FOREIGN EXCHANGE RATE VOLATILITY AND ITS EFFECT ON INTERNATIONAL TRADE IN KENYA

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ABSTRACT

Exchange rate volatility has received much attention in economic research especially with the advent of floating exchange regimes. The volatile nature of exchange rate is generally perceived as having negative affect on international trade. However, theoretical and empirical perspectives are mixed on the nature of relationship. This study examined foreign exchange rate volatility and its effect on international trade. It used error correction model in analysis of time series data for the period 1966-2018. A negative relationship existed between foreign exchange rate volatility and international trade volumes. Controlling inflation rate, interest rate and gross domestic product, foreign exchange rate had a negative and significant effect on export volumes with a $p<0.05$ and R^2 of 0.9864. Foreign exchange rate volatility have a negative and significant effect on import volumes with a $p<0.05$ and R^2 of 0.9924. Controlling for inflation rate, interest rate and gross domestic product, foreign exchange reserves had a positive and significant moderating effect on the relationship between foreign exchange rate volatility and international trade with $p<0.05$ and R^2 of 0.9557. The study recommends formulation and implementation of policies that address core causes of exchange rate volatility to improve stability to gain maximum benefits from international trade. It also recommends improvement of exports and reduction of overdependence on imports alongside maintaining enough stock of foreign exchange reserves to cushion adverse effects of exchange rate volatility.
Keywords: International trade, Export volumes, Import volumes

INTRODUCTION

International trade can be thought of as the cross-border exchange of goods and services (Vernon, 2017). The origin of international trade can be traced from the early mercantilism period and it has evolved gradually to a modern trade today (Kang, 2016). International trade can be discussed in three dimensions that include the exports, imports and balance of trade of a country (Mogoe, 2013). International trade has been of central interest to researchers across the globe due to the rising significance of the international trade to the growth of any nation. The rising significance of the international trade necessitated the implementation of reforms of trade policy in 1980 as an important objective of structural adjustment programs (Bhagwati, 2005). According to Global Strategic Rivalry theory of international trade, Booth and Erskine (2016) argue that international trade exposes domestic firms to the higher standards practiced by foreign firms and this leads to increased efficiency.

According to the traditional school of thought, there is a connection between international trade and exchange rate volatility. The theory places major emphasis on the behavior of firms building on the assumption that volatility of exchange rate reduces returns of ventures and transactions executed with foreign currency and thus reduce trade to very low levels (Dergi, 2017). Kenya has been experiencing exchange rate volatility between the Kenyan shilling and the US dollar which is the main foreign currency used for exchange in the country. According to Obura and Anyango (2016), the Kenyan shilling exchange against the dollar witnessed all time lowest value of Ksh 36 per dollar in 1993 to the historically highest value of Ksh 106 per dollar in 2015. However, the rate of exchange has continued to fluctuate due to the changing demand of the foreign currency from 2014 to 2017. Exchange rate volatility is usually generated from real exchange rate or real effective exchange rate (Bordo, Choudhri, Fazio & MacDonald, 2017). Exchange rate volatility may pose adverse consequences on international trade, which are due to adjustments of costs and uncertainties due to the fluctuations (Dergi, 2017).

Kenyan economy operates under the floating exchange rate which has been a recipe for the fluctuations and consequently affecting the trade flows. The negative hypothesis of exchange rate volatility on international trade gets back up from a study by Demers (1991) which uses the case of a competitive firm which is uncertain about demand due to the price fluctuations resulting from the unexpected movements of the exchange rates. There has

been inconsistency in research findings showing negative results in the short run and a positive relationship in the long run. In emerging economies like Malaysia, it is observed that increased volatility in exchange rates increases the uncertainty about future behavior of exchange rate (Wong, 2017). Therefore, the exporters will prefer to sell in domestic markets rather than foreign market and exports will be adversely affected. A study by Oshota and Badejo (2015) indicates that developing economies with floating exchange rate have current account deficits exceeding 5%

ceiling which has detrimental effects on the trade flows. This is evident in developing economies like Kenya whereby the unfavorable balance of trade has been very huge due to instabilities in the exchange rate. The Kenyan currency has been losing value over time when compared to U.S dollar (Vass, 2013).

