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# IMPACT OF EXCHANGE RATE VOLATILITY ON KENYA'S TEA EXPORTS

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**Abstract**

*This paper sought to investigate the extent to which exchange rate volatility affects performance of tea exports. The objective was to determine the impact of exchange rate volatility on tea exports, the contribution of tea exports earning to Kenya's economy and draw policy recommendations emanating from empirical findings for enhancing tea exports. This paper investigated the behavior of exchange rate volatility on performance of tea exports using time series. Johansen and Julius Multivariate cointegration technique was applied to annual time series data for the period of 1970-2008 in order to recognize the short run and long run behavior of the variables in the study. Cointegration and error correction technique (ECM) developed by Engle and Granger was used. Dickey fuller (DF) and Augmented Dickey Fuller (ADF) unit root test for stationarity was employed in this study. Phillips Perron (pp) on first difference was adopted to test stationarity in their first difference and testing cointegration feasibility. The data was sourced from central bank of Kenya, Kenya National Bureau of Statistics, Tea Board of Kenya and the International financial statistics of International Monetary Fund (IMF). The results indicate that exchange rate volatility negatively affects performance of tea exports in the country. This paper recommends periodic monitoring of the exchange rate so as to reduce its impact and drawing of fiscal and monetary policy that will make exchange rate manageable.*

*Keywords: Exchange rate volatility, Tea exports, Kenya, cointergration, multivariate, financial statistic's*

## INTRODUCTION

Kenya relies heavily on the agricultural sector as the base for economic growth, employment creation and foreign exchange generation. Exports of agricultural products are of vital importance to the economies of less developed countries. Problems of employment, balance of payments, income distribution, and price and income stabilization are thus directly related to the agricultural export sector.

Ten percent of Kenya's population depends directly or indirectly on the Tea sector in terms of employment and income. Kenya 's tea is sold at Mombasa tea auction under the auspices of the East African tea trade association (EATTA) whose member ship consists of brokers, buyers, producers ware house men and packers. Over 84 % of Kenya's tea is sold at the auction. In the world teas are offered at the auction by brokers on behalf of the producers. They invite bids in US Dollars per kilogram and knocked to the highest bidder, tea bought from the auction is mainly exported. The exchange rate in Kenya shilling against the US Dollar will determine the tea export earnings at that particular time.

Agriculture sector performed well from independence accounting for 40% of GDP in 1963. Its performance in the recent year has been declining enormously (24% of GDP in 2004) (statistical Abstract 2004). Despite the downward trend, the sector plays a leading role in the economy. In 2004 agricultural sector in Kenya provided employment for over 80% of the total population and accounted for over 70% of foreign exchange earnings mainly from tea, coffee and horticulture (Economic survey 2005). Tea industry is the largest employer in the agricultural sector and almost 10% of Kenya's population depends directly or indirectly on the tea industry.

### Tea and the Kenyan economy

Despite the fluctuation of growth rates of the agricultural sector, tea has been contributing favourably to the Kenyan economy in terms of value of exports which are important in generating foreign exchange. Tea contributes more than 20% of total foreign exchange earnings. To show this, in 2002 tea contributed 26% of the total agricultural commodity export.

In Kenyan economy the exchange rate is determined by the Central bank of Kenya. Tea proceeds are in terms of US Dollars the exchange rate regime that will be applied will determine the foreign exchange earned from tea exports, though other factors like foreign income of importing country, export prices relative to world non fuel primary commodity prices of tea exports, income of importing countries affects tea exports. These are some of the challenges the tea sector exports have been facing and that led to the need for this study.

**Problem statement**

An analysis of Kenyan export performance shows that the country has been able to expand its export volume to compensate for losses due to deteriorating terms of trade. Though 26% of export earning still accrue from export of tea, there has been a decline in the value of domestic tea export from Kenya, since the year 2000, despite aggressive market campaigns by tea firms. This is attributed mainly to the strength of Kenyan shilling against the US Dollar. In other words, the appreciation of the Kenyan shilling will lead to low tea earnings from exports. Low foreign exchange earnings constrains importation of vital raw materials which affects tea quality. In such a situation, and given that tea is one of the main mainstay of Kenya economy, an increase in tea earnings is expected to contribute significantly to the alleviation of economic problems (unemployment, balance of payment, budget deficit, unequal income distribution, debt issues).

