Scholarly Journal of Business Administration, Vol. 3(1) pp.12-19, January 2013
Available online http:// www.scholarly-journals.com/SJBA
ISSN 2276-7126 ©2013 Scholarly-Journals

Full-length Research Paper

Exchange rate fluctuations-shock in Tanzania An empirical analysis

Ntui Ponsian Proti

Augustine University of Tanzania, P. O. Box 307, Mwanza, Tanzania. E-mail: ponsianproti@yahoo.com. Tel: +255784965676.

Accepted 23 January, 2013

The purpose of this study is to examine the determinants of exchange rate movement in Tanzania. The issue is very relevant considering the current depreciation of Tanzania shilling and the shillings of other countries in the East African community and the importance of currency value in the economic growth of a country. Regression model is used to estimate the relationship between exchange rate change and inflation, interest rate, imports, exports, economic growth, political tension and national debt and literature review also is used to identify potential factors which can affect exchange rate movement. The empirical results of the study suggest that variables such as national debt, political tension and economic growth affect exchange rate movement in Tanzania. From the literature review other potential factors which can affect exchange movement are: central banks actions, unemployment outlook, news or surprises on currency, equity flows, currency management, risk aversion, government controls, terms of trade, current account deficit and commodity prices. The findings of this study have important implications for the Central Bank of Tanzania and other central banks in developing economies and their governments to know what may be a reason for falling or rising in values of their currencies.

Key words: Exchange rate, fluctuation, depreciation, valuation, Tanzania, Africa.

INTRODUCTION

A volatile and constantly depreciating exchange rate can adversely affect a number of key macroeconomic variables such as private investment, GDP growth and the demand for money Valadkhani (2010).

Tanzania has experienced the high fall in value of its currency, Tanzanian Shilling (Tshs) against the dollar and other major currencies since 1999 to date. According to the report of BOT (2008/2009) in 1999, one dollar was exchanged at 760 Tshs and now the currency is exchanged at one dollar at 1600 Tshs. This shows that for 11 years the currency has fallen by approximately 50%. The fall of currencies is not only in Tanzania but also shown in its neighboring countries of East African region. Uganda and Kenya have observed huge depreciations of their currencies against the dollar and also high inflation rates which have caused strikes and demonstrations of the people and civil society organizations blaming high costs of living.

According to Madura (2000), exchange rate measures the value of one currency in units of another currency. As economic condition changes, exchange rates also substantially change. A decline in currency value is referred to as currency depreciation while increase in the same is known as appreciation.

Determinants of exchange rates volatility are of interest because of the exchange rates potential linkages to other economic variables (Karl, 2004). Previous studies showed that volatile exchange rates depress or adversely affect international trade due to uncertainty and the associated risks of fall in the value of the currency (Sauer, 2001; Dell' ariccia, 1999; Chowdhurry, 1993) quoted in Karl (2004). The studies also showed that investments and profitability of companies and other businesses are negatively affected by exchange rates volatility (Bleeney, 2001).

Exchange rates are clearly influenced by a wide range of different factors and the importance of each varies both from country to country for a given currency overtime. The question is that which factors are likely to dominate. The study by consensus economics (2010 to 2011) surveying 90 currencies against USD identified six factors considered to be common and these factors are: relative growth, inflation differential, trade or current account balance, equity flows, short-term interest rate

differential and long-term interest rate differential. The study ranked first in the nominal interest rate and second in economic growth. Out of the mentioned six factors, the study identified other factors as risk aversion, intervention policy, commodity prices and currency or foreign exchange management.

Karl (2004) found that the structural factors affecting exchange rates in 85 studied developing and transition economies in 2001, a cross- sectional study as decentralized dealer markets, regulations on the use of domestic currency by non residents, acceptance of article VIII obligation and limits on banks foreign exchange positions. The study also identifies macroeconomic fundamentals as inflation, real GDP growth, the fiscal deficit (in %GDP) and the openness of the economy (measured by sum of exports and imports relative to GDP). Inflation, fiscal deficit, real GDP growth and open economies are found to be significant while current account deficit private capital flows relative to GDP and volatility of the terms of trade are not significant.