However, there is generally lack of consensus on the effects of exchange rate volatility on international trade (Breitenbach, Tipoy, & Zerihun, 2017). The Kenyan exports to Western Europe particularly United Kingdom and Germany increased from $437 million in 1992 to $672 in 1997 while the exports to African countries increased from $330 million to $971 million in 1997 (OEC, 2015). Kenya majorly imports machinery and capital goods also seems to have been increasing alongside the exports. For instance, the imports totaled to $2928 million in 1996 with the deficit standing at $73.5 million that year while the figure increased drastically to $251.7 million in 2000. According to the Observatory of Economic Complexity (OEC, 2015) in East Africa, in 2015 the Kenyan exports were $5.25B and imports were $17.6B, resulting in a negative trade balance of $12.3B. This explained the negative trend in the balance of payment. According to OEC report of 2016, Ghana exports equaled to $10.5B while the imports equaled to $11B in 2016 an indication that the trade balance deficit was $0.5B. This indicates that international trade levels in Kenya are not favorable for economic growth due to the huge trade balance deficit. The general objective of the study was to determine the effect of foreign exchange rate volatility on international trade in Kenya, while specifications objectives were to determine the effect of foreign exchange rate volatility on export volumes in Kenya, and establish the impact of foreign exchange rate volatility on import volumes in Kenya.

LITERATURE REVIEW
Exchange Rate Volatility and Export Volumes
Klein (1990) investigated the effects of exchange rate volatility on the proportions of the bilateral exports of nine categories of goods from the United States to seven major industrial countries using fixed effects framework. The study adopted monthly data frequency spanning the period from February 1978 to June 1986. The study findings revealed a mixed evidence on the effects of exchange rate volatility on exports. In six categories, the volatility of real exchange rate significantly affects the volume of exports and in five of these categories, the effect is positive with one being negative effect.

Chowdhury (1993) analyzed the dynamic relationship between the volume of export and measure of exchange rate volatility in the context of a multi-variate error-correction model for each of the G-7 countries- Canada, France, Japan, Germany, Italy, United States and United Kingdom. The study adopted annual data frequency spanning the period between 1973 and 1990. The error-correction results indicated that exchange rate volatility has a significant negative impact on the exports in each of the G-7 countries. The studies however, used small sample sizes in estimating the effect of exchange rate volatility on international trade hence the results cannot be relied upon fully to make long run conclusions in regards to exchange rate volatility and international trade. In addition, although the studies used robust estimation methods that pointed out significant and reliable results, the findings could not be used to draw conclusion for the developing nations such as Kenya since it was conducted in developed economies.

Bristy (2014) analyzed the impact exchange rate volatility have on the exports of Bangladesh. The major objective of this study was to investigate how depreciation of the exchange rate and volatility affect exports of Bangladesh. The study adopted annual data frequency for the period between 1980 and 2012. The findings of the study reveal that exchange rate depreciation has a positive impact on the earnings of exports. However, the study noted that the balance of trade in Bangladesh was worsening over time attributing that to exchange rate volatility, which offsets the export growth gained because of exchange rate depreciation. The study found that international trade relies heavily on the long run relationship between the trading nations and change in exchange rate policy would not have immediate effect on the trade flows; hence past year's exchange rate policy plays a key role in augmenting exports.

Soleymani and Chua (2014) investigated the effect of exchange rate volatility on industry trade flows between Malaysia and China. The utilized disaggregated bilateral trade data of 24 exporting industry over the period of 1985 to 2010 testing the short-run and long-run impacts using bounds testing approach and cointegration analysis. The results indicated that exchange rate uncertainty has positive effects on majority of these industries exports. The foregoing studies did not however point out the extent to which exchange rate volatility will affect the exports volumes in a certain country which the current study seeks to establish.