The impact of exchange rate volatility on agricultural exports is well documented in literature (Arize 1995); Arize, et.al. (2000, 2004); Batten, et. Al. (1984); and Cannon, et. Al.(2005), According to a study by Adubi (1999) exchange rate volatility has a significant negative effect on agricultural exports, Tea export markets are volatile and significantly influenced by many factors, export prices income of importing countries, and of particular importance the exchange rate volatility. Each of these factors can have adverse effects on tea exports. In this study the author zeroed on tea exports before and after economic liberalization since many studies on exchange volatility were done after economic liberalization, the inclusion of the period before economic liberalization is expected to enrich the study. The question that begs answers, is to what extend have these factors especially exchange rate volatility influenced the volume, value of earnings from tea exports.

**Objectives of the study**

The overall aim of this study was to examine the impact of exchange rate volatility on the performance of Kenya's tea exports. The knowledge of the impact of such volatility of exchange rate will facilitate in the determination of an exchange rate regime that favors tea exports and by extension increase foreign exchange earnings.

***Specific objectives***

1. To determine the existence of a functional relationship between the exports on one hand and a set of independent factors on the other hand among them being exchange rate.
2. To determine whether there is a long run relationship between exchange rate fluctuations and performance of tea exports.
3. To estimate the impact of exchange rate volatility on performance of tea exports.
4. To draw policy recommendations for enhancing tea exports.

**Justification of the Study**

There are much widening disparities in income distribution between the rural and urban areas which is a worrying phenomenon, and must be adequately dealt with. More than 60% of tea grown in Kenya is grown by small scale farmers who form the bulk of producers in the country which fall in the rural areas, (the national tea committee, bulletin of statistics, 2000). Those with small acreages can generate reasonable earnings from tea. Tea is labor intensive and employment can be achieved through production of tea. These employment opportunities will depend on tea exports. Exchange rates fluctuation has negative effects on agricultural exports. The more volatile the exchange rate changes, the lower the income earnings of farmers, which subsequently leads to a decline in output production and a reduction in export trade.

An appreciation of local currency decreases exports earnings and vice versa. The implication is that monetary authorities should adopt a mechanism that will lead to the stability of the exchange rate. Empirical results of this study will enable us determine the best exchange rate regime favourable to the tea sector.

The study covered Kenya's tea exports in relation to monthly exchange rates from 1970 to 2008 using Secondary data, from CBK, IFS, KNBS and TBK.

**LITERATURE REVIEW**

Exports of agricultural products have played a vital role in economic growth of many developing countries. However the structural adjustment programmes of 1980's disrupted the positive trend of foreign exchange earnings derived from these crops (Nzioki, 2002). This section surveyed the theoretical and empirical issues relevant to the objectives raised.

Despite the prediction of purchasing power parity theory, it is a well documented fact that the real exchange rate between countries fluctuates over time. Real fluctuation in relative prices of countries has various impacts on their economies and trade flows. A positive effect of a real depreciation has been found at the firm and sectoral level but the effect at the aggregate level has been found to be positive and negative in different countries (Mariana Colacelli, 2008).

A larger number of recent studies focus on effects of exchange rate volatility Arize (1995), Arize et al (2004). The 2004 study by, Arize Osang and Slottje (2004) investigated the impact of real exchange rate volatility on the export flows of eight Latin American countries over the quarterly period 1973 – 1997. The results show that increases in the volatility of the real effective exchange rate exert a significant negative effect upon export demand in both the short – run and long – run. The long – run elasticities range from a low of 0.10 in the Dominican Republic to a high of 0.69 in Venezuela, implying that exchange rate volatility exerts a significant adverse long – run effect on export volume.

