational firms. The model envisaged that production location is acquired by the divergence in labour productivity that may be grounded by the gap of production techniques between countries. Thus, each country has to produce goods with relatively higher yields and to be able to import other goods. Advanced technology increases productivity; that is, production is concentrated in regions with higher technology. The H-O model argues that production location is beaconed on the endowment factors rather than technical differences. Each country generates goods using available factors and sometimes exchanges goods using its available resources via international trade. The model also examines the effects of the endowment factor on production, location and decision, arguing that production is concentrated in regions with abundant resources. However, the model has several challenges where technology cannot be acquired freely by any business and also the factor endowment does not result in the factor price gap, as the factor price is equalised through international trade. Reinert (2008) concluded that the Ricardian failure was a result of inappropriate assumptions which always produced misleading answers.

Rybczynski Theory

This theory was developed by Rybczynski (1955) and investigates the effects of an increase in the quantity of a factor of production against production, consumption and terms of trade within the context of the H-O Model.

The theory argues that an increase in the factor endowment causes an absolute expansion in the production of goods and an absolute reduction in the production of the commodity using relatively little of the same factor. The theory also argues that an increase in factor endowment is necessarily beneficial because a country can export more, thus import more and consume more. However, Daniel (2000) calls this an export-biased trade strategy, stating that this could worsen terms of trade by offsetting the positive impact of the increase in factor endowment. Nevertheless, while emphasising the importance of increase in factor endowment on growth, Colombatto (1900) argues that the export-biased trade strategy can play an important role in the growth process of developing countries. Three points were tabled out to support his argument. First, growth of developing countries depends considerably on industrialisation, though in most cases their development is low. Second, the export promotion policies are not overly emphasised as the macro-economic factors are not conducive. Third, exports make growth easier and lead to more savings, higher technological advancement and easier access to foreign loans.

Endogenous growth theories

The Endogenous Growth Theory emphasises the importance of economic growth within the economic field. Some of the main contributors to this theory are Romer (1986), Lucas (1988), and Mankiw *et al*. (1992). The model proposes ways by which growth in less developed countries could be accelerated by making maximum and efficient use of available resources. The theory aims at explaining both the degree of differences in economic growth rate across countries and, a greater deal of the growth observed and technological advancement as a form of capital accumulation. Generally, the theory states that the output per worker (growth per unit of labour) increases with the output per capita (growth per unit of capital) with increasing rate. Capital is assumed to include both human and physical capital. This theory capitalises on the demise of the Solow Model. Solow (1956) had failed to explain how to determine the GDP growth rate (Brzezinski & Dzielinski, 2009). Nevertheless, endogenous theories can be used to determine the growth rate. Therefore, this article employs the Endogenous Growth Model.

Selected Studies

The effects of trade have been analysed as a major factor for economic growth by many authors (Frankel & Romer, 1999; Rodriguez & Rodrik, 2000). However, some of them noted the positive relationship between trade and economic growth while others noted the opposite. Nevertheless, several studies by Were (2015) and Edwards (1993) used cross-sectional data while defending their case on the effects of trade on economic growth for different time periods. Studies by Musila and Yiheyis (2015), Lin (2000), and Trejos and Barboza (2015) used time-series data while studies by Zahonogo (2016) and Eriș and Ulașan (2013) used panel data for their analysis. Digging from various studies, as mentioned earlier, some have identified a positive relationship between trade and economic growth. For example, Chang *et al.* (2009) investigated the effects of trade openness on economic growth for the period of 1960 to 2000 for the sample size of 82 countries (22 developed and 60 developing countries). They employed a simple Harris-Todaro Model and used a non-linear growth regression on empirical analysis and came up with positive results. Lin (2000) examining the association between trade and economic growth in China for the period of 1952 to 1997 employed a regression on the Econometric Model. He found out that export and import growth, together with the growth rate of the volume of trade, are positively correlated to the growth rate of the GDP per capita. Were (2015) examined the differential effects of trade on economic growth and investment based on cross-country data from 1991 to 2011 and a sample of 85 countries (developed, developing and least developing countries) coupled with standard growth regression. He found out that trade is largely consistent with the positive impact on economic growth though in LDCs, especially those in Africa, the results become insignificant. Contributing to positivity, Kim (2011) used instrumental variable threshold regressions while investigating whether trade contributes to the welfare of an individual in the long-run or not. Nevertheless, he concluded that trade openness has a strong positive effect on growth, especially for developing countries. Also, Jouini (2015) observed positive results while analysing the link between economic growth and openness to international trade, between 1980 to 2010.

On the contrary, other studies have shown a negative relationship between trade and economic growth. Musila and Yiheyis (2015) investigated the impact of trade openness on economic growth in Kenya from 1982 to 2009 using OLS regression on estimates. The study found that the aggregate trade openness negatively impacts economic growth. Zahonogo (2016) examined the relationship between trade and economic growth in 42 countries within Sub-Saharan Africa (SSA) from 1980 to 2012. The study employed a pooled mean group estimation technique and concluded that trade openness and economic growth do not move together in SSA. Trejos and Barboza (2015) wrote a paper in regard to the dynamic estimation of the relationship between trade openness and output growth in Asia, from 1950 to 2010. Coupled with a sample size of 23 Asian countries and using both a static OLS and a dynamic ECM estimation model, the paper concluded that Asia's economic-growth miracle is inversely proportional to trade openness. Eriș and Ulașan (2013) using a Bayesian Model averaged the estimate of cross-country growth regressions from 1960 to 2000, and found no evidence that trade openness is directly correlated with economic growth in the long-run. Further, Ulaşan (2015) came up with negative results while investigating the correlation between trade openness and economic growth.

METHODOLOGY, ANALYSIS AND FINDINGS

Data and Variables

To analyse trade and economic growth in Tanzania, six variables and time series data for the period between 1970 and 2016 from the UNCTAD database were employed. As far as empirical analysis of the data was concerned, the following model was created and expressed in log form:

$$lnGDP_t = \alpha + \beta_1 lnEXP_t + \beta_2 lnIMP_t + \beta_3 lnPOP_t + \beta_4 lnFDI_t + \beta_5 lnEXR_t + \varepsilon_t \text{...................(1)}$$

Whereby, economic growth (GDP) is represented by GDP total expressed in US dollars at constant prices in millions. EXP stands for exports while IMP stands for imports and both are measured in US dollars at current price, in millions. POP is the average growth in population, while FDI is the inward flow of foreign direct investment expressed in US dollars at current price in millions. Lastly EXR is the exchange rate, α is the intercept, β_1 to β_5 are the coefficients of the respective variables, while ε_t is the random error term.

Descriptive Data Analysis

The descriptive statistics in Table 1 exhibits the presence of low standard deviation for all variables in this article. This signifies that most of the numbers in these variables are very close to the mean. It also appears that three variables - lnGDP, lnEXP and lnIMP - are right-skewed, while lnPOP, lnFDI and lnEXR are negatively skewed. Observing the Kurtosis of the data, the analysis exhibits that all variables are platykurtic (short-tailed) except for lnPOP and lnFDI which are leptokurtic (long-tailed). A Jarque-Bera test of normality shows that the residuals of lnGDP, lnIMP and lnFDI are normally distributed, while the remaining three variables are not normally distributed. Also, the correlation coefficients show that some of the selected variables are positively correlated and some are negatively correlated with each other. Nevertheless, some are highly correlated and others are weakly correlated. For example, lnGDP is positive and strongly correlated with all variables except for lnPOP which is negatively correlated. The details are provided in Table 1.