FX Trade 2010/2011 survey identifies five (5) top factors affecting exchange rates. The survey states that exchange rates change by the second and therefore, it is very important to understand the dynamics that affect them since currency changes affect everyone. The identified factors are: Central banks actions, trade balance, economic growth expectations, unemployment outlook and interest rates.

According to www.thisismoney.co.uk (2011), exchange rates are determined by market forces. The site explains factors which make currencies strong or weak and identified. Interest rates showed that higher interest rates attract investors due to better returns. Economic health is another factor for positive growth, inflation and debt burden. Official intervention by government or central banks may raise interest rates or buy it from the international foreign markets and finally, shocks speculations, news and surprises on a currency, while other studies are explaining factors influencing exchange rate changes. Rogoff (1999) and Rogoff and Obstfeld (1995) studying inflation in the short run and macroeconomic factors both in the short run and long run concludes that neither macro nor random walk factors explain exchange rate behavior rather foreign exchange dealers determine behavior. The study also concludes that there is no consensus on what factors affect exchange rates.

It is therefore easy to say the currency has depreciated or appreciated, but it is difficult to tell why these changes? People, specifically, politicians can use historical information or generally known information referred to as “the obvious” about the causes but empirically, these may not be true in certain countries depending on social, economic and political characteristics or differences. Therefore, this study finds what factors influence change of exchange rates in Tanzania.

Motivation for the study

The purpose of this study is to determine the factors influencing change in exchange rates in Tanzania. The innovation of this study was derived from the current situation in Tanzania and East African Region of fall in currencies and high costs of living. In Tanzania, specifically, the Tshs fell by 50% just in eleven years against US dollar (that is, Tshs 760 / USD in 1999 to 1600 Tshs / USD in mid 2011). There is no doubt that the fall of a currency has a lot of negative impacts on the society and the economy as a whole, though, there are just few advantages which may not be significant to the countries which have less to export. Though, the trend shows that the currency (Tshs) is depreciating, the faster fall of rate of change was observed at the beginning of 2011 which have brought attention to individual citizens and civil society groups about high costs of living.

The answers to why the fall of currency is not given, though, politicians give simple answers like high cost of fuel and crude oil in the oil producer countries. Is that the only factor causing all these? From the study of different authors, exchange rates are generally caused by inflation rates, political stability, national debt, price of products and goods special drawing rights, income levels, GDP growth, government controls and expectations or news. These are general factors which may result to exchange rates change in any country in the world but some of the factors may not be significant in other countries. Therefore, this study will determine significant factors which cause or influence exchange rate fluctuation in Tanzania focusing on ten major currencies selected by BOT annual report (2008/2009).

After reviews of the related literature and development of the hypotheses to be tested, the research design was presented. The findings are then presented and discussed before the conclusions are finally presented.

METHODOLOGY

Design

The study is quantitative in nature. The research uses quantified factors to answer all the research questions and achieve the three research objectives. Simple Regression Analysis model known as Ordinary Least Square (OLS) is used to find the results which will be interpreted for major conclusions. The study uses panel data of eleven (11) years from 1999 to 2009 for ten (10) major currencies making a total of 110 observations.

Data collection

Data are collected from Bank of Tanzania (BOT) annual reports, Tanzania Bureau of Statistic and their websites. Quantification of the variable is done to ensure that they

fit in MINITAB software for analysis. Data are collected from year 1999 to 2009, which gives a total of eleven years. The focus then is on ten major currencies making a total number of observations to be 110.

Sample and data source

Quantitative methods are employed to examine the relationships between the independent variables (Inflation, interest rate, import, export, total national debt, political stability and economic growth). The data are drawn from annual reports of the Bank of Tanzania, Tanzania Bureau of Standards and their websites.

The data collected are for eleven (11) years period running from 1999 to 2009 for ten major currencies selected by BOT which resulted in110 observations. The years 1999 to 2009 are chosen because it is for the first time in history of Tanzania for a Central bank to issue an annual report to the general public and hence, have access to massive data. The design is chosen because the population is small and the use of panel data increases the number of observations, thus, allowing meaningful statistical analysis.