Cameron, Kihangire and Ports (2005) investigated the effects of exchange rate variability on Uganda's tropical freshwater fish exports. The empirical evidence suggests that Uganda's exports of fish were negatively and significantly correlated with exchange rate volatility. Similarly, Vergil (2002) investigated the impact of real exchange rate volatility on the export flows of Turkey to the United States and its three major trading partners in the European Union for the period 1990: 1 2000: 12. The exchange rate volatility measures are negative for all countries and are significant at 1 % level for France and Germany and at 10 % for the U.S. The results obtained provide evidence that the real exchange rate volatility has a significant long – run effect on real exports. Frey (2005) also finds significantly negative coefficients for the exchange rate uncertainty measure in the case of Canada, the United Kingdom and the United States. In the case of Canadian pork and live swine exports, Fabiosa (2002) finds that the volatility of the exchange rate has a negative impact

Kiptui Kandie (2005) studied the movements of the Kenya shilling exchange rate and he argued that the Kshs exchange rate has gone through various cycles. The shilling depreciated by 78.2% in January 1995, to October 2000 followed by a period of relative stability in October 2000 to November 2004. Recently however, the shilling has experienced a strong appreciation. The large swings in the shilling exchange rate are also associated with varying degrees of volatility. Volatility was highest during the period just after liberalization, that is, January 1995 to October 2000 and lowest in the period from October 2000 to November 2004. Since then, however, the shilling experienced prolonged appreciation in nominal and real terms up to the end of 2007. The fluctuation in the exchange rate has attracted public attention especially from exporters who have argued that the strengthening shilling is eroding their competitiveness.

Estimating the aggregate and individual agricultural export supply, Fosu (1992) noted that RER of a domestic currency does not influence the economy's agricultural exports directly; instead, it influences agricultural export through its effects on the incentive structure. In his study at 5% level, the lagged export variable turned out to be the only significant variable in the aggregate mode.

## RESEARCH METHODOLOGY

### Research Design

This study used a theoretical and empirical approach based on case study and historical designs in Kenya. This study used the export demand frame work to determine the impact of foreign rate volatility on the performance of tea exports.

**Model specification**

In analyzing the commodity exports the researchers adopted the traditional export frame work that was put forward by Goldstein and Khan (1978) and has been used in several studies for example, Chowdhury (1993), Arize (1995), Arize, Osong and Slottje (2000) and Kiptui Moses (2008). This export demand framework postulates a long-run relationship between exports, foreign economic activity, relative prices and exchange rate volatility.

The above frame is given as follows:

$$\ln X_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 V_t + \varepsilon_t \quad \text{.....(1)}$$

*Where* $X_t$ = Tea exports

$Y_t$ = foreign income proxied by the industrial production index of industrial countries.

$P_t$ = export prices relative to world non fuel primary commodity prices and

$\varepsilon_t$ = an error term.

$V_t$ = measure of risk or uncertainty given by the 12- months moving average of the standard deviation ($\sigma$) of absolute changes in the real effective exchange rate.

Several studies have such a time varying measure of exchange rate variability to account for periods of high and low exchange rate volatility (see Chowdhury, 1993:Lastrapes and koray, 1989; Kenen and Rodrik 1986 and Arize et al 2000) and define volatility as the measure of risk or uncertainty given by the 12- month moving average of the standard deviation of absolute changes in the real effective exchange rate.

The following is the formulae for finding volatility:

$$V_t = \left[ (1/m) \sum_{i=1}^{m} \left( \ln R_{t+i-1} - \ln R_{t+i-2} \right)^2 \right]^{1/2} \quad \text{.....(2)}$$

Where $V_t$ is exchange rate volatility, $m$ (=12 in this case) is the order of the moving average, and $R_t$ is exchange rate at a given point in time.

The role of exchange rate volatility is to consider the currency movement effects through uncertainty.

The above export demand frame work was modified in this study so as to include dummy variable (du) in the analysis which are perceived to influence the dependent variable, before and after liberalization.

Hence, following is the modified model adopted in the study

$$\ln X_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 V_t + du + \varepsilon_t \quad \text{.....(3)}$$

In this study the Johansen multivariate approach introduced by Johansen (1988) is applied in order to establish the existence of a long – run or equilibrium relationship and the maximum eigenvalue statistic is used to test for the existence of cointegration.