Osoro (2013) using cointegration and error correction modelling investigated the relationship between exchange rate and trade balance in Kenya used annual data for the period 1963 to 2012 to determine the short-run and long-run

effects of determinants of trade balance among them exchange rate. The study results reveal that a positive correlation between exchange rate and trade balance in Kenya in the long-run. Otieno and Mudaki (2011) studied factors influencing real exchange rate and export sector performance in Kenya. The data comprised of annual time series data for Kenya over the sample period 1960 to 2010. The study adopted Error Correction Model due to its ability to combine short-run dynamics and long-run equilibrium model in a unified system. The study found that real exchange has positive effects in the short-run but effects are statistically insignificant. It did not offer exclusively explanation on the relationship between real exchange and export performance. The studies also did not provide statistical evidence of exchange rate volatility effects on total export volume in the long-run.

Exchange Rate Volatility and Import Volumes
Bahmani-Oskooee and Kovyryalova (2008) investigated the impact of exchange rate volatility on trade flows. The study focused on bilateral trade between US and the United Kingdom concentrating on 177 commodities using annual data for the period between 1971 and 2003. The study employed a bounds testing approach to cointegration and error-correction modelling in the analysis. The results reveal that volatility of exchange rate between the dollar and pound has short-run effect on the imports between those two trading nations. In most cases it was witnessed the volatility had adverse effects on the traded commodities. The conclusion was that exchange rate volatility poses a negative effect on imports especially in a floating exchange rate regime.

Khan, Azim, & Syed, (2014) analyzed the impact of exchange rate volatility on trade between Pakistan and trading partners. The study employed monthly data frequency for the sample period between 1970 and 2009. The study used GARCH-based modelling and least-square technique with fixed-effects estimation to measure the volatility impact on demand functions. The findings of the study reveal that exchange rate volatility discourage imports. The studies did not give the results on the short-run impact of exchange rate volatility on imports. Also, the specific action of the estimating equations was typically rather crude, consisting of a few macro variables from standard trade equations in use at time. Oyovwi (2012), investigated the impact of real exchange rate volatility on Nigeria's imports using annual data for the period 1970 to 2009. The study employed Error correction model and cointegration in the analysis of the study variables and found that real exchange rate volatility has not significant effect on imports.

Nyambariga (2017) investigated the effects of exchange rate volatility on imports and exports in Kenya during the period 1980-2015. The study employed cointegration analysis using Johansen test. The results of the study indicate that real exchange rate volatility significantly affects imports in the short-run while in the long-run the impact of volatility on import function is not substantial. The studies did not however employ robust estimation methods in the analysis of the data and also the results did not indicate statistical evidence of the extend of exchange rate volatility on imports. The current study used a large sample size of 53 years hence the findings of the study are more reliable for making inference for the long run relationship between foreign exchange rate volatility and international trade.

METHODOLOGY
This study used Causal research design and Error Correction Model to analyze the effect of exchange rate volatility on international trade using a time series data for the time period spanning from 1966 to 2018.

Model 1
The following model was constructed to reflect the effects of foreign exchange rate volatility on export volumes.
$$\Delta \ln(EXPT)_t = \beta_0 + \beta_1 \Delta \ln(ER)_t + \beta_2 \Delta \ln(FER)_t + \beta_3 \Delta \ln(INFL)_t + \beta_4 \Delta \ln(IR)_t + \beta_5 \Delta \ln(RDI)_t + \beta_6 Dum_1 + \beta_7 Dum_2 + \beta_8 EC_{t-1} + \mu_t$$
Model 2
The following model was constructed to reflect the effects of foreign exchange rate volatility on imports volumes
$$\Delta \ln(IMPT)_t = \beta_0 + \beta_1 \Delta \ln(ER)_t + \beta_2 \Delta \ln(FER)_t + \beta_3 \Delta \ln(INFL)_t + \beta_4 \Delta \ln(IR)_t + \beta_5 \Delta \ln(RDI)_t + \beta_6 Dum_1 + \beta_7 Dum_2 + \beta_8 EC_{t-1} + \mu_t$$

RESULTS AND DISCUSSION
Table 1 shows results of Juselius Johansen cointegration test used to investigate whether a log-run relationship existed between Export volumes and the independent variables. The first null hypothesis indicated that there is no cointegrating equation. The Trace statistics are greater than the critical value 108.3251>95.7537 hence we reject the null hypothesis that there is no cointegrating equation. In the second null hypothesis the trace statistics value is greater than the critical value 75.4507>69.8189 hence we reject the null hypothesis and conclude that there is at most 1 cointegrating equation. The third null hypothesis the trace statistics is less than the critical value

44.6609<47.8561 hence we fail to reject the null hypothesis that there is at most 2 cointegrating equations. This implied that there was cointegration hence showing presence of long-run relationship between export volumes and the independent variables.