Table 1: Statistical Analysis of Selected Variables

	lnGDP	lnEXP	lnIMP	lnPOP	lnFDI	lnEXR
Mean	9.563674	6.670292	7.470440	1.116504	3.657141	4.990557
Median	9.460340	6.252624	7.281083	1.136610	2.995732	6.004563
Maximum	10.76724	8.621054	9.400256	1.217828	7.643627	7.685744
Minimum	8.705012	5.507257	5.763183	0.935356	-4.605170	1.948817
Std. Dev.	0.598603	0.986773	1.002667	0.066631	3.047306	2.225127
Skewness	0.481105	0.813783	0.629626	-1.346781	-0.654901	-0.341818
Kurtosis	2.009635	2.258488	2.431633	4.194852	3.178447	1.375556
Jarque-Bera	3.733897	6.264343	3.737985	17.00410	3.422038	6.082931
Probability	0.154595	0.043623	0.154279	0.000203	0.180682	0.047765
Correlation						
lnGDP	1.000000					
lnEXP	0.944868	1.000000				
lnIMP	0.963065	0.957590	1.000000			
lnPOP	-0.183100	-0.053877	-0.014208	1.000000		
lnFDI	0.796519	0.814960	0.728093	-0.373173	1.000000	
lnEXR	0.906589	0.752270	0.809163	-0.354820	0.705014	1.000000

Source: Author's own computation

VAR Lag Order Selection Criteria

The lag length was chosen based on VAR Lag Order Selection Criteria method where lag length n was selected. All five (5) lag selection criteria confirmed the selection of the lag length of 1 as shown in Table 2. It should be noted that the lag order is chosen to avoid autocorrelation in the residual.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-16.63450	NA	1.80e-06	0.961533	1.162273	1.036367
1	410.1153	132.3015*	1.01e-13*	-15.78290*	-13.57476*	-14.95973*
2	322.5629	587.9421	1.56e-12	-13.00279	-11.79835	-12.55379

* lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Estimation and Testing Procedures

This sub-section discusses all relevant methods employed in this study. These methods or testing procedures include unit root tests and ARDL approach (bounds test) to cointegration developed by Pesaran *et al*. (2001), with the condition of the regression being purely I(0), purely I(1), or mutually co-integrated. A general to specific method is employed only to determine long-run effects.

Unit root test

This article employs the Augmented Dickey-Fuller (ADF) unit root testing procedure (Dickey & Fuller, 1979) and the Phillips Peron (PP) test (Phillips & Perron, 1988) to test the stationarity of the series for each variable. This is the first step in examining the time series properties of the data by looking at the patterns and trend. For both ADF and PP tests, the interest lies in determining the size of the coefficient β as observed in equation (2 & 3).

$$\Delta Y_t = \alpha + \beta K_{t-1} + \sum_{j=1}^{n} \delta_i \Delta K_{t-1} + \mu_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

The standard Dickey-Fuller Model has been augmented by ΔK_{t-i}, where Y_t represents a linear time trend, Δ is the first difference operator, while β, δ and μ are parameters to be estimated. Based on VAR Lag Order Selection Criteria method, the lag length 1 was chosen to avoid autocorrelation in the residual as shown in Table 2. The reason of using the PP test lies on its advantages of correcting for serial correlation and heteroskedasticity in error terms, as the test is applied without including number of lags (Enders, 2015). Therefore, the equations and hypothesis to be tested are similar to those of ADF; the only difference is that the PP test ignores a number of lags and takes the following form:

$$\Delta Y_t = \alpha + \beta K_{t-1} + \mu_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

Results for the unit root

The ADF and PP test results in Table 3 indicate that the lnGDP variable whose null hypothesis of the presence of unit root at level, was rejected indicating that lnGDP is stationary at 1% level of significance. The remaining variables become stationary at first difference. Backed up with these results, no other method of co-integration was upheld rather than engulfing the ARDL approach which fulfils the basic two requirements. First, the approach does not require all the variables to be integrated in the same order (Pesaran & Pesaran, 1997). Second, the approach requires that no variables should be integrated into order two I(2) (Ouattara, 2004). Therefore, the ARDL Model suffices for this article. Pesaran *et al*. (2001) concluded that the applicability of ARDL is possible only if some variables are purely I(0) and purely I(1) or mutually integrated. Against this background, the ARDL Model of co-integration is legitimately employed.