Upon confirmation of existence of cointegration among the variables, an Error Correction Model (ECM) is estimated to capture the short-run dynamics. ECM corrects for disequilibrium or it is a means of reconciling the short run behavior of an economic variable with its long run behavior and is as follows.

$$\Delta \ln X_t = \alpha_0 + \alpha_1 ECT_{t-1} + \sum \beta_i \Delta \ln X_{t-i} + \sum \gamma_i \Delta \ln Y_{t-i} + \sum \tau_i \Delta \ln P_{t-i} + \sum \theta_i \Delta V_{t-i} + \sum + \omega_i du_t + \varepsilon_t . \quad \text{.....(4)}$$

Equation (4) = Estimated with a five lag structure for volatility and foreign income proxie and one lag period for the rest of the variables all the variables, a constant term and one period lagged error correction term

$\Delta$ denotes first differences

$X_t$ = exports

$ECT_{t-1}$ = The lagged error correction term and is the residual from the cointegrating regression. If there exist two cointegrating vectors, the two error correction terms will be included in the above error correction model. ECT~I(0), captures the adjustment towards the long-run equilibrium.

$\alpha_0$ = constant term or intercept

$\alpha_1$ = the proportion of the disequilibrium in the export demand in one period corrected in the next period.

$\beta_i$ = coefficient of lagged export demand

$\gamma_i$ = coefficient of lagged foreign income proxied by the industrial production index of industrial countries.

$\tau_i$ = coefficient of lagged export prices relative to world non fuel primary commodity prices

ω is the coefficient of the dummy variable

$\theta_i$ = coefficient of lagged measure of risk or uncertainty given by the 12- months moving average of the standard deviation ($\sigma$) of absolute changes in the real effective exchange rate.

*Du* is the dummy variable that captures for the period before liberalization and after liberalization. Where 0 before and 1 after liberalization.

The coefficients, $\beta_i$ , $\gamma_i$ , $\tau_i$ , $\theta_i$ ω show how the average speed of export demand adjustment may differ depending on whether adjustments is in responses to lag export demand, foreign income proxied by the industrial production index of industrial countries, export prices relative to world non fuel primary commodity prices, measure of risk or uncertainty given by the 12- months moving average of the standard deviation ($\sigma$) of absolute changes in the real effective exchange rate shocks.

If for example the coefficients $\gamma_i > \beta_i > \tau_i > \theta_i >$ δi it implies a faster response of export demand to lagged foreign income proxied by the industrial production index of industrial countries than lagged export demand to lagged export prices relative to world non fuel primary commodity prices and lagged measure of risk or uncertainty given by the 12- months moving average of the standard deviation ($\sigma$) of absolute changes in the real effective exchange rate and inflation rate.

**Cointegration analysis**

Cointegration tests are conducted in case of non-stationarity of the series to ensure long run relationships. The long run equilibrium relationship among the variables was tested via Johansen (1988) and Johansen and Juselius (1990) approaches. The method is superior to the Engle-Granger (1987) two-step procedure in the estimation of both long-run relationships and Error Correction Models (ECM), as is applicable in a multivariate case that might be linked by more than one cointegrating vector. The Johansen and Juselius approach also determines the number of cointegrating vectors and provides estimates of these vectors together with estimates of the adjustment parameters.

The test for the number of significant characteristic roots of a matrix is found via the Trace Statistic Test. After determining the long run relationship between exchange rate volatility and the explanatory variables, the short run dynamics of the relationships are examined.

The cointegration regression (Engle and Granger, 1987) is carried out where the residual obtained from the equation of the linear *I* (1) series is taken as the valid error-correction term which is then built into an error-correction model (ECM).

Before carrying out the cointegration tests, we will first carry out the unit root tests of the time series properties of the concerned variables outlined in the model below:

$$\ln X_t = \alpha + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 V_t + + du + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

In summary, the modeling strategy to be adopted in this study involves three steps:

a) Determine the order of integration of the variables by employing Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF) and Phillips-Perron (1988) unit-root tests;
b) if the variables are integrated of the same order, we will apply the Johansen – Juselius (1990, 1992, 1994) maximum likelihood method of cointegration to obtain the number of cointegrating vector(s); and
c) If the variables are cointegrated, we can specify an error correction model and estimate it using standard methods and diagnostic tests.

**The Data**

This study employed secondary data from various sources, Export volumes, prices of tea and real exchange rates were obtained from Central Bank of Kenya (CBK) export volumes are in tones while export prices are in US Dollars. The real exchange rates are computed through a weighing process.