Table 1: Cointegration test for export volumes model
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.4818	108.3251	95.7537	0.0051
At most 1 *	0.4598	75.4507	69.8189	0.0166
At most 2	0.3121	44.6609	47.8561	0.0968

Table 2. Cointegration Test for Import Volumes Model
Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.6676	153.1964	125.6154	0.0004
At most 1 *	0.5282	98.1268	95.7537	0.0340
At most 2	0.3691	60.5665	69.8189	0.2184

Results in above table show the Juselius Johansen cointegration test which was adopted to investigate whether a log-run relationship existed between Import volumes and the independent variables. The first null hypothesis indicated that there is no cointegrating equation. The trace statistic was greater than the critical value 153.1964>125.6154 hence rejecting the null hypothesis that there is no cointegrating equation. The second null hypothesis indicated that no cointegrating equation. However, the trace statistics value is greater than the critical value 98.1268>95.7537 hence rejecting the null hypothesis and conclude that there is at most 1 cointegrating equation. In the third null hypothesis, the trace statistic was less than the critical value 60.5665<69.8189 hence we fail to reject the null hypothesis that there is at most 2 cointegrating equations. In conclusion therefore, it is evident that there was presence of cointegration. This implies that there is long-run relationship between the import volumes and the independent variables.

Effect of Foreign Exchange Rate Volatility on Export Volumes in Kenya
Table 3. Vector error correction model on foreign exchange rate volatility and export volumes

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	3.3030	0.7449	4.4343	0.0001
LNEXCHR	-0.0644	0.0915	-0.7032	0.0156
LNFER	0.0169	0.0496	-0.3412	0.7345
LNINFL	0.0817	0.0223	3.6703	0.0006
LNIR	-0.0097	0.0210	-0.4651	0.6441
LNGDP	0.8069	0.0758	10.6451	0.0000
Dummy1	0.0444	0.0581	0.7651	0.4482
Dummy2	0.2845	0.1511	1.8838	0.0661
R-squared	0.9864	Mean dependent var		21.6120
Adjusted R-squared	0.9843	S.D. dependent var		0.9915
S.E. of regression	0.1243	Akaike info criterion		-1.1946
Sum squared resid	0.6949	Schwarz criterion		-0.8972
Log likelihood	39.6560	Hannan-Quinn criter.		-1.0802
F-statistic	466.4997	Durbin-Watson stat		1.0403
Prob(F-statistic)	0.000000			

Table above shows regression results for the existence of long run relationship between foreign exchange rate volatility and export volumes. The coefficients of the constant, foreign exchange rate, foreign exchange reserves,

inflation rate, interest rate, gross domestic product, dummy representing exchange rate regimes, dummy representing structural breaks and residual were 3.3030, -0.0644,0.0169,0.0817, -0.0098,0.8069,0.0444 and -0.2845 respectively. The regression constant was 3.3030 implying the value of export volumes other variables are equal to zero. The model was found to be significant as indicated by the p-value of 0.000<0.05 hence rejecting the null hypothesis that the model is not significant. The R^2 was 0.9864 implying that the independent variables predicted 98.64% of changes in export volumes.

The model was represented as;

$$LNEXPT = 3.3030 - 0.0644LNEXCHR + 0.0169LNFER + 0.0817LNINFL - 0.0098LNIR + 0.8069LNGDP + 0.0444Dummy1 - 0.2845Dummy2$$

Foreign exchange rate had a significant negative effect on export volumes since 100% change in foreign exchange rate would result to 6.44% change in export volumes in the opposite direction holding other factors constant. The findings were consistent with those of Bristy (2014), Soleymani and Chua (2014) who found that exchange rate uncertainty has positive effects on exports. The inconsistency could have been caused by the different methodology used. The findings were consistent to those of Chit, Rizov, & Willenbockel, (2010) who investigated the impact of bilateral real exchange rate volatility on real exports of five emerging East Asian nations and it was discovered that foreign exchange rate volatility had a negative influence on exports volumes. The consistency could be attributed to similarity in methodology used in this study and the other studies.

A positive significant relationship was identified between foreign exchange reserves and export volumes whereby a 100% change in foreign exchange reserves prompted a 1.69% change in export volumes in the same direction. The findings were found to be consistence with those of Polterovich, & Popov (2003) who found that accumulation of foreign reserves positively influences export-led growth through triggering exports externally. A negative relationship existed between export volumes and interest rate whereby a 100% change in interest rate would result to 0.98% in export volumes in the opposite direction. This implied that an inverse relationship existed between export volumes and interest rate whereby when interest rate increases, the export volumes decreases and vice versa. There was a positive relationship between export volumes and gross domestic product whereby a 100% change in GDP resulted to 80.69% change in export volumes in the same direction. A positive relationship was witnessed between inflation rate and export volumes since a 100% change in inflation would result to 8.17% change in export volumes in the same direction. The results are consistency a study by Kiganda, Obange, & Adhiambo, (2017) who found that inflation had significant long-run effects on total exports. Similarly, the results are in agreement with those of a study by Ahmed, Ghauri, Vveinhardt, & Streimikiene, (2018) who found that a 1% increase in exports would also result to 0.63% increase in inflation rate.

The dummy variable representing flexible foreign exchange rate regime adopted between 1993 to 2018 exhibited positive effects on export volumes since the flexible regimes allowed swift reactions to changes in foreign exchange rates through the forces of demand and supply hence exports volumes improved due to conducive exchange market. When the government adopts the flexible regime, the exporters are able to transaction in the international market effectively since the forces of demand and supply regulate the amount of foreign currency which is used in such transactions. At no time will there be deficiency in foreign currency since exchange market is always at equilibrium.

The dummy variable representing structural breaks exhibited negative effect on export volumes owing to the destructions on the economic activities. The major structural breaks captured within the study period included the breakdown of East Africa Community in 1977, the attempted coup d'état of 1982, the first tribal clashes of 1991, 1992 multi-party clashes, the 2007/8 post-election violence and the 2009 global financial crisis that affected international trade and negatively influencing export volumes in Kenya. During these periods, the economic productivity is slowed down which leads to low supply of goods and services alongside affecting the surplus which should be used for export purposes. The breakdown of the East Africa Community in 1977 affected the economic integration between Kenya and her neighbors and consequently affected export volumes. The global financial crisis which hit the world in 2009 weakened the international market by making the usual buyers of Kenyan exports unable to purchase a lot of goods due to financial constraints which adversely affected export volumes.

Table above shows regression results for the existence of long run relationship between foreign exchange rate volatility and import volumes. The coefficients of the constant, foreign exchange rate, foreign exchange reserves, gross domestic product, interest rate, inflation rate, dummy representing exchange rate regimes and dummy

representing structural breaks were -1.0075, -0.2083, 0.0264, 1.0328, 0.0495, 0.0114, 0.4047, and -0.0090 respectively. The regression constant was -1.0075 implying the value of import volumes when other variables are zero. The model was found to be significant as indicated by the p-value of 0.000<0.05 hence rejecting the null hypothesis that the model is not significant. The R^2 was 0.9924 implying that the independent variables predicted 99.24% of changes in import volumes.

Effect of Foreign Exchange Rate Volatility on Import Volumes in Kenya
The model was represented as:

$$LNIMPT = -1.0074 - 0.2083LNEXCHR + 0.0264LNFER + 1.0328LNGDP + 0.0495LNINFL \\ + 0.0114LNIR + 0.4047DUMMY1 - 0.0090DUMMY2$$

The import volumes and the foreign exchange rate were found to have a negative significant association since a 100% change in foreign exchange rate would result to 20.83% change in import volumes in the opposite direction. The findings are consistent to those of Khan et al. (2014), Osei-Assibey (2017), who found that foreign exchange rate volatility had a negative effect on import volumes. The results are contrary with the findings of Sabri, Laban, Khaled, & Peeters, (2012) who revealed that exchange rate volatility makes imports cheaper hence increasing hence implying positive effects. A positive relationship existed between import volumes and foreign exchange reserves as indicated by the positive coefficient whereby 100% change in foreign exchange reserves would result to 2.64% change in import volumes in the same direction. The findings were coherent with the study findings of a study by Arize, & Malindretos, (2012) who studied foreign exchange reserves in Asia and its effects on import demand and found that when foreign exchange reserves increase triggers increase in import demand due to increase in funds.

Table 4. Vector error correction model on foreign exchange rate volatility and import volumes

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	-1.0075	0.6467	-1.5578	0.1263
LNEXCHR	-0.2083	0.0795	-2.6206	0.0119
LNFER	0.0264	0.0431	-0.6140	0.5423
LNGDP	1.0328	0.0658	15.6931	0.0000
LNINFL	0.0495	0.0193	2.5611	0.0139
LNIR	0.0114	0.0182	0.6272	0.5337
DUMMY1	0.4047	0.1312	3.0861	0.0035
DUMMY2	-0.0090	0.0504	-0.1795	0.8584
R-squared	0.9924	Mean dependent var		21.8415
Adjusted R-squared	0.9912	S.D. dependent var		1.1528
S.E. of regression	0.1079	Akaike info criterion		-1.4771
Sum squared resid	0.5238	Schwarz criterion		-1.1797
Log likelihood	47.1437	Hannan-Quinn criter.		-1.3628
F-statistic	841.5872	Durbin-Watson stat		1.1925
Prob(F-statistic)	0.000000			

The relation between interest rate and import volumes depicted a significant positive association whereby a 100% change in interest rate would result to 1.14% in import volumes in the same direction. This was an implication that increase in rise in interest rate triggers growth in import volumes because the currency appreciates hence making import cheaper hence increasing in the long-run. A positive relationship was found to exist between gross domestic product and import volumes. This was because 100% change in GDP would result to 103.28% change in import volumes in the same direction. The results are similar to findings of a study conducted by Todshki, & Ranjbaraki, (2016) which found that gross domestic product has positive influence on imports.

A positive relationship existed between inflation rate and import volumes with 100% in inflation rate resulting to 4.95% change in import volumes in the same direction. The study is consistent with the findings of Ahmed, Ghauri, Vveinhardt, & Streimikiene, (2018) who found that 1% increase in imports would result to 0.57% increase in inflation. The dummy variable representing flexible foreign exchange regime positively influences international trade since there is usually ease of attaining equilibrium in the foreign exchange market through interaction of demand and supply. Flexible exchange rate regime creates a conducive environment for traders in the international trade to complete their transactions effectively since the foreign currency used is readily available. This was noted

by the positive relationship between the dummy and import volumes implicated by the positive coefficient which implied the more flexible the exchange rate regime, the higher the ease of importing the most needed goods and services within a country due to affordability. The dummy variable representing the structural breaks captured under this study exhibited negative effect on import volumes which was attributed to economic activities slowdown witnessed adversely affected international trade.

CONCLUSION

The study revealed that in both short-run and long-run, export volumes are influenced by exchange rate, foreign exchange reserves, interest rate, inflation rate and gross domestic product. Foreign exchange rate and foreign exchange reserves negatively and positively affect export volumes, respectively. Foreign exchange rate volatility was observed to influence imports volumes in Kenya both in the long-run and short-run. Uncertainties in the exchange rates make the prices of imports unpredictable which in the long run may affect import volumes.

The empirical estimation concludes that foreign exchange rate volatility affects international trade depending on the perspective of the traders in relation to risk. Basically, it was observed that foreign exchange rate volatility has both negative and positive effects to the international trade volumes which adversely affect the gains a country reaps from the cross-border trade. Stability of the exchange rate will aid the nation maintain stable balance of payment which is essential for the growth of any nation.

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