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IMPACTS OF LOWER EXCHANGE RATES ON EXPORTS, IMPORTS AND NATIONAL OUTPUT OF TANZANIA

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Abstract. *This paper investigates empirically the long-run and short-run impacts of lower exchange rates on exports, imports and national output of Tanzania for annual recorded period dating from 1990 to 2011. The estimates of the cointegrating equations are obtained using the Vector Error Correction models which allow restrictions to be included to isolate the short run and long run behaviours of the selected variables. The major results shows that lower value of the currency (annual official exchange rate), has led to the increase in exports in the long run while imports have been declining overtime. Also this paper notice that in the long-run, other things being equal, the national output is increasing due to the devalued exchange rate in Tanzania which has lasted for more than twenty years. We follow all time series econometric procedures to measure the stability and robustness of our results and all discussion and conclusions are based on the results obtained from the specified VECM models.*

Key Words: *Exchange rate, Devaluation, Exports, Imports, VECM, Cointegration, Error Correction Model, Tanzania*

JEL Classification: *O24, F3, F31*

Introduction

The structural adjustment policies undertaken in least developing countries in the mid-1980s to early 1990s have had mixed outcomes. Some developing countries such as those in the Eastern Asia have experienced growth in the long-run while in some other LDCs, especially in the sub-Sahara region, the growth and the expected outcome have been quiet disappointing. There are many reasons that have been listed as the causes of poor economic growth and development in SSA including poor planning, corruption, small market share in the world market, poor technology and poor implementation of the suggested implementation. Therefore, the causes for poor performances of the SSA economies ranges from political reasons, social and economic reasons. One key aspect of the structural adjustment policies is the devaluation of the exchange rates (Value of the local currencies against leading currencies) so as to make local products more competitive in the world market. Therefore, theoretically, lower exchange rate makes exports cheaper and imports expensive hence reducing trade deficit, encouraging foreign investments and promoting employment and revenues in the long-run. Other aspects of the structural adjustment programme included reforming trade policies, adopting free market policies that would reduce monopolies and inefficiencies in the market.

Throughout the past two decades, studies such as Nyamrunda (2012) have noticed strong convergences between lower exchange rate, FDI and national output. Despite the fact that convergences have been slower throughout the SSA region, the role of lower exchange rate on promoting long run growth cannot be ignored. Therefore, overall the effects of devaluation and

lower exchange rates on trade and investment flow have been one of the highly researched areas for the past thirty years. This debate on what is the exact exchange rate that is suitable for a particular economy has grown both in academics and policy forums. One of the most interesting points being raised is the role of external (world market) forces on the values of the exchange rates in least developing economies. Some economist argues that the value of the local currency should be left free to compete in the world market (externally determined) while some argues that the values of the currency should always be determined internally to reflect the existing needs of the economy. It is worth to note that, however, both internal and external factors that determine the value of a local currency have a significant explanatory power in any economy. Therefore, factors such as current inflation rates (price levels), stability of the oil prices, money supply (M4), foreign reserves, demand and supply of goods and services, balance of trade and the status of the government budget are among the key determinants of the exchange rate of any economy.

In this paper, given the brief history on why the exchange rate was devalued in the late 1980s and continues to depreciate since then, we examine the role of the exchange rate on trade balance (exports and imports) over years. The aim is to estimate the short run and long run impacts of allowing an exchange rate to remain lower for more than two decades. As will be specified later, time series statistical procedures that allow imposing restrictions that isolates short run and long-run responses are more preferred by this paper. In the analysis, we carefully highlight the impacts of volatilities of the exchange rates on the volume of exports over time. That also means, autoregressive models are optimised to measure the long run impacts of higher/lower volatilities of the exchange rates in a developing economy (which has limited productive sectors) both in the short run and in the Long-run.