The other source of data was the International Financial Statistics (IFS) of the IMF. world non –fuel commodity prices which together with export prices were used to derive relative prices. Time series data was analyzed using microfit4.0

**ANALYSIS & FINDINGS**

**The Augmented Dickey-Fuller test for unit root**

Before undertaking the Granger-type causality test specified under equation (1), the study conducted a formal test to confirm the time series properties. The researchers employed the augmented Dickey-Fuller (ADF) unit root procedure to test the level of integration for the variables concerned.

The variables in the series where found to have at least unit root between them (see table 1). The null hypothesis of the series being non-stationary is accepted in levels, however from the results from the table it is evident that there is exist a unit root for the data observed under the study.

Table 1 Unit root tests for residuals

Based on OLS regression of $LX_t$ on:

C $LY_t$ $LP_t$ $LV_t$ DU

39 observations used for estimation from 1970 to 2008

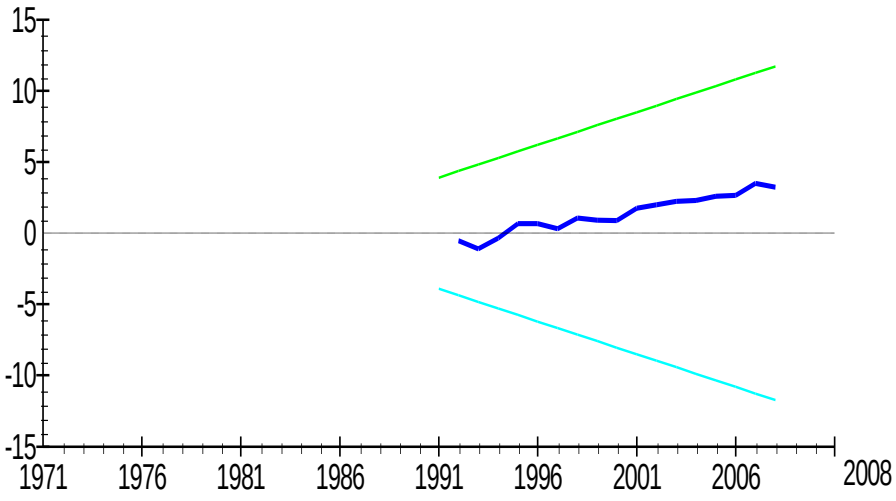
| | Test Statistic | LL | AIC | SBC | HQC |
|---|---|---|---|---|---|
| DF | -4.0483 | 44.3806 | 43.3806 | 42.6323 | 43.1288 |
| ADF(1) | -3.2897 | 44.3806 | 42.3806 | 40.8841 | 41.8771 |
| ADF(2) | -1.9759 | 46.0618 | 43.0618 | 40.8170 | 42.3065 |
| ADF(3) | -1.5922 | 46.2031 | 42.2031 | 39.2100 | 41.1960 |
| ADF(4) | -1.3937 | 46.2411 | 41.2411 | 37.4999 | 39.9823 |

95% critical value for the Dickey-Fuller statistic = -4.8513
LL = Maximized log-likelihood AIC = Akaike Information Criterion
SBC = Schwarz Bayesian Criterion HQC = Hannan-Quinn Criterion

**The Stability Test**

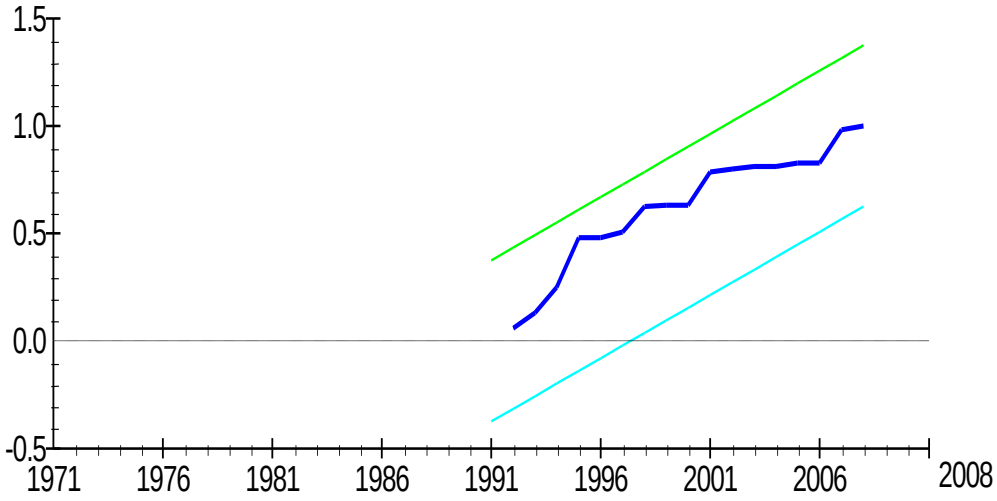
In interpreting the foregoing long-run model it was implicitly assumed that the sample coefficients remained stable throughout the period. Inference drawn on the strength of the full sample estimate might be invalid if it happens that the coefficients were indeed not stable. The plot of the CUSUM test and CUSUM of Squares test (Brown *et al*, 1975) show that no errors were statistically significant over the study period. Instability would have been shown by movement of the residue plot outside the critical lines in any of the two graphs below.