Exchange rate measurement

To measure exchange rate (our dependent variable), we consider a percentage change in their values (valuation) from one year to another. This is in line with Madura (2000) which supports that the exchange rates are commonly measured by a percentage change in their values from one year to another.

Following our hypotheses development as aforementioned, we specify the following ordinary least squares (OLS) regression model:

$$\text{EXCHANGE RATE CHANGE} = \alpha_0 + \alpha_1 \text{INF} + \alpha_2 \text{INR} + \alpha_3 \text{TTD} - \alpha_4 \text{RGG} + \alpha_5 \text{PLS} + \alpha_6 \text{EXP} + \alpha_7 \text{IMP} + \varepsilon$$

Where;
EXCHANGE RATE CHANGE (EXR) = Valuation as percentage change in exchange rate of Tshs relative to other currencies.
INF = Inflation rate in Tanzania at the year end
INR = Real interest rate in Tanzania at the year end
TTD = National debt in a year as a percentage of total debts in ten years
RGG = Real GDP growth as a measure of economic grow
PLS = Political stability measured as a political tension
ε = Is an error term un-explaining proportion of the problem i.e. factors affecting exchange rate fluctuation.
EXP =Export from Tanzania measured by a percentage of export in a year to total exports in ten years.
IMP =Import to Tanzania measured by a percentage of import in a year to total imports in ten years.

Data analysis

Data collected are arranged on a Minitab page whereby change in exchange rate becomes a dependent variable while all other variables are independent variables. The regression equation regresses the exchange rates against all other variables to find out the computer output for interpretation.

The objective one (determining factors influencing exchange rates) is answered by the literature review of both empirical and theoretical studies which mention all factors which can affect exchange rate in any country.

The coefficients of the regression results showed the relationship between exchange rates and the variables. There are two expected relationships namely; positive relationship where the factor increases and the exchange rate is increased and secondly, the negative relationship whereby as the factor falls the value of the currency increases, note that the value of the currency here is focused on value of foreign currency relative to domestic currency. The dependent variable shows movement of foreign currency relative to domestic currency (Tshs) and therefore, a positive relationship between EXR and any variable indicates a negative relationship with domestic currency since an increase in value of a foreign currency relative to local or domestic currency means fall in value of domestic currency relative to a foreign currency.

Finally, the T and P values of each variable tell whether the variable is significant or not. A significant variable must give a T value ≥ 1 and P value ≤ 0. 12.

The validity of the model is determined by the value of P, R^2 and F test. R^2 shows the percentage at which the problem is explained, P value shows the probability that the model is not significant and F– test shows how the error term relates to mean term. The model therefore, is significant when P is small (P≤ 0.000), R^2 is larger (R^2≥ 0.5 though small R^2 is acceptable) and F- test is larger (≥0). Correlation matrix also is used to identify highly correlated variables to avoid measuring one variable or closely related.

RESULTS AND DISCUSSION

Descriptive statistics and correlation matrix

Table 2 presents a summary of the descriptive statistics of the dependent and independent variables. Table 2 shows that the mean exchange rate change is -4.29%. This suggests that the Tanzanian shilling has generally being decreasing on an average rate of 4.29% in the past eleven years. This is consistent with the report by BOT (2008, 2009) and the current situation of falling values of currencies in East African Region. We therefore, view

Table 1. Selected currencies as per BOT annual report 2008/2009.

Currency	Country
U.S Dollar	USA
Pound sterling	UK
Deutsche Mark	German
Swiss Francs	Switzerland
Dutch Guilder	Netherlands
French Franks	France
Belgium Francs	Belgium
Italian Lire	Italy
Swedish Kroner	Sweden
Japanese Yen	Japan

Model specification.

Table 2. Descriptive statistics.

Variable	Mean	Standard deviation	Coeff. variable	Minimum	Median	Maximum	Range
EXR	-4.29	11.52	-268.30	-46.50	-4.60	21.40	67.90
INF	6.400	2.327	36.36	4.100	5.90	11.30	7.200
INR	18.745	3.162	16.87	13.80	19.3	23.10	9.300
TTD	9.0909	0.9340	10.27	6.700	9.40	10.40	3.700
PLS	0.3636	0.4832	132.89	0.000	0.00	1.000	1.000
RGG	6.282	1.885	30.01	2.000	7.10	7.800	5.800
EXP	9.093	8.955	98.49	0.100	6.55	62.80	62.70
IMP	9.085	6.654	73.24	1.200	6.30	28.60	27.40

Table 3. Correlation matrix for the independent variables.

Variable	EXR	INF	INR	TTD	PLS	RGG	EXP	IMP
EXR	1	-	-	-	-	-	-	-
INF	0.052	1	-	-	-	-	-	-
INR	0.365*	0.387*	1	-	-	-	-	-
TTD	-0.173****	-0.135	-0.147	1	-	-	-	-
PLS	-0.233**	0.057	-0.173***	-0.745*	1	-	-	-
RGG	-0.412*	0.153***	-0.607*	-0.169***	1	-	-	-
EXP	-0.060	0.328*	* -0.065	-0.327*	0.279*	0.349*	1	-
IMP	-0.032	0.791*	0.012	-0.344*	0.254*	0.474*	0.518*	1

*, **, *** Significant at the 1, 5 and 10% respectively.

these findings as a reflection of poor control by the proper authorities on the value of the currency leaving it depreciating consecutively without appreciating against other foreign currencies. Inflation rate seems to increase by 6.4% on the average. This may also give an indication of rise in prices of goods in the country to a more worsened condition if not properly managed. On average, banks and other financial institutions borrow at a rate of 18.745 in a period of eleven years. This is very a high interest rate which may discourage local borrowers and hence slowdown the country's economy (Madura, 2000).

In line with the country's prospects and 2011/ 2012 National Budget plan, the country's economic growth measured by GDP growth is 6.28%. This shows that the economy of a country is growing on average at a rate of 6% which is close to 7% growth as projected by the National budget.

The Pearson correlations are presented in Table 3. We use the correlation matrix to determine whether the independent variables are highly correlated. Table 3

Table 4. OLS regression results of income accounting method strategies (N=110).

Predictor	Coefficient	SE coefficient	T	VIF
Constant	116.33	23.73	4.90*	-
IF	0.8771	0.9053	0.97	5.8
IR	-0.7027	0.5257	-1.34	03.6
TD	-9.908	1.812	-5.47*	3.8
PS	-16.954	3.138	-5.40*	3.0
RG	-2.4844	0.7520	-3.30*	2.6
EP	-0.0278	0.1173	-0.24	1.4
IM	-0.1058	0.3251	-0.33	6.1

S = 9.10915, R^2 = 41.4%, R^2 (adj) = 37.4%; *, **, *** Significant at 1, 5 and 10% respectively.

Table 5. Analysis of variance.

Source	DF	SS	MS	F	P
Regression	7	5989.55	855.65	10.31*	0.000
Residual error	102	8463.61	82.98		
Total	109	14453.16			

Durbin-Watson statistic = 2.33109; *, **, *** Significant at 1, 5 and 10% respectively.

shows that there is little correlation with most of the independent variables, as the highest correlation, –0.791 is not far from the benchmark of 0.7, suggesting that the problem of multicollinearity is not serious (Tibachnick and Fidel, 1996 quoted in Ntui, 2011).

Multiple regression analysis

The results of the regression analysis are shown in Table 4. The regression equation is given as:

EXR = 116 + 0.877 IF - 0.703 IR - 9.91 TD - 17.0 PS - 2.48 RG - 0.028 EP- 0.106 IM

As shown in Table 4, the regression model is significant as indicated by small P- value (p≤0.000) and hence, has significant explanatory power. The R^2 of the model is 0.414 and the *F*-value of 10.310 is significant at the 1% level or better. The adjusted R^2 of the model indicates that the model explains 41.4% of the variation in the exchange rate change or movement.

In terms of the explanatory factors, we found out that inflation (INF) is not significantly related to the exchange rate change, and the direction of the coefficient is positive rejecting what was predicted. However, the hypothesis that there is a significant relationship between inflation rate and exchange rate change (H_1) is rejected. This is in line with the report of Bli (2007) and Bergen (2010) who shows that inflation is a factor in explaining changes in exchange rates. Our results suggest that inflation rate does not influence the movement of exchange rate in Tanzania. This may indicate that inflation in the country easily exports and therefore strengthens the currency. Since Tanzania export less significant items as compared to other countries, the influence of inflation may not be significant as shown in the results.

Total National Debt (TTD) is negatively and significantly related to the exchange rate; hence, the second hypothesis (H_2) is supported. The positive relationship between changes in exchange rate and total national debt is in line with previous studies which showed a positive relationship (Bergen, 2010; Fan, 2007; Valadkhani, 2009; Henckel, 2004; Modeste, 2005; Cavallo et al., 2005). This research finds out that large national debt cause fear to foreign investors to own securities dominated by that currency and donors on important development projects. The study also finds out that the monetarization of the national debt generates high inflation which may also cause high inflation. Generally, exchange rate change is influenced by national debt increase as may be shown by every year's national budget. Given that the Tanzanian government depends on more than 45% of its budget from borrowing.

Our results also showed a negative and insignificant negative relationship between real interest rate and exchange rate change, thus inconsistent with H_3. This implies that real interest rate in Tanzania has little or no influence on exchange rate fluctuation. The direction shows also that as exchange rate improves, real interest

rate decreases showing that the economy is stabilizing and also nominal inflation is decreasing justifying formal version of fisher effect. The results contradict studies showing that the countries with higher interest rates attract foreign investments and hence create demand for local currency which therefore increase exchange rate (Bli, 2007; Madura, 2000; Bergen, 2010).

The economic growth of the country measured by real GDP growth is significantly affecting exchange rate movement, thus, H_7 is supported. This shows that as the country's economy is improving, the value of the currency falls. This may be due to government interference to encourage foreign investments and exports. Though, it is significant, the direction of our findings is inconsistent with those of Madura (2000) and Valadkhani (2003) who show positive relationship between exchange rate and economic growth. In contrast, Malcolm (2000) using macroeconomic model found no evidence of a strong direct relationship between changes in exchange rate and GDP, hence, rejects strong relationship but may accept relationship between GDP and exchange rates. We found out that there is a significant negative relationship between political tension and exchange rate or value of a currency, thus, H_6 is supported. This supports the idea that the year of general election and one year before and after general election, the currency falls in value due to political pressure. This may be due to fear of new regime which normally is not known and may have its own policies which may affect investors' funds. The result is in line with Bergen (2010) who stipulates that investors prefer to invest in stable countries politically. High political risks cause loss of confidence to investors and a loss of confidence in currency and movement of capital to the currencies of more stable countries.

The study finds insignificant negative relationship between export and exchange rate meaning that the more the country exports, the value of the currency falls, thus, this result does not support H_3. The study supports Bergen (2010) who states that foreign corporations will be encouraged to purchase more Tanzanian goods when the currency is worthless and by doing so, they are creating demand for the currency, hence, raising its value. The insignificance of export factor affecting exchange rate is in line with the studies of Duasa (2009), Dees (2008) and Fan (2002) who confirms that there is no clear evidence that import and export affect exchange rates.

Finally, the relationship between the import and exchange rate is negative and not significant, thus, H_4 is supported. These results suggest that the more we import, the less the value of the currency it becomes. The direction is as expected; the variable is not significant showing that though we import more than we export (BOT, 2008, 2009), the imports have no or little effects on exchange rates. This may be due to the government or central bank interventions on exchange rate.

CONCLUSION

This research examines the determinants of exchange rate movements focusing on Tanzania shilling relative to other ten foreign currencies (Table 1) selected by the BOT (2008/2009) for eleven years from 1999 to 2009 making a total of 110 observations.

We therefore examined whether inflation, interest rate, import, export, total national debt, political stability and economic growth affect exchange rate movement. There was no significant relation between inflation and exchange rate movement. This result contradicts expectations as it shows that high inflations cause the value of a currency to rise. This may be due to government or central bank interventions to raise value of a currency during difficulties like high inflations. The results showed contrary to the purchasing power parity, that exchange rate differentials are positively related to inflation differentials. Total national debt is found to be negatively related to exchange rate change, suggesting that the higher the national debt, the lower the value of the currency. This may be caused by investors fear on risks associated with highly leveraged government which may default in payments on some securities invested. The high debt may be caused by poor government plans on extending tax base and hence, large borrowings or debts.

The relation between real interest rate and value of a currency is negative, suggesting that the currency gains value when the real interest rates are low consistent with the fisher effect that the higher the real interest rate, the lower the inflation, hence, low value of a currency in normal circumstances or in absence of government interventions. A currency gain of value when real interest rates are low may be due to government pressures to rescue economy but in normal circumstances, the currency gains value when interest rates are high, signaling attractive investments from foreigners and their foreign companies or simply foreign investments.

The economic growth measured by real GDP growth is significantly affecting exchange rate movement. This shows that as the country's economy is improving, the value of the currency falls. This may be due to government interference to encourage foreign investments and exports.

There is a significant negative relationship between political tension and exchange rate or value of a currency. This may be due to fear of new regime which normally is not known and may have its own policies which may affect investors' funds. Since value of a currency is an important measure of the country's economic performance, there should be a policy to separate economy from politics so as to avoid economic shakes before, during and after elections.

Finally, we found out that there is no or little relationship between value of Tshs, import and exports. The abnormal behaviour of Tshs may be due to lack of

free market on exchange rate caused by lack of central bank independence allowing politicians to dominate their decisions as can be explained by Yabu (2010). This study makes a number of contributions to the literature. First, it is the first study to examine the factors that determine exchange rates in Africa, and Tanzania, in particular. Secondly, the paper introduces the effect of political tension as a new factor that determines value of a currency in a country. No previous study has examined empirically this variable in the context of exchange rate fluctuation. Thirdly, our study demonstrates that we cannot generalize that all factors affecting exchange rates are common in all countries in the world. The factors may have different effects on developed countries and their peers in a developing nation such as Tanzania; for example, the differences in some of our results as compared with prior research suggest that the economic, social, and political differences may be affecting exchange rate movement. Whilst studies in developed countries report inflation rates, interest rates, import and export as major factors affecting exchange rate. In Tanzania, these factors are not significant showing that they have no or little effect on exchange rate movement. This seems to suggest that exchange rate market in Tanzania is not freely left to the powers of supply and demand. The government manipulates and protects it against powerful currencies. Thus, the results of this study cast doubt on the reliability of purchasing power and interest rate parity relationships showing the country with higher inflation has lower value of its currency and the one with higher interest rates having higher value of its currency respectively.

Finally, the findings of this study have policy implications for Tanzania Central Bank and other financial regulators. Interventions on exchange rate movements cause the market to behave abnormally. The important factors of economic development may be giving misleading results. This can be shown by an average economic growth measured by GDP (6%) or projected growth of (7%) with the highest compared to other East African countries and many countries in the world but living standard of citizens does not reflect this called success. This means that in the context of Tanzania, regulations need to clearly specify when and why interventions will be applied and also Central bank has to work independently to avoid political pressures.

The findings of this study should be interpreted in the context of the sample size used. A sample size of 110 observations is too small to provide conclusive evidence in Africa but can be used to give evidence to Tanzania. Further research is required in other African countries using more variables and currencies as well as many years.

Since the R^2 is very small, it shows that there are other critical factors affecting exchange rates. The government should therefore deal with taxation system, money and income transfer and most importantly, there should be a total ban of using foreign currencies in a country and in line, there should be a control on banks and financial institutions on selling or speculations on foreign currencies as well as controlling opening foreign currency accounts.

It may also be interesting to carry out a cross-country study to determine whether factors differ by country in Africa. Further to this, because the study uses panel data, with each currency included eleven times, the results are affected by the economic changes or specific events in a specific year. The explanatory power R^2 is small showing that there are many other factors explaining exchange rate fluctuation not included in the model and therefore, future researchers could use cross-sectional data using one year but many currencies to avoid the economic changes between years, test price index, oil prices, internal debt, external debt, IMF quota, special drawing right, government interventions, use of foreign currencies in the country and current account deficit. There should also be a need to investigate the monetary system used by the countries today to clearly know if it is a fixed exchange rate system, flexible exchange rate system, pegged or managed float.

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