Empirical Model

To identify the long run and short run romantics between exchange rates, exports and imports, we introduce the following autoregressive model (1) with an optimal amount of lags. Through this process, the cointegration tests are easily carries out using the Dickey Fuller test and the Johansen's Trade test with the data which covers from 1990 to 2011. It is worth we insist that the aim is to examine whether (ΔX) adjusted seasonally (overtime) with its lags and other variables and their lags in the equation (imports and exchange rates). Granger, (1988), simply defined cointegration as causation and therefore through this process, we expect to estimate results that portray which one causes shocks to the other over a period of time.

$$\Delta X_t = \alpha + \beta_1 X_{t-1} + \beta_2 X_{t-n} + \beta_3 M_t + \beta_4 M_{t-1} + \beta_5 M_{t-n} + \beta_6 ER_t + \beta_7 ER_{t-1} + \beta_8 ER_{t-n} + \varepsilon \quad (1)$$

After some experimentation especially on the stochastic trend of the variables in (1), we employ a vector error correction model which is a restricted VAR for non-stationary series that are known to be cointegrated. Basically, the VEC procedure includes cointegrating equations that are included in (1) so as to isolate the short run and long run behaviours of the endogenous variables. Therefore, the error correction term is the cointegration term because the long run deviation from the point of equilibrium is corrected gradually after some adjustments in the short run. Below is an illustration on how the cointegrating parameters are captured whereby; first we consider the following cointegrating traditional model which has two variables in the system with one equation that is adjusting equally and no lagged difference variables.

$$y_{2,t} = \phi y_{1,t} \quad (2)$$

Whereby the corresponding VECM can now be written as follows;

$$\Delta y_{1,t} = \alpha_1 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \varepsilon_{1,t} \quad (3)$$

$$\Delta y_{2,t} = \alpha_2 \left(y_{2,t-1} - \beta y_{1,t-1} \right) + \varepsilon_{2,t} \quad (4)$$

The coefficient α_1 is intended to measure the speed of adjustment of the i^{th} endogenous variable towards the long run equilibrium. Therefore α_1, α_2 and β are positive parameters while ε_1 and ε_2 are white noise disturbances. Then, the right hand side $\left(y_{2,t-1} - \beta y_{1,t-1} \right)$ is the Error Correction term whereby in the Long-run this term is equal to zero. That also implies in the long-term, the right hand side is constant and the first different is equal to zero. However, if the endogenous variables (y_1 and y_2) are not equally converging towards equilibrium then the right hand side of model (3) and (4) cannot be equal to zero. Therefore, from equation (1), our error correction equations will be expressed as follows

$$\Delta X_t = \alpha_1 (X_{t-1} - M_{t-1} - \beta ER_{t-1}) + \varepsilon_{1t} \quad (5)$$
$$\Delta M_t = \alpha_2 (X_{t-1} - M_{t-1} - \beta ER_{t-1}) + \varepsilon_{2t} \quad (6)$$
$$\Delta ER_t = \alpha_3 (X_{t-1} - M_{t-1} - \beta ER_{t-1}) + \varepsilon_{3t} \quad (7)$$

Then, if $(X_{t-1} - M_{t-1} - \beta ER_{t-1}) \rangle 0$ it indicates the deviations are positive and thus the value of the exchange rate would decline and the level of exports X will increase while imports $(-M)$ will fall other factors being equal. The Long run Equilibrium will be achieved at $\beta ER_{t-1} = X_{t-1} - M_{t-1}$. That also means, at equilibrium point, the three variables βER_{t-1}, X_{t-1} and M_{t-1} are changing only in response to shocks of the noise disturbances ε_{1t}, ε_{2t} and ε_{3t}. In addition, if α_3 is large then exports X and imports M indicates to be strongly responding to the exchange rate previous period's deviation from long run equilibrium. On the other hand if α_3 is smaller, then it indicates that exports X and imports M do not respond to previous years deviations from the long-run equilibrium point. Also if α_1 and α_2 are equals to zero $(\alpha_1 + \alpha_2 = 0)$ then exchange rates changes in response to ε_{1t} and ε_{2t} meaning that X and M changes to eliminate any deviation from the long run equilibrium. Finally if α_1, α_1 and α_3 it means there is no long-run equilibrium relationship between exchange rates, and thus the VEC and cointegration equations cannot be used for these variables. Therefore the crucial point to note is that VEC equations, initially portrayed by models (3) and (4), required the variables to be cointegrating with the cointegrating vector $(1-\beta)$ which also implies $X_{t-1} - M_{t-1} - \beta ER_{t-1}$ must be stationary. To gain more information, we also include the national output (GDP) in the process so as to capture the final impact of lower exchange rates both in the short run and in the long run.

Data and Data sources

The data used by this analysis are gathered from databases of the World Bank as they were found to be more consistent and accurate as compared to other sources. Therefore, the annually recorded data sets on imports of goods and services (constant LCU), exports of goods and services (constant LCU), Official exchange rate (LCU per US$, period average) and GDP (constant 2000 US$) are used in the VECM process specified from equations (1) to equation (7). First, we measure the unit root status of our data set whereby the unreported results indicated that all our variables are none stationary at level data rather at first and second difference. The unreported results of the stochastic

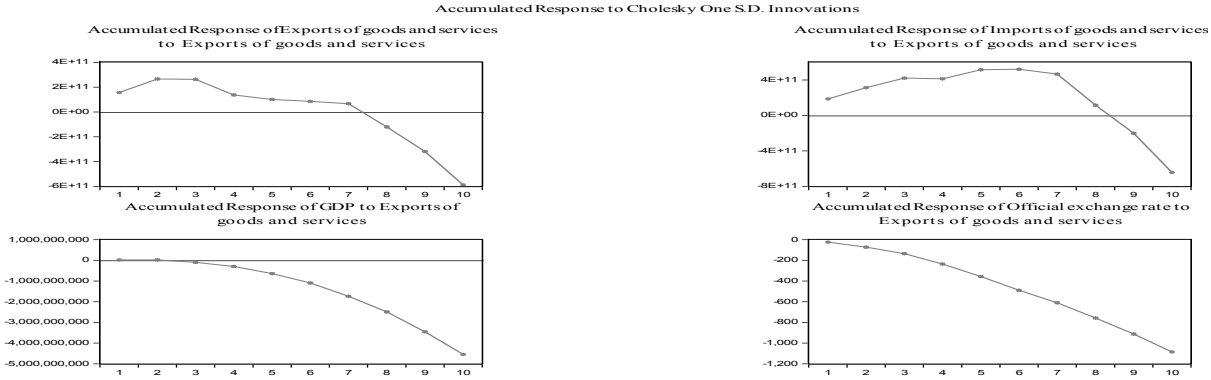
trend were measured by using the Augmented Dickey Fuller test. Following the results from the stationary test, we were satisfied that VECM is appropriate for our dataset since the traditional OLS estimations would produce misleading results due to the existence of a unit root. The lag length used by the VECM is selected by measuring the goodness of fit of the dataset by using the Akaike Information Criteria and Schwarz selection Criteria. Due to unavailability of historical data for the previous years, the available information dates from 1990 to 2011.