Table 3: Results for Unit Root Tests

	Intercept (t)	Trend and intercept (t)	Intercept (t)	Trend and intercept (t)
Variables	Augmented Dickey-Fuller (ADF) test			
	At levels		At first difference	
lnGDP	-2.397336	-5.698388***	-8.704786***	-8.734846***
lnEXP	1.522989	-0.485072	-6.039820***	-6.750824***
lnIMP	0.324183	-1.163867	-4.738450***	-4.768295***
lnPOP	-2.361489	-2.382887	-2.977786	-4.008856***
lnFDI	2.160272	1.423978	-12.25043***	-4.720551***
lnEXR	4.526530	-0.209088	-3.767118***	-5.309890***
	Phillips Perron (PP) test			
lnGDP	-3.478537**	-4.647726***	-13.43961***	-14.78003***

lnEXP	1.533738	-0.488681	-6.039820***	-6.754633***
lnIMP	-0.072145	-1.380615	-4.874390***	-4.835002***
lnPOP	-2.105487	-2.130879	-2.656874	-4.175640***
lnFDI	-0.753243	-2.689200	-12.40846***	-13.28669***
lnEXR	4.237014	0.489438	-3.775112***	-5.243159***

Source: Author's own computation

Note: MacKinnon's (1996) critical values used in the rejection of the null hypothesis of the unit root, where ***, ** and * represent 1%, 5% and 10% respectively

Diagnostic Stability Test

It is crucial to perform an appropriate model diagnostic test before embarking on further econometric analysis. The diagnostic checks performed in this analysis passed four major tests: serial correlation, heteroskedasticity, normality, recursive residuals and the CUSUMSQ (cumulative sum of recursive residuals of square). These tests were suggested by Pesaran and Pesaran (1997). This allows one to explore whether the assumptions of the regression model are valid and will assist in deciding whether the subsequent inference results can be trusted.

Table 4: Results of the Diagnostic Test

	Test statistic	Prob	Remarks
Breusch-Godfrey serial correlation LM test	0.925866	0.4054	Do not reject H_0
Heteroskedasticity test: Breusch-Pagan-Godfrey	0.596425	0.7312	Do not reject H_0
Normality (Jarque-Bera test)	0.044442	0.1323	Do not reject H_0

Source: Author's own computation.

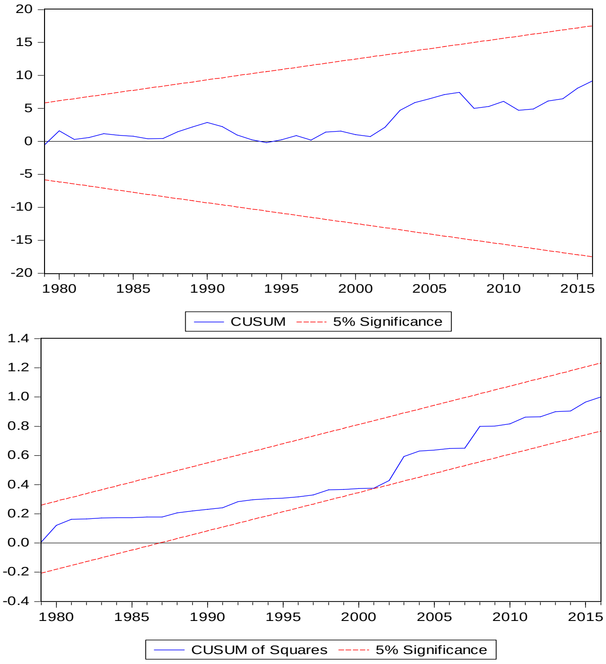

Figure 2: Plot of Cumulative Sum and Squares of Recursive Residuals

Much of the evidence from the diagnostic test results presented in Table 4 shows that there is no indication of heteroskedasticity and misspecification in the model. Using the Breusch-Pagan-Godfrey test the hypothesis of the presence of heteroskedasticity is rejected. Since the Jarque-Bera statistics and its corresponding probability is more than 0.05, this confirms that the residuals are normally distributed. Also, the model is free from serial correlation, as confirmed by Breusch-Godfrey serial correlation LM test. Nevertheless, the presence of the cumulative sum inside two critical lines at 5% significant level, as reflected in Figure 2, signifies the stability of the model. This gives the go-ahead for further analysis.