Figure 1 Cumulative Sum of Recursive Residual




The straight lines represent critical bounds at 5% significance level

Figure 2 Cumulative Sum of Squares Recursive Residual




From the above stability test, we conclude that the stability of the long-run model is remarkable considering the large number of important reforms undertaken during the 1980s and 1990s. This also indicates that the model is well specified.

**Cointegration Analysis**

The researchers proceeded to conduct the multivariate cointegration test applying the Johansen and Juselius (1990) maximum likelihood estimation procedure. As the selection of the correct order of ARDL is important in this type of examination, and given the nature of the sample size, lag order selection by either the Akaike information criteria (AIC), or by the Schwartz Bayesian criteria (SC) is recommended (Pesaran, 1997), this study employed the Akaike information criteria.

The results from the cointegration analysis (Table 2) show that when one lag is used (one lag is sufficient for data using annual observation), the null hypothesis of no cointegration (r<= 2) between variables *(exps-*$v_t$*)*, is rejected at 5 per cent or 10 per cent using either the trace test or maximum eigenvalue test. This provides evidence on the existence of at least one cointegrating vector in the model and therefore I conclude that the variables exhibit a long-run association between them.

Table 2 Cointegration results

Cointegration with unrestricted intercepts and restricted trends in the VAR

Cointegration LR Test Based on Maximal Eigenvalue of the Stochastic Matrix

39 observations from 1970 to 2008. Order of VAR = 3.

List of variables included in the cointegrating vector:

$X_t$ $P_t$ $Y_t$ $V_t$

Trend

List of I(0) variables included in the VAR

du

List of eigenvalues in descending order:

.65434 .56671 .53393 .40325 .22003 .0000

| Null | Alternative | Statistic | 95% Critical Value | 90% Critical Value |
|---|---|---|---|---|
| r = 0 | r = 1 | 37.1807 | 37.8600 | 35.0400 |
| r<= 1 | r = 2 | 29.2721 | 31.7900 | 29.1300 |
| r<= 2 | r = 3 | 26.7195 | 25.4200 | 23.1000 |
| r<= 3 | r = 4 | 18.0688 | 19.2200 | 17.1800 |
| r<= 4 | r = 5 | 8.6977 | 12.3900 | 10.5500 |

Use the above table to determine r (the number of cointegrating vectors).

Cointegration with unrestricted intercepts and restricted trends in the VAR

Cointegration LR Test Based on Trace of the Stochastic Matrix

39 observations from 1970 to 2008. Order of VAR = 3.

List of variables included in the cointegrating vector:

$X_t$ $P_t$ $Y_t$ $V_t$

Trend

List of I(0) variables included in the VAR:

OE DU

List of eigenvalues in descending order:

.65434 .56671 .53393 .40325 .22003 .0000

| Null | Alternative | Statistic | 95% Critical Value | 90% Critical Value |
|---|---|---|---|---|
| r = 0 | r>= 1 | 119.9389 | 87.1700 | 82.8800 |
| r<= 1 | r>= 2 | 82.7582 | 63.0000 | 59.1600 |
| r<= 2 | r>= 3 | 53.4861 | 42.3400 | 39.3400 |
| r<= 3 | r>= 4 | 26.7665 | 25.7700 | 23.0800 |
| r<= 4 | r = 5 | 8.6977 | 12.3900 | 10.5500 |