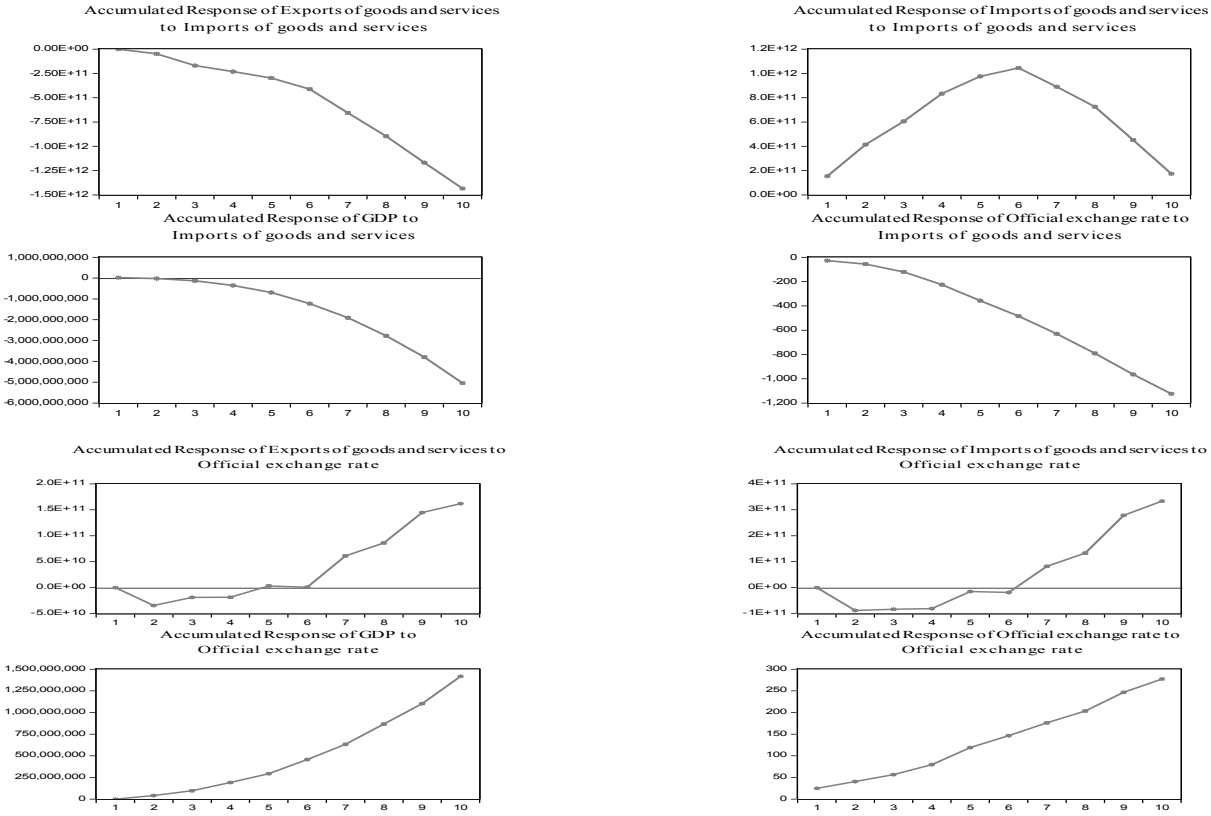
Since we focus in particular on the Tanzania economy, it was necessary (at descriptive level) to investigate the impacts of different policy reforms that took place in the early 1990s which were aimed at allowing the market to determine the levels of the macro-variables. At that level, it was difficult to identify the actual impacts of these reforms despite the fact that there have been some outcomes on indicators such as FDI flows and total national outputs. It is important we point out that; the official exchange rate of Tanzania (like in any developing country) is highly integrated to the world market. And thus, the fluctuations of the exchange rate in this type of an economy are highly explained by the status of the world market. For instance we found out that Tanzania shilling (the exchange rate) has had a negative response to the previous world economic crises implying that negative shocks in the world market leads to a decline of the value of the local currency, other things being equal.

Empirical results and Discussion

Our results indicates that the Tanzania shilling exchange rate, which has been lower ever since the implementation of the structural adjustment policies began, have had lower long run impacts on both volume of export and imports of goods and services. Our results are based on both impulse response functions, variance decomposition and the time series simulate through the VECM equations. On the other hand, the value of the exchange rate has had some positive impacts on the total national output. In other word, lowering exchange rate leads to a long-run increase in the value of GDP. The two cointegrating equations estimated by the VECM process also indicate that the four selected variables have a long-run equilibrium relationship and thus they are converging towards equilibrium as time passes by. The responses of each variable to a shock in another variable are also very interesting and they help to isolate the short run and long run.

Figure 1: Accumulated Impulse Responses





On the other hand, the response of exports of goods and services to a shock in the official exchange rate is also negatively declining in the short run but starts to pick-up quickly and continues to grow in the long run. That suggests that, in the long-run, export increases as the currency value continue to decline. Lower exchange rate encourages exports of goods and services. Furthermore, the impulse responses indicates exports of goods and services respond negatively (decline) as a reaction to any shock that may cause imports to increase. On the other hand, imports increase in the short-run but then decline in the long-run as a response to a shock in the exports of goods and services.

Table1: Vector Error Correction Estimates

	Vector Error Correction Estimates			
Error Correction:	D(Exports)	D(Imports)	D(GDP)	D(Exchange rate)
CointEq1	-1.265 (-1.051) [-1.204]	0.000 (0.000) NA	0.001 (-0.001) [0.321]	-0.000 (0.000) [-4.759]
CointEq2	-3.969 (-3.267) [-1.215]	-0.24341 (-0.154) [-1.579]	0.0006 (-0.002) [0.387]	(0.000) (0.000) [-4.795]
D(Exports (-1))	0.762 (-0.425) [1.790]	-0.231 (-0.668) [-0.346]	0.0006 (-0.000) [1.873]	0.000 (0.000) [1.367]
D(Exports (-2))	-0.349 (-0.698) [-0.500]	0.009 (-1.097) [0.008]	-0.0002 (-0.000) [-0.881]	0.000 (0.000) [2.578]
D(Imports (-1))	0.108 (-0.477) [0.227]	0.607 (-0.749) [0.811]	-0.00017 (-0.000) [-1.102]	0.000 (0.000) [2.226]
D(Imports (-2))	0.554 (-0.234)	0.403 (-0.367)	-0.000 (0.000)	0.000 (0.000)

	Vector Error Correction Estimates			
Error Correction:	D(Exports)	D(Imports)	D(GDP)	D(Exchange rate)
	[2.369]	[1.098]	[-2.172]	[-0.494]
D(GDP(-1))	-906.39 (-1345.61) [-0.674]	415.098 (-2112.81) [0.196]	0.161 (-0.434) [0.371]	0.000 (0.000) [-1.354]
D(GDP(-2))	-794.502 (-882.81) [-0.899]	-292.419 (-1386.15) [-0.211]	0.308 (-0.285) [1.083]	0.000 (0.000) [-1.623]
D(Exch.rate(-1))	-1.44E+09 -1.70E+09 [-0.825]	-1.85E+09 -2.70E+09 [-0.673]	909959.1 -564561 [1.612]	-0.32812 -0.48862 [-0.672]
D(Exch.rate(-2))	3.36E+08 (-1.50E+09) [0.223]	5.75E+08 (-2.40E+09) [0.243]	171056.4 (-485807) [0.352]	-0.04737 (-0.42046) [-0.113]
C	1.05E+12 (-9.80E+11) [1.075]	3.34E+10 (-1.50E+12) [0.022]	4.37E+08 (-3.20E+08) [1.386]	468.1594 (-272.813) [1.716]
R-squared	0.69	0.72	0.79	0.65
Cointegrating Equations:	CointEq1	CointEq2		
Exports (-1)	1	-0.24061		
Imports (-1)	-2.99145	1.040463		
GDP (-1)	1134.069	-437.468		
Official exchange rate(-1)	-2.83E+10	9.05E+09		
C	1.77E+13	-5.14E+12		
Standard Errors in ( ) and t-statistics in []				

For the case GDP, the unreported results indicated that GDP responds positively to shock in imports, exports and the official exchange rate both in short-run and in the long-run. In general the impulse responses have produced results that are good compliment to the results computed by the VECM models and that also means that our results are robust and can be used for policy analysis.