Co-integration Testing Using ARDL Approach

The ARDL Model (the bound test) for co-integration is employed in order to test the relationship between variables. Using the dynamic model (eqn 4), the ordinary least square (OLS) method on estimation is used and the results are presented in Table 5.

$$\Delta \ln GDP_t = \mu + \lambda \ln GDP_{t-1} + \delta_1 \ln EXP_{t-1} + \delta_2 \ln IMP_{t-1} + \delta_3 \ln POP_{t-1} + \delta_4 \ln FDI_{t-1}$$
$$+\delta_5 \ln EXR_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \ln GDP_{t-i} + \sum_{i=0}^{p} \beta_{1i} \Delta \ln EXP_{t-i} + \sum_{i=0}^{p} \beta_{2i} \Delta \ln IMP_{t-i} + \sum_{i=0}^{P} \beta_{3i} \Delta \ln POP_{t-i}$$
$$+\sum_{i=0}^{p} \beta_{4i} \Delta \ln FDI_{t-i} + \sum_{i=0}^{P} \beta_{5i} \Delta \ln EXR_{t-i} + \varepsilon_i \text{...} (4)$$

Whereby, δ_1 to δ_5 correspond to the long-run relationship, while β_1 to β_5 correspond to short-run dynamics of the model; whilst subscripts $_t$ and $_{t-i}$ represent time periods. The re-parameterised results are presented in Table 5.

Table 5: Re-parameterised Results - ΔlnGDP$_t$

Method: LS, Sample (adjusted): 1972 - 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.201929	6.943164	0.317136	0.7532
lnGDP$_{t-1}$	-0.901149	0.232025	-3.883847	0.0005
lnEXP$_{t-1}$	0.000266	0.001906	0.139615	0.8898
lnIMP$_{t-1}$	2.476175	0.941856	2.629037	0.0128
lnPOP$_{t-1}$	0.356005	2.322405	0.153292	0.8791
lnFDI$_{t-1}$	0.516092	0.141806	3.639421	0.0009
lnEXR$_{t-1}$	0.004289	0.001208	3.551875	0.0010
ΔlnGDP$_{t-1}$	0.094115	0.182819	0.514798	0.6102
ΔlnEXP$_{t-1}$	0.000793	0.001834	0.432155	0.6685
ΔlnIMP$_{t-1}$	-1.12E-05	0.000631	-0.017731	0.9860
ΔlnPOP$_{t-1}$	4.987235	4.671759	1.067528	0.2937
ΔlnFDI$_{t-1}$	1.137751	0.461086	2.467545	0.0188
ΔlnEXR$_{t-1}$	-0.048389	0.023614	-2.049185	0.0482

R-squared	0.739030	Mean dependent var	0.061930
Adjusted R-squared	0.228667	S.D. dependent var	2.203841
S.E. of regression	1.935536	Akaike info criterion	4.395497
Sum squared resid	119.8816	Schwarz criterion	4.917422
Log-likelihood	-85.89868	Hannan-Quinn criter.	4.590065
F-statistic	2.087006	Durbin-Watson stat	1.921641
Prob(F-statistic)	0.048100		

From the re-parameterised results presented in Table 5, the general to specific technique to drop or maintain some variables is applied. Studies by Katrakilidis and Trachanas (2012) and Fousekis *et al.* (2016) also used this technique on econometric analysis. Nevertheless, the decision to maintain or drop some variables lies on the decision made by t-statistics, whereby the bigger the value of the t-statistic the better the model and vice versa. Therefore, for the variables to be maintained and their corresponding t-statistics have to be greater than 1.96, otherwise, the variables have to be dropped. Applying the stipulated method, four differenced variables of lnGDP, lnEXP, lnIMP and lnPOP have to be dropped because the corresponding t-statistic was found to be less than 1.96. A reduce model in equation (5) was also run to come up with the reduced results which are presented in Table 6. These results are to be subjected to further econometric analysis.

$$\Delta \ln GDP_t = \mu + \lambda \ln GDP_{t-1} + \delta_1 \ln EXP_{t-1} + \delta_2 \ln IMP_{t-1} + \delta_3 \ln POP_{t-1} + \delta_4 \ln FDI_{t-1}$$
$$+\delta_5 \ln EXR_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta \ln GDP_{t-i} + \sum_{i=1}^{p} \beta_4 \Delta \ln FDI_{t-1} + \sum_{i=1}^{P} \beta_5 \Delta \ln EXR_{t-1} + \varepsilon_i \text{.........................} (5)$$

Table 6: Reduced Results - $\Delta \ln GDP_t$

Method: LS, Sample (adjusted): 1971 - 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.201929	6.943164	0.317136	0.7532
$\ln GDP_{t-1}$	-0.343617	0.103535	-3.318839	0.0022
$\ln EXP_{t-1}$	0.009773	0.004445	2.198681	0.0348
$\ln IMP_{t-1}$	0.356005	2.322405	0.153292	0.8791
$\ln POP_{t-1}$	0.417682	0.150215	2.780551	0.0088
$\ln FDI_{t-1}$	0.339438	0.150890	2.249577	0.0311
$\ln EXR_{t-1}$	0.020269	0.008793	2.305189	0.0266
$\Delta \ln FDI_{t-1}$	0.435840	0.137650	3.166283	0.0030
$\Delta \ln EXR_{t-1}$	-1.567204	0.589363	-2.659147	0.0119

R-squared	0.685305	Mean dependent var	4.605164
Adjusted R-squared	0.388878	S.D. dependent var	2.323495
S.E. of regression	1.816376	Akaike info criterion	4.150307
Sum squared resid	135.2681	Schwarz criterion	4.386496
Log-likelihood	-91.53221	Hannan-Quinn criter.	4.239187
F-statistic	6.854284	Durbin-Watson stat	1.909584
Prob (F-statistic)	0.000099		

From the reduced results presented in Table 6, the long-run relationship can be computed using the Wald Test (the F-test). Therefore, the lower and upper bound values are employed basing on 1% significance level for the unrestricted intercept and no trend in the model as proposed by Pesaran *et al*., (2001). To accept the long-run relationship between variables, the computed value of F-statistics has to be greater than that of the upper bound value; this will enable the rejection of the null hypothesis and accept the alternative hypothesis. If the computed F-statistic falls below the lower value, then it means that there is no co-integration between variables. But if the computed value of F-statistic falls between two bounds, the results are inconclusive and a different technique of co-integration has to be applied (Ghildiyal *et al*., 2015). Below are the hypotheses used to assist to arrive at a decision:

$H_0: \lambda = \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ (the long-run relationship does not exist)
$H_1: \lambda \neq \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ (the long-run relationship does exist)

Table 7: ARDL Long-run Relationships (bounds F-test)

	F- Statistic (computed)		*Probability*		*Remarks*	
Bounds test	*5.8639*		*0.0022*		Reject H_o	
Critical value bounds	1%		5%		10%	
	I(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)
Pesaran *et al*. (2001, p. 300), Table CI(iii) Case III	3.41	4.68	2.62	3.79	2.26	3.35

Source: Author's own computation

The analysis of the ARDL bounds testing approach to co-integration results presented in Table 7 shows that the calculated F-statistic (5.8639) is greater than that of Pesaran *et al*. (2001) at 1%, 5% and 10% levels of significance. This indicates that all variables are co-integrated in the case of Tanzania, from 1970 to 2016. In other words, all variables move together in the long-run.

$$\delta_{\ln EXP}; -\frac{\delta_1}{\lambda} = 0, \delta_{\ln IMP}; -\frac{\delta_2}{\lambda} = 0, \delta_{\ln POP}; -\frac{\delta_3}{\lambda} = 0, \delta_{\ln FDI}; -\frac{\delta_4}{\lambda} = 0, \delta_{\ln EXR}; -\frac{\delta_5}{\lambda} = 0$$

Using the reduced results, long-run coefficients are calculated and this is ultimately useful in the determination of long-run effects. The notation above is used to compute F-statistic and its corresponding p-values, as shown in Table 8.

Table 8: Estimated Results for Long-run Coefficients

Regressor	Long-run coefficients	F-statistic	P-value
$lnEXP_{t-1}$	0.0284	18.244	0.0000***
$lnIMP_{t-1}$	1.0360	3.0079	0.0046***
$lnPOP_{t-1}$	1.2155	1.8241	0.0760
$lnFDI_{t-1}$	0.9878	3.5666	0.0010***
$lnEXR_{t-1}$	0.0589	4.0196	0.0003***

Source: Author's own computation

Note: *, **, *** denote significant level at 10%, 5% and 1%, respectively

DISCUSSION OF EMPIRICAL FINDINGS

This article has analysed the relationships between trade (exports and imports) and economic growth in Tanzania. It has also included foreign direct investment, population growth and exchange rates as explanatory variables. Based on the empirical findings of the study and the results presented in Table 6, a positive contribution of almost all variables to economic growth in Tanzania is observed at 1% significant level; albeit, population growth happens to be insignificant. Nevertheless, the long-run results for trade indicate that an increase of one million US dollars of exports and imports will proportionately increase the total GDP of the country by 0.02% and 103.6%, respectively. Though the percentage increase of imports is so higher than that of exports, this is not a favourable situation as trade deficit is bound to rise. These findings are consistent with theoretical and empirical literature which suggests that for most developing countries, Tanzania included, the level of economic performance is positively affected by increase in trade. In addition, the empirical findings of this study coincide with those of Chang *et al.* (2009), Lin (2000), and Were (2015) who hold that trade has a positive impact on economic growth.

The empirical findings also suggest that FDI inflows exert a positive influence on economic growth in the long-run. That is an increase of one million US dollars of FDI will proportionately increase the GDP total of the country by 98.78%. These findings also coincide with the findings of De Mello (1997), Alfaro *et al*. (2004), Gui-Diby (2014) and Hong (2014) who observed that there was positive contribution to economic growth against FDI flows. However, Agbloyor *et al*. (2014) found there was negative association between FDI and economic growth in 14 African countries. Further, looking at the empirical results of the exchange rate, it is the case that any increased rates will positively influence the economic growth by 5.89%. These results are more less the same as those of MacDonald (2000) and Korkmaz (2013), both of whom concluded that the exchange rate is likely to arouse economic growth in European countries. Also, the findings of this study reveal a positive contribution of population growth on economic growth, though its long-run coefficient is not significant; consequently, it has no impact on economic growth in Tanzania.

CONCLUSION AND POLICY RECOMMENDATIONS

The study analysed the subject of trade and economic growth to find the kind of relationships that exist between these two aspects. Despite the fact that this subject is not new in the world of economics as the subject has been tackled by many authors, in Tanzania, it is still a subject that needs a lot of attention. It is from this background that this study set to investigate the question of trade and economic growth, and come with appropriate recommendations to policy makers. Nonetheless, the article employs the general-to-specific technique only to come up with long-run effects. Much of the evidence from the econometric analysis shows that exports and imports are directly correlated with economic growth in the long-run. Further assessment of the individual variables of foreign direct investment, exchange rates and population is as well directly related to economic growth; however, the latter is not significant. The latter part leads to a conclusion that population growth has no significant impact on economic growth in Tanzania. In as much as the contribution of imports to economic growth is higher than that of exports, this makes an alarming call to policy makers to check the import-export policy measures for the realisation of the full potential of trade on economic growth. This article therefore, recommends that policy makers should pay more attention to export promotion policy and import measures that will allow the importation of raw materials for the products to be exported; in doing so, trade deficit will be minimised.

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