Having established this, the study then proceeded to estimate an error-correction model based on equation (4) to investigate bi-directional causality between exports and $v_t$

Table 3 Error Correction Representation for the Selected ARDL Model
ARDL(2) selected based on Akaike Information Criterion

Dependent variable is dX

39 observations used for estimation from 1970 to 2008

| Regressor | Coefficient | Standard Error | T-Ratio[Prob] |
|---|---|---|---|
| $dX_t$ | -.73764 | .16253 | -4.5384[.000] |
| dC | 318085.3 | 169725.7 | 1.8741[.070] |
| $Dp_t$ | 60.1529 | 35.1453 | 1.7115[.096] |
| $dY_t$ | -44.38357 | 13.71723 | 3.2356[.003] |
| $dV_{t-5}$ | -63.2944 | 31.5923 | -2.0035[.008] |
| ddu | .053084 | .021194 | 2.5046[.017] |
| ecm(-1) | -.82167 | .083959 | -9.7866[.003] |

ecm = X -3.87E+0.7*C - 7.320.8*$P_t$ + 6.4605*$Y_t$ – 0.7703164*$V_{t-5}$ + 0. 54016.5*du

| | | | |
|---|---|---|---|
| R-Squared | .66163 | R-Bar-Squared | .59196 |
| S.E. of Regression | 2.529.7 | F-stat. F( 7, 34) | 9.4973[.000] |
| Mean of Dependent Variable | .14864 | S.D. of Dependent Variable | .39601 |
| Residual Sum of Squares | 2.18E+08 | Equation Log-likelihood | -384.2631 |
| Akaike Info. Criterion | -392.2631 | Schwarz Bayesian Criterion | -399.2138 |
| DW-statistic | 2.0167 | | |

*R-Squared and R-Bar-Squared measures refer to the dependent variable*

The lagged error correction term is negative, significant and the coefficient is less than unity. This means that the error correction model is well specified and also confirms our earlier findings on the Cointegration of the variables.

The test statistics are satisfactory. The goodness-of-fit variable ($R^2$) show that the exogenous variables account for 66% of the variations in exports in the short run. The DW statistic is 2.02 and larger than $R^2$, implying that the regression is not spurious. From the diagnostic test statistics, the null hypotheses of the absence of residual autocorrelation, normality, misspecification and heteroskedasticity in the residual cannot be rejected.

As the variables are expressed in logarithmic form, the coefficients are interpreted as elasticities. The error-correction term (*ecm*) is negative as expected, and significant (high absolute *t*-statistic). The strong significance reinforces the argument of the model variables being cointegrated. The adjustment of the model to the previous year's disequilibrium is 82.1%.

The regression results should be interpreted cautiously. The immediate price effect (depreciation of real exchange rate) is statistically insignificant while the same variable lagged five periods is significant but negative. This could be explained by the fact that adjustments to price response in the short run are not likely to be considerable. Nonetheless, export prices (both current and lagged) have a positive influence on volume of tea exports in the short run. Surprisingly, foreign income has an unexpected negative sign. This could be explained by the shifting markets for the Kenyan commodities, especially with the rising economic integration and the decline in exports to the European Union. Liberalization is found to have positive impact on tea exports.

**The Granger causality test**

Table 5 provides the results of the error correction model that would be used for causality test between variables. The estimated results show that bi-directional Granger causality exists between performance of tea exports and exchange rate volatility based on the F-statistics for the joint significance of the autoregressive terms. This observation supports previous finds by M C Kiptui (2008), and Prof Ndungu et al (2006). Similarly, the null hypothesis ' exchange rate volatility does not Granger cause exports change ' is rejected, The results shows that the null hypothesis 'Granger no-causality from exchange rate volatility to exports growth' can be rejected at 10 percent level of significance based on the statistical significance of the error correction term.

Finally, the results indicate a negative relationship between exchange rate volatility and tea exports although this is not significant when current values are used, implying that tea exports are not price elastic. However the same variable lagged five periods gives statistically significant results. These findings are in line with Prof Ndungu et al 2006 and Kiptui (2008) who also found out the same results.

**Discussion of findings**

The study was aimed at finding out the relationship between exchange rate fluctuations and the performance of tea exports in Kenya. This study was motivated by the Quist for knowledge and the need to draw policy recommendation that can be adopted.

The study found the following.

That there exists a significant impact of exchange rate volatility on performance of tea exports in Kenya, this effect is also noted to be negative as is depicted from the coefficients of the regression results. A 1% increase foreign exchange volatility leads to a decrease of 63% in tea exports.

It is also seen that there exist a strong relationship between performance of tea exports and foreign income, the finding is that foreign incomes have significant effect on performance of Tea exports implying that tea export growth can been driven by factors which are beyond the control of local policy makers. This implies that external developments are important in influencing performance of Tea exports. Though capital inflows are driven by both push and pull factors, recent inflows to Kenya are considered to be growth-related thus suggesting a role for pull factors. A 1% increase in foreign income leads to a 44% decrease in performance of tea exports.

Hand in hand with the above is the finding that relative prices have got significant influence in performance of tea exports. This influence is found to be positive where a 1% increase in relative prices leads to 60% increase in performance of tea exports.

The dummy variable for liberalization is statistically significant supporting the view that liberalization has got effects on international trade by creating linkages therefore promoting exports.

**CONCLUSIONS**

This is a timely study, given the relatively poor performance of the Kenyan tea in the international market and the recent seasonal fluctuations in the exchange rate and inflation rates. This paper has therefore made recommendations and policy intervention measures to be adopted in relation to exchange rates

However, Tea exports trends observed indicate that Kenya's share of global tea trade has been fluctuating over time. With many countries implementing steps to liberalize business, economic and market environments to reduce barriers to foreign trade, the amount of exports they trade with should increase.

This study investigated the short-run and long-run causality relationships between performance tea exports and fluctuations in exchange rate and inflation rate in Kenya, using the Autoregressive Distributed Lag (ARDL) approach in the examination of a Granger type test of causality with an error correction. Moreover, the estimation results suggest a causal linkage from $v_t$ to change in exports performance of Kenya's tea. A negative causal relation from $v_t$ to exports performance of tea is observed in the study, as indicated by the estimated cointegrating

vectors. Finally, the statistical significance of F-statistics for joint significance of autoregressive terms and/or the error term implies a strong bi-directional causality between exchange rate volatility and performance tea exports. Finally, the finding that foreign incomes and relative prices have significant effects on performance of Tea exports implies that tea export growth could be driven by factors which are beyond the control of local policy makers. This implies that external developments are important in influencing performance of Tea exports. Though capital inflows are driven by both push and pull factors, recent inflows to Kenya are considered to be growth-related thus suggesting a role for pull factors. This is however an area for further research especially the need to determine whether the source of exchange rate movements determines its impact on exports. Furthermore, given the limited data available, the recent policy reforms and trade and investment liberalization may have helped to create a more open trade environment which would have otherwise positive effect on tea exports, however the sub sector have been affected by the exchange rate fluctuations. The study findings support the view that exchange rate volatility affects tea exports performance in Kenya negatively, however the impact is insignificant , meaning that tea exports are not price elastic, therefore calling for reasonable policy formulation to protect these crucial sector considering the much benefits accrued from this sector.

**Recommendations**

The results emphasize monitoring of exchange rate volatility and adopting appropriate monetary and fiscal policies to ensure stability in exchange rate. Although exporters and policy makers have been preoccupied with recent steep exchange rate appreciation, focus needs to shift to exchange rate volatility and support towards reforms .This will enable exporters to hedge against exchange rate risk such as developing forward and futures market which represents long term solution.

**Policy implications**

This section of the study draws policy intervention that are aimed at cushioning the negative effects of exchange rate fluctuations in performance of tea exports in the country as well as the effects of inflation and external incomes.

There is need for a monitoring body that should be mandated to carry out frequent and regular monitoring of the fluctuations in exchange rate fluctuations for the purpose of drawing policy recommendations.

Hand in hand with the above policy intervention is that there should be in place proper monetary and fiscal policies that help to stabilize exchange rate. These policies should be implemented all through out in the economy so as to lower the risk.

**Limitation of the study**

All the data were based on secondary data which at times may not a true representation of the primary data if not authenticated.

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