Table 2: Variance Decomposition

	Variance Decomposition of Exports of goods and services				
Period	S.E.	Exports	Imports	GDP	Off. Exchange rate
1	159000000000	100.000	0.000	0.000	0.000
2	266000000000	97.790	0.099	0.053	2.059
3	338000000000	96.178	0.087	1.177	2.558
4	423000000000	81.967	11.785	0.755	5.492
5	680000000000	70.431	24.370	0.854	4.344
6	1260000000000	68.911	26.469	1.284	3.335
7	2340000000000	72.179	24.384	0.842	2.595
8	4270000000000	70.539	25.879	0.674	2.908
9	7870000000000	68.919	27.412	0.650	3.020
10	14700000000000	67.477	28.690	0.743	3.090
	Variance Decomposition of Imports of goods and services				
Period	S.E.	Exports	Imports	GDP	Off. Exchange rate
1	250000000000	64.664	35.336	0.000	0.000
2	548000000000	52.647	42.266	1.785	3.302
3	989000000000	61.040	34.995	1.768	2.197
4	1740000000000	61.150	34.712	1.709	2.429
5	3170000000000	64.865	31.676	1.178	2.281
6	5830000000000	65.555	30.661	1.051	2.734
7	10800000000000	66.942	29.403	0.888	2.768
8	20100000000000	66.821	29.413	0.847	2.920
9	37700000000000	67.050	29.224	0.805	2.921
10	70800000000000	67.023	29.211	0.803	2.963

Variance Decomposition of GDP					
Period	S.E.	Exports	Imports	GDP	Off. Exchange rate
1	51396926	8.579	23.149	68.272	0.000
2	77267494	7.395	21.039	39.449	32.117
3	170000000	49.992	26.619	8.617	14.772
4	452000000	59.217	31.760	1.550	7.473
5	1050000000	67.538	28.047	0.485	3.930
6	2200000000	66.768	28.984	0.533	3.714
7	4360000000	67.572	28.579	0.572	3.278
8	8420000000	66.961	29.132	0.687	3.220
9	16100000000	67.157	29.060	0.721	3.062
10	30600000000	67.077	29.128	0.759	3.036
Variance Decomposition of Official exchange rate					
Period	S.E.	Exports	Imports	GDP	Off. Exchange rate
1	44	24.695	36.703	8.046	30.556
2	95	63.461	23.287	3.992	9.261
3	208	62.862	31.648	1.596	3.894
4	443	65.591	30.897	0.771	2.741
5	872	65.843	30.161	0.881	3.115
6	1651	67.291	28.972	0.817	2.920
7	3098	66.838	29.374	0.808	2.980
8	5837	66.979	29.291	0.785	2.945
9	10999	66.987	29.238	0.798	2.977
10	20716	67.182	29.070	0.788	2.960
	Cholesky Ordering: Exports Imports GDP Official exchange rate				

The variance decomposition also indicates that imports and the official exchange rate highly explain the variations in the volume of export of goods and services per year. This could be explained by the fact that with higher imports, the demand for foreign currency with which imports are to be bought (normally US dollar in Tanzania) increases hence appreciation of the same against the Tanzanian shilling which lowers the Tshs value against the dollar. Thus it will have a direct influence on the volume of exports. The variance decomposition also shows that the size of the national output (GDP) does not cause mass variations to the export of goods and services.

Same results are also observed on the variations in imports of goods and services which are highly explained by the volume of exports and the official exchange rate. With higher exports in theory the demand for Tanzanian shilling will increase hence an impact on the exchange rate. Higher exports means acquiring more of foreign currency, this coupled with favourable changes in exchange rates due to higher exports, increases the country's purchasing power for imports. In addition, imports and exports of goods and services are found to be causing variations on the level of national output per year (GDP) while the official exchange rate is found to be causing fewer variations in GDP.

Finally the variations in the official exchange rate per year are found to be highly correlated to the imports and exports of goods and services per year. The fact that importation and exportations entail the use foreign currencies it means they are affected by variations in exchange rates, hence any variations in exchange rate whether favourable or unfavourable will have a direct impact on the country's volume of imports and exports. There are studies (Cushman, 1983, 1986; Kenen and Rodrik, 1986; Koray and Lastrapes, 1989) that argue that variations in official exchange rate indexes poses costs for market participants who are risk averse, and they therefore tend to favour domestic to foreign trade. But also it might be true to argue that, market participants can benefit from exchange rate volatility if trade is considered as an option held by a particular firm. Just like any other option (e.g. stocks), the value of trade can rise with any changes in exchange rate indexes.

Noteworthy is that, the volume of exports is the variable that explains many variations in the official exchange rate. That also implies variations in the official exchange rate decreases as exports increase other factors being equal and therefore an economy should always seek to promote exports

and reduce imports. But we also insist on the role of devaluation of a currency, as the more real exchange rate index drops the more there is a depreciation of the exporter currency with respect to the trading partner's currency and export competitiveness is improved (Caporale and Rault et al., 2009). In his paper Cao-Alvira (2014) found that Colombian bilateral trade of non-commodities historically exhibited long-run improvements after a real devaluation of their currency.

With our results we therefore support the traditional view that currency devaluation could be useful to influence changes in real variables and the structure of the economy. Our results also supports the well-known proposition that the positive effects of devaluation will be offset if devaluation is accompanied by expansionary macro policies. An effective adoption of devaluation mends the country's trade balance by stopping speculative behaviour as well as by realigning relative prices (Himarios, 1989).

Nevertheless it is good to also note that, unstable exchange rate index has a significant negative impact on the volume of exports because for risk averse market participants, exchange rate uncertainty causes them to reduce their activities, change prices, or shift sources of demand and supply in order to minimize their exposure to the effects of exchange rate volatility (Chowdhury, 1993).

Conclusion and Implications

This paper investigates the short run and long run romantics between the value of the currency and the flow (imports and exports) of goods and services from/to the rest of the world. The researchers of this study curiously wanted to know if the long devalued Tanzanian shilling has had any significant impact on the flow of exports as well on imports and the role it has played on the national output. Initially it was introduced that, the exchange rates in many developing countries were devaluated following the conditions imposed by the IMF and the World Bank which aimed at promoting exports and discouraging imports in the long-run hence to promote local productivity. There have been few studies with very different perspective that explores the long run and short run impacts of the currency devaluation that took place in many LDC's from late 1980s to mid-1990s. The numerical analyses being developed by this study have produced results that are not far away from the aims of devaluation and lower exchange rates. The key point to note from this analysis is that the devalued exchange rate, other things being equal, have played a significant role on promoting exports and discouraging imports in the long-run.

The econometric techniques we employ in this study have become prominent is estimating the short-run and long-run trends of a time series. First we measured the stochastic trend (stationarity) of our arrangement where we were satisfied that our data set contained a unit root and thus the selected variables were cointegrating towards equilibrium. In addition, we imposed some restriction on the VECM model based on assumptions such as; in the short-run, floating lower (below the market equilibrium for supply and demand for foreign currencies) exchange rates have no impact on the volume of the national output, volume of export and the imports of goods and services. That also means we assumed that exports and imports are sold and bought in advance and thus any fluctuations on the value of the currency cannot affect the already processed transactions. Therefore, the impacts and romantics between the selected variables is observed in the long-run suggesting that lower exchange rates encourages exports and discourages imports in the long-term and hence leading to growth of the national output.

This paper cannot be thought to be invulnerable to limitations especially on the data set which range from 1960 – 2011 annual data. Conceivably monthly or quarterly data on the selected variables could have allowed this study to employ even more econometric procedures. We are therefore recommending further studies to try use monthly or quarterly data. We also recommend

researchers to do more researches in developing economies where there are scarce of data and studies in such areas.

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