DOES THE EXCHANGE RATE MATTER FOR KENYA'S EXPORTS? A BOUNDS TESTING APPROACH

BY

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TABLE OF CONTENTS

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Abstract

The study investigates the impact of the real exchange rate on the demand for Kenya's exports in an export demand framework which also includes economic activity for Kenya's major export categories: tea, coffee, horticulture and manufactured goods. Bounds testing and ARDL approaches to the analysis of long-run relationships and error correction modeling are applied. The existence of long-run relationships is established for coffee, tea and horticulture exports but rejected for manufactured goods exports. The results indicate that the real exchange rate has positive effects in the short-run but the effects are found to be statistically insignificant. Nevertheless, the short-run elasticities are high and positive as in the case of coffee and manufactured goods which are close to unity. The results however confirm the dominant role played by economic prosperity of the export destination countries as demonstrated by significant positive long-run and short-run elasticities. The short-run income elasticities are close to one for tea, horticulture and coffee. The long-run income elasticities are high, ranging from 1.0 for tea to 2.4 for horticulture and 2.8 for coffee. Therefore, the foreign income variable is highly significant and elasticities larger compared to the elasticities of the real exchange rate variable. Therefore the argument that real exchange rate appreciation has adversely affected exports is not strongly supported by the analysis as increased foreign economic activity dominates as the most important factor explaining export growth. The results however suggest that the effects of the real exchange rate are more likely to be long-run in nature rather than short-term and that there could exist threshold levels at which exchange rate fluctuations harm exports.

1.0 INTRODUCTION

The Kenya shilling 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 (October 2000 to November 2004). Recently however, the shilling has experienced a strong appreciation. Between November 2004 to March 2007 the shilling appreciated by 14.7%.

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. Recently however, volatility increased posing challenges for macro economic management. The fluctuation in the exchange rate has also attracted public attention especially from exporters who have argued that the strengthening shilling is eroding their competitiveness.

In addition to the developments in the shilling exchange rate, there has been a significant change in export earnings. Export earnings have been on an upward trend since 2002, the period during which the shilling depreciated in real terms (see figure 1). This is particularly true for manufactured goods, horticultural products and to some extent, tea. Horticulture is unique because output from this sector has been upward even before 2002. Coffee earnings stopped declining in the period after 2002 and remained fairly stable. As shown in figure 2 however, the real exchange rate volatility as measured using preceding twelve months standard deviation of the real exchange rate (REERDEV) has been on an upward trend since 2002 and therefore makes it difficult to conjecture the possible effects of the real exchange rate fluctuations on exports. The positive relationship between the depreciation of the real exchange rate and export earnings in 2002-2004 perhaps could explain why there has been concern over the more recent appreciation of the shilling (2005-2007) with exporters warning of job losses in Kenya's main export sectors: Tea, Horticulture, Coffee, and manufactured goods.

Figure 1: Coffee (COFF), Tea (TEA), Horticulture (HORT) and Manufactured Goods (MAN) exports Versus Real Effective Exchange Rate (REER)

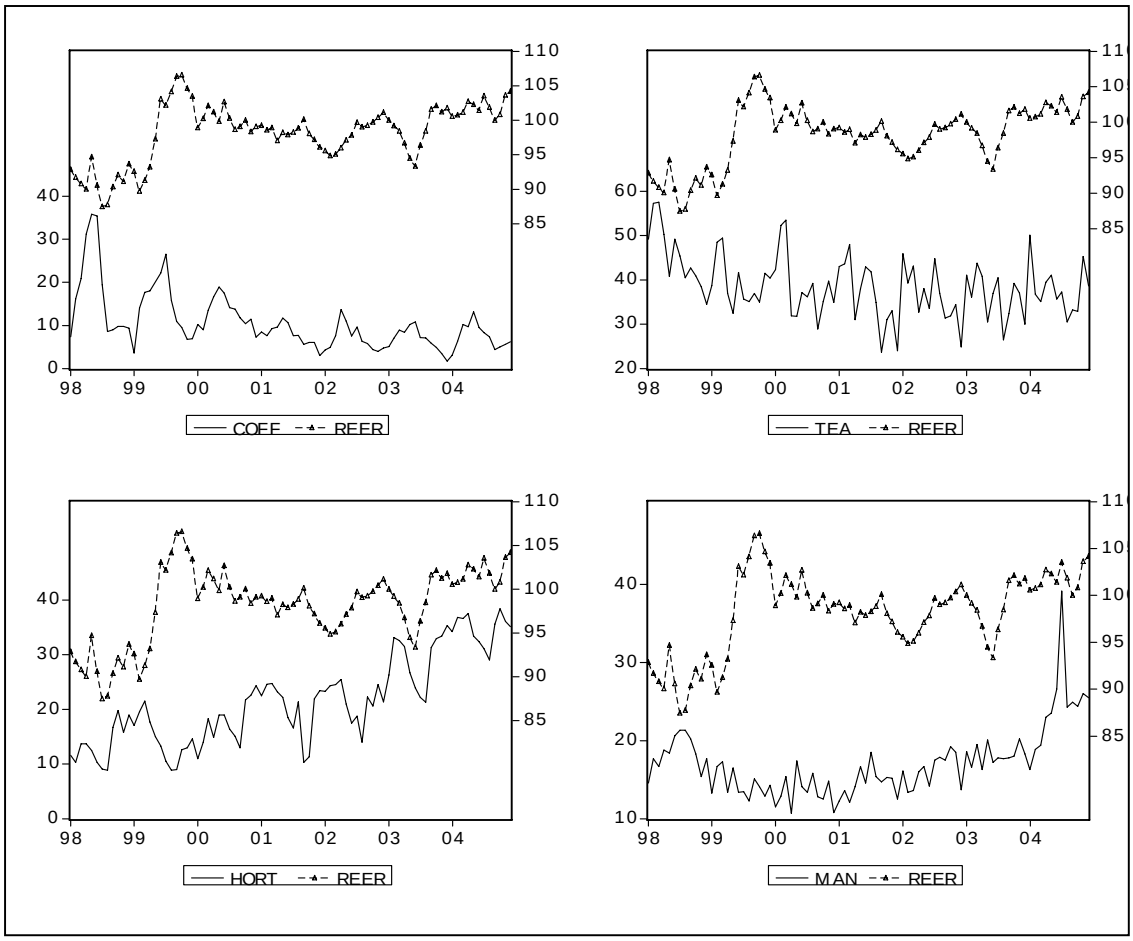
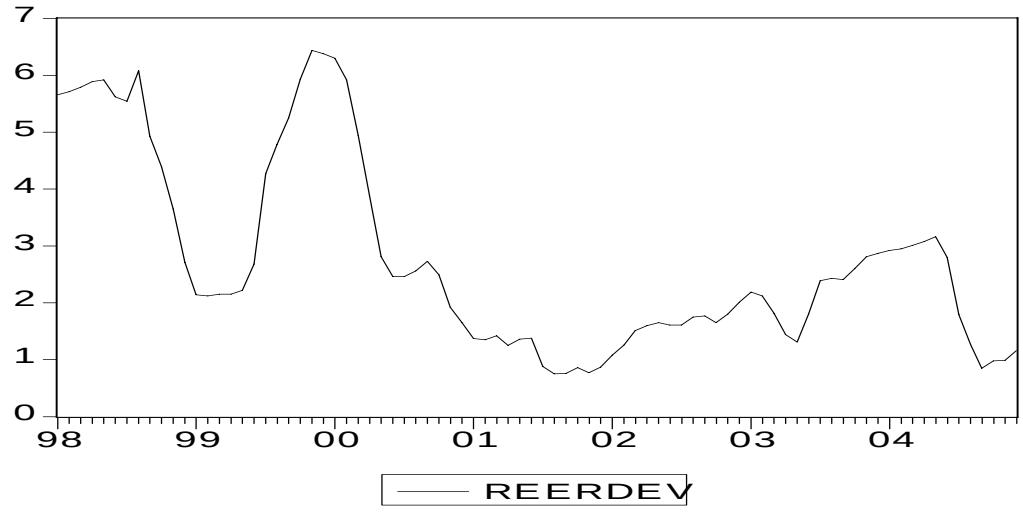


Figure 2: Real Exchange Rate Volatility



The relationship between the real effective exchange rate and exports has been studied extensively in various studies. Using cointegration analysis Vergil(undated) shows that Turkey's exports are cointegrated with foreign income and the real exchange rate. For the US economy, Batten and Belongia(1984) found that real exchange rates were related negatively to exports, but their impact was dominated by the level of real GNP in importing nations. In the case of Canadian pork and swine exports Fabiosa (2002) finds that the level of the real exchange rate has a significant positive effect on pork exports, with more being exported when there is a depreciation of the domestic currency. A large number of recent studies focus on effects of exchange rate volatility. For instance, Arize, Osang and Slottje (2004) investigate 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. They find that the long-run income elasticity is greater than unity in all countries. Cameron, Kihangire and Potts (undated) investigated the effects of exchange rate variability on Uganda's tropical freshwater fish exports. The empirical evidence suggests Uganda's exports of fish were negatively and significantly correlated with exchange rate volatility.

The positive relationship between export earnings and the depreciation of the shilling in real terms after 2002 in Kenya has raised questions over underlying determinants of demand for the country's exports. While it has been argued by some that the exchange rate is a factor, others point to the favourable economic growth prospects in export destination countries. Therefore this study aims at answering the following question: Does the increase in export earnings reflect effects of improved trade competitiveness or could it be reflective of developments in destination countries that Kenya has no control over? Therefore, while analyzing the impact of the fluctuations of the real exchange rate on Kenya's exports, this study will also examine foreign economic activity as a potential determinant of Kenya's exports.

The rest of the paper is organized as follows. Section 2 discusses the methodology applied which includes bounds tests and ARDL modelling approach, the empirical model together with a description of data and data sources. Section 3 presents the results, including unit root tests, Bounds testing to the analysis of long-run relationships as well as the estimated models and long-run and short-run elasticities. Section 4 concludes the study.

2.0 METHODOLOGY AND DATA

2.1 Bounds Tests and Auto Regressive Distributed Lag (ARDL) Modelling Approach

This study applies bounds testing for long-run relationships and uses ARDL modelling approach. The ARDL modelling approach popularised by Pesaran *et al* (1999) is advantageous since it can be applied irrespective of whether the variables are I(0) or I(1).

The ARDL model testing procedure starts with conducting the bounds test for the null hypothesis of no cointegration. The calculated F-statistic is compared with the critical value tabulated by Pesaran, Shin and Smith (1999) who developed this new approach to the problem of testing the existence of a long-run relationship between a dependent variable and a set of regressors, when it is not known with certainty whether the underlying regressors are I(0) or I(1). The proposed tests are based on standard F-statistic used to test the significance of the lagged levels of the variables in a first difference regression. Two sets of asymptotic critical values are provided; one set assuming that all the regressors are I(1) and another set assuming that they are all I(0).

Unlike the Johansen approach, the ARDL approach to cointegration does not require pre-testing of the variables for unit roots. However, since the order of integration of any of the variables must be I (0) or I(1) it is necessary to test for unit root to ensure that all the variables satisfy this condition.

If the computed F-statistic exceeds the upper critical value, the null hypothesis of no long-run relationship can be rejected regardless of whether the underlying orders of integration of the variables are I(0) or I(1). There are three possibilities: the F-statistic may fall below a lower critical value, implying that the null hypothesis cannot be rejected; the F-statistic may fall between the two bounds rendering the result inconclusive; or the F-statistic is above the upper bound, implying that a long-run relationship exists.

After confirmation of the existence of a long run relationship between the variables in the model, the long run equations can be determined and the short-run dynamics or error correction models can be estimated. The $B\overset{o}{a}rdsen$ transformation of the ARDL (m, n; p) yields a variant of an error correction mechanism (see Banerjee, Dolado, Galbraith and Hendry, 1993 and Hassler and Wolters, 2005) and may be written as:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{m-1} \alpha_i^* \Delta y_{t-i} + \sum_{j=1}^{p} \sum_{i=0}^{n-1} \beta_{ji} \Delta x_{jt-i} + \alpha_m^* y_{t-m} + \sum_{j=1}^{p} \beta_{jn}^* x_{jt-n} + \varepsilon_t \text{ ……..1}$$

The implied long-run multiplier, θ_j, is defined as the long-run effect of a change in x_j on y and by use of $B\overset{o}{a}rdsen$'s transformation, $\theta_j = \frac{\beta_{jn}^*}{-\alpha_m^*}$. The long-run effect can then be computed from equation 1 by dividing the coefficient on x_{jt-n} by the negative of that on y_{t-m}. The inclusion of the dynamics ensures unbiased estimates of the long run model and valid t-statistics even when some of the regressors are endogenous. To achieve good estimates, information criteria such as the Schwartz Bayesian or the Akaike information criteria are observed.

2.2 The Empirical Model

In line with the traditional framework for analyzing the demand for commodity exports as set out by Goldstein and Khan (1978), two equations are specified in this study, one being an export demand equation for agricultural commodities while the second specifies demand for manufactured goods. This distinction is made because a different foreign income variable is applied in each case. Therefore, the estimated error correction model for agricultural commodities is given by equation 2 and manufactured goods, by equation 3, below.

$$\Delta \log XPA_t = \alpha_0 + \sum_{i=0}^{l-1} \beta_{1i} \Delta \log YAG_{t-i} + \sum_{i=0}^{m-1} \beta_{2i} \Delta \log REER_{t-i} +$$

$$\sum_{i=1}^{p-1} \alpha_i \Delta \log XPA_{t-i} + \alpha_p \log XPA_{t-1} + \beta_l \log REER_{t-1} + \beta_m \log YAG_{t-1} + \mu_t \text{.....(2)}$$

$$\Delta \log XPM_t = \tau_0 + \sum_{i=0}^{l-1} \gamma_{1i} \Delta \log YMAN_{t-i} + \sum_{i=0}^{m-1} \gamma_{2i} \Delta \log REER_{t-i} +$$

$$\sum_{i=1}^{p-1} \gamma_i \Delta \log XPM_{t-i} + \tau_p \log XPM_{t-1} + \gamma_l \log REER_{t-1} + \gamma_m \log YMAN_{t-1} + \mu_t \text{.....(3)}$$

Where,

- ***XPA*** represents value of exports of Tea (TEA), Horticulture (HORT), and Coffee (COFF), all expressed in US dollar terms.
- ***YAG*** is foreign economic activity, proxied by imports of export destination countries for Kenya's tea, coffee, and horticulture. Kenya's agricultural exports consisting of coffee, tea, and horticulture are usually sold to Europe, Egypt and Pakistan while manufactured goods, including re-exports are sold to neighbouring countries i.e. Uganda, Tanzania and Rwanda. The weights attached to these countries in the computation of the economic activity index (YAG) are as follows: UK, 38.5%; Netherlands, 30.8%; Pakistan, 19.2% and Egypt, 11.5%. The demand for exports is assumed to depend on the level of foreign real economic activity; with higher GDP in foreign countries resulting in higher demand in those countries.
- ***REER*** is the weighted real effective exchange rate obtained from bilateral real exchange rates between the Kenya Shilling and the currencies of major trading partners, notably the US dollar, Japanese yen, Uganda and Tanzania shillings, South African rand, the euro and the Indian rupee. In computing the real effective exchange rate, weights are chosen depending on the importance of the export destination countries. An increase in the real exchange rate represents depreciation or increased competitiveness. As the country's competitiveness improves, