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Thesis · October 2014

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International Journal of Economics, Commerce and Management
United Kingdom ISSN 2348 0386 Vol. VII, Issue 4, April 2019

http://ijecm.co.uk/

ECONOMIC DETERMINANTS OF EXCHANGE RATE VOLATILITY IN KENYA

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Abstract

Exchange rate volatility is the focus in determining the economic performance of any particular country. Therefore, there is need in understanding of the concept of exchange rates, extend of the causality of exchange rate volatility and their operations in domestic and foreign currencies exchange. Despite abundant empirical literature on the effects of exchange rate volatility on macroeconomic variables, such as, economic growth in many developing open economies like Latin America and Asia, few studies have investigated the determinants of exchange rate volatility. This study therefore analysed the effects of interest rate and inflation rate differentials on the exchange rate volatility of Kenya Shillings relative to the USA dollar. The study employed an explanatory approach using time series data, collected monthly for 175 months from January 2000 to July 2014. The data consisted of KSH/USD Exchange rate, 3-month Treasury bills and inflations rates of US and Kenya. Regression analysis revealed that interest rate differential (β =0.826) and inflation rate differential (β=.0.05) had a significant and positive effects on the exchange rate. The results implied that higher interest rates in the country cause a depreciation of the Kenya shillings, which was contrary to interest rate parity (IRP) theory. In addition, the study found that an increase in inflation rate differential causes an increase in exchange rate, which was found to be in agreement with the purchasing power parity (PPP) theory. This study therefore recommends the adoption of suitable policies that seek to control interest rates, inflation rates and associated pressures to safeguard volatile exchange rate movement.

Keywords: Exchange rate volatility, economic performance, Inflation rate, differentials

INTRODUCTION

The exchange rate (price of one currency in relation to another) is an important macroeconomic variable, determining a country's level of trade, international competitiveness, debt servicing costs, and hence, its general economic health (Jamil *et al*., 2012; Danmola, 2013). Thus, volatility of the exchange rate (its instability, fickleness or uncertainty) is expected to impact on the economic performance of a country. The major corpus of research appears to support this view. A volatile exchange rate causes risk-averse commodity trader to demand higher prices to cover for the uncertainty, decreasing the volume of trade (Arize *et al*., 2005; Grier and Smallwood, 2007). Muhammad (2012) argues that exchange rate fluctuations encourage speculative behavior based on expectations that the exchange rate will continue to appreciate. This could result in liquidity shortages and trigger significant balance sheet effects, which may require central bank action to stabilize the system for instance, by providing short-term foreign currency liquidity to the banks. Higher exchange volatility increases uncertainty over the return of investment, which lowers foreign direct investment, a crucial plank for development in small economies, for instance, Kenya (Barlevy, 2004). Because of the central role exchange rates play in national economies, it is germane to gain an understanding on the causality of the exchange rate volatility.

Studies suggest that various factors could influence exchange rate volatility. First, differentials in inflation between two countries would result in differences of purchasing power of the two currencies, as enunciated by purchasing power parity (PPP) theory (Cassel, 1922). After early disappointments with dynamic equilibrium models of PPP (for example, Mark, 1990), recent inclusion of transaction costs, non-traded goods, Harrod-Balassa-Samuelson effect and wealth effects have led to a modified and more acceptable PPP (Taylor and Taylor, 2004). Secondly, interest rate differentials could increase premium of a currency of a country with a higher interest, because of higher capital inflows, controlling for other mitigating factors, for instance, inflation (Hakkio, 1986; Eichebaum and Evans, 1995). On the other hand, an increase in interest rate may adversely affect future export performance, reducing the flow of foreign exchange reserves and hence, depreciating a currency (Furman & Stiglitz, 1998), showing that the effects of interest rates could be contradictory. Thirdly, consistent adverse balance of payments could make the currency to depreciate in near future and vice versa (Kandil, 2009). Other studies have fingered political pressure (Faia *et al*., 2008) and market sentiment (Hopper, 1997) as being crucial determinants of exchange rate volatility. However, few studies have looked at the relationship between interest rate and inflation rate differentials, balance of trade and exchange rate in Kenya. A study by Ndung'u (1999) assessed whether the exchange rates in Kenya were affected by monetary policy, and whether these effects were permanent or

transitory. The objectives of this study were: (1) To determine the effect of interest rate differentials (interest rate parity-IRP) on exchange rate volatility and (2) to determine the effect of inflation rate differentials (purchasing power parity-PPP) on the exchange rate volatility.

RESEARCH METHODOLOGY

The study employed an explanatory approach using time series research design. Time series data gives a flow of information over a discrete regular interval of periods which is a property exhibited by macroeconomic data due to its frequency of occurrence in time. Secondary data, consisting of monthly data of KSH/USD Exchange rate, 3-month Treasury bills and Inflations rates of US and Kenya for the time periods 175 months from January 2000 to July 2014. The exchange rate was measured by the Kenyan shilling in terms of USA dollar while the interest rate was the 3-month T-bills monthly rate. Inflation differential was the monthly inflation difference between domestic inflation and USA inflation. The requisite data were obtained from the various publications and websites of the Central Bank of Kenya, Kenya National Bureau of Statistics (KNBS) and the US Federal reserve.

Normality in the data was checked by inspecting skewness and kurtosis values whereas a correlation matrix was used to check multicollinearity amongst exogenous variables. Augmented Dickey-Fuller (1979) test was conducted to test the null hypothesis that the data was a random walk or non-stationary. To establish the relationship between the interest rates and inflation rates with currency exchange rate, Ordinary Least Squares (OLS) linear method was used. The study tested the following model (i):

$$E_t^R = \alpha + b_1 Int_t^D + b_2 Inf_t^D + \varepsilon t \quad \text{.....(i)}$$

Where:

Exchange rate (EXR) given as E_t^R : represents KSH/USD exchange rate for the periods *t.*

α=constant,

t-is time period: samples of months 1 to 175, from January 2000 to July 2014, where January 2000 = 1 and July 2014 = 175.

D- differential between local and base country

Int_t^D (Interest rate differential: the difference of average interest rate in the local and in USA for the periods *t* defined above.

Inf_t^D (Inflation rate differential): the difference of inflation in the home and USA for the periods *t* defined above.

RESULTS AND DISCUSSION

Preliminaries

The values of skewness and kurtosis were within the benchmark of ±2, suggesting that the data was sufficiently normal. The correlation between interest rate and inflation rate differentials was 0.29, suggesting that multicollinearity was minimal. Results of the Augmented Dickey-Fuller (ADF) unit root test are presented in Table 1.

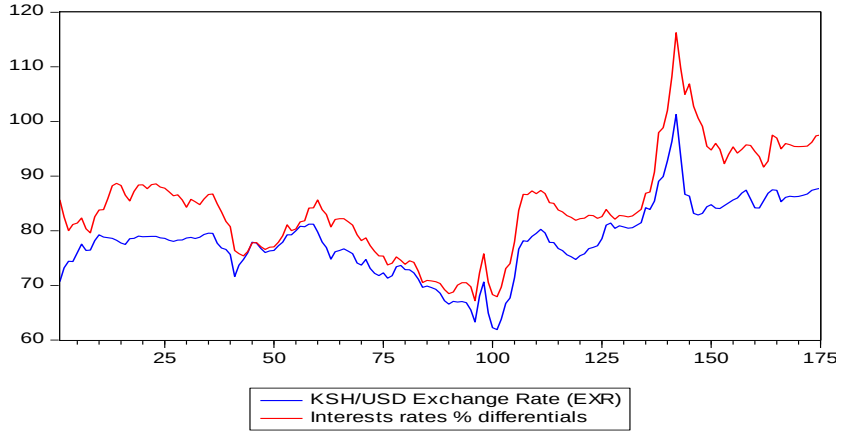
Table 1: Unit root tests summary table at level with trend and intercept

Variable	Test Critical values (level)	ADF Test statistic	Prob*	Coefficient	Lag length
EXR	-4.011977*	-4.442354	0.3565	-0.048845	1
	-3.436009**				
	-3.142085***				
INTRD	-4.012618*	-4.237488	0.0807	-0.070088	**3**
	-3.436318**				
	-3.142266***				
INFRD	-4.015700*	-5.800419	0.1994	-0.097375	**12**
	-3.437801**				
	-3.143138***				

*, **, and ***denotes 1%, 5% and 10% significant levels

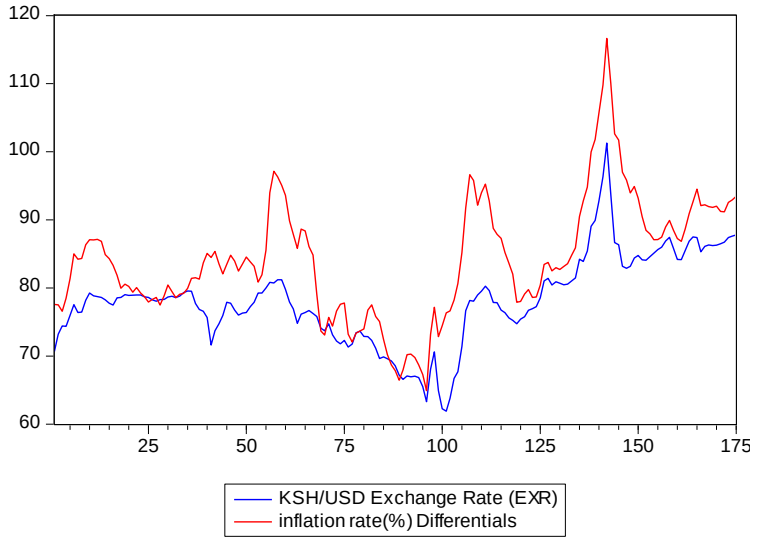
The computed ADF statistic for the three variables under study (exchange rate: -4.44; interest rate differential: -4.237, and inflation rate differential: -5.800) were all smaller than the critical "tau" values at 1%, 5%, and 10% significant levels, suggesting that the data did not have a unit root problem, that is, the data was adequately stationary over the time period. A plot of the variables showed fluctuations over the period, buttressing this conclusion (Figures 1 and 2).

Figure 1: Graph showing exchange rate (EXR) and interest rate differentials (INTRD)



The horizontal axis is the monthly information while the vertical axis is the variable representations. The Kenyan shilling rose from ksh72.24 at the beginning of the study to around ksh80 against the dollar in the 20th month before a sharp fall in the 45th month of the study. Again, the exchange rate rose steadily before it fell in the months between 62 and 100 exchanging at approximately ksh62.53. The exchange rate then steeply rose to a high of approximately ksh103 in the months of 140th of the study (November 2011) before slightly coming down afterwards. Interest rate differential also kept on fluctuating, depending on the market forces of demand in the capital (investment) in the domestic and foreign 91-day discounting bills.

Figure 2: Graph Showing exchange rate (EXR) and inflation rate differentials (INTRD)



Inflation rate differentials were observed to steeply fluctuate, suggesting discrete differences in inflation levels between Kenya and US.

OLS Regression analysis

The results of the OLS linear regression are presented in Table 2.

Table 2: Results of Linear Regression Model for Exchange Rates volatility

Variables	**Coefficients and t - values**
Constant(C)	72.754 (83.567) ***
Int_t^D *(INTRD)*	0.826 (7.299) *
Inf_t^D *(INFRD)*	0. 05 (0.536) **

Table 2...

R^2	0.2609
F- Value	30.357**
Adjusted R^2	0.2523

Figures in parentheses are t-values. *, **, and *** = t value significant at the 10, 5 and 1% levels of probability, respectively.

The estimated equation for the linear model can thus be written as:

EXR=72.754 + 0.826*INTRD + 0.05*INFRD + ε ……. (ii)

The β coefficients for both interest rate and inflation rate differentials were significant and positive at p<.10 and p<0.05, respectively, implying that an increase in any of them would likely increase the exchange rate. For instance, a unit increase in interest rate differential will cause a 0.826 increase in the exchange rate, *ceteris paribus*. This is unlike Hakkio (1986) and Eichebaum and Evans (1995), who argued that higher interest rate differentials could cause the currency of a country with a higher interest rate to appreciate because of higher capital inflows. This implies that higher interest rate in Kenyan does not attract foreign capital inflow to increase the demand for local currency. Instead, capital may outflow from the country, as investors may perceive it as the sign of economic difficulties; hence, the demand for foreign currency increases. It is observed that central bank generally pursues conservative monetary policy to raise the rate of interest during the period of financial difficulties. Therefore, investors may like to shift their capital in a favorable country. In addition, the KSH is freely convertible only for the current account transactions, but not for the capital account transactions. Funds transfer from capital investment accounts needs official approval of the central bank. As investment capitals cannot flow in and out freely, a higher interest rate in normal economic period may not adequately attract the foreign capital. Lastly, appreciation of the currency of a country with higher interest rate usually occurs when inflation is low (Eichebaum and Evans (1995). Thus, the anomalous results might be explained by the higher inflation in Kenya relative to the USA during the study period. The study therefore found no support for the interest rate parity (IRP) theory (Lemgruber, 2008).

The β coefficient for inflation rate differential was 0.05, suggesting that a unit increase in inflation rate differential causes a 0.05 increase in exchange rate. This was in line with studies that have suggested that countries with higher inflation rates typically experience depreciation of their currency in relation to currencies of their trading partners (Taylor and Taylor, 2004). This study therefore lends support to purchasing power parity (PPP) theory (Cassel, 1922).

The OLS regression model was found to explain only 25% (Adjusted R^2: 0.252) of the variance in exchange rate volatility. The remaining unexplained variation in exchange rate volatility could partly be attributed to other factors not specified in the model and partly to the error term in the regression equation. Thus, other factors suggested in literature, for instance, consistent adverse balance of payments (Kandil, 2009), political pressure (Faia *et al*., 2008) and market sentiment (Hopper, 1997) could be important determinants of exchange rate volatility.

CONCLUSIONS AND RECOMMENDATIONS

This study investigated the effects of interest rate and inflation rate differentials on the exchange rate volatility of Kenya Shillings relative to the USA dollar between January 2000 and July 2014. The study found that an increase in interest rate differential causes an increase in the exchange rate, *ceteris paribus*, which was unusual as higher interest rates are expected to attract higher capital inflows, leading to the appreciation of the currency. However, this could be explained by the high inflation in the country and that higher interest rate in Kenya could lead to capital outflow from the country as investors may perceive it as a sign of economic difficulties; leading to the demand for foreign currency increases. The study thus found no support for interest rate parity (IRP) theory. The study also found that an increase in inflation rate differential causes an increase in exchange rate, which was found to be in agreement with the purchasing power parity (PPP) theory.

The economic variables that determine exchange rate fluctuations are of fundamental concern to every economy. For the government to control the volatility in the exchange rates, there must be appropriate adoption of policies that seek to control interest rates, inflation rates and associated pressures so as to safeguard exchange rate movement that may adversely affect the economic performance.

It is of great importance for policy makers to establish the extent of macroeconomic variables causality on exchange rate dynamics and stability so as to make appropriate decisions for the economic. Prudent analysis of independent macroeconomic variables as was performed in the study is needed in order to construct sound monetary policies that will be of fundamental success to the Kenyan economy. Of concerns is the concept of interest rate parity or differential on the volatility of exchange rate in the economy which was empirically found in the study to have a greater effect, for instance higher interest rate differentials could cause the currency of a country with a higher interest rate to appreciate because of higher capital inflows as depicted by a coefficient of 0.826 change on exchange rate in the results, hence vital in determining the policy implication due to its versatility in transmission mechanisms in the economy ranging from savings, capital formation, investment and economic stability of currency. The contribution of

economic variables on the exchange rate stability will also benefit the economy in the investment potentials and influx of capital from investors who will find the country favorable as it is possible to forecast inflation rate, interest rate and exchange rate trends before making an investment decision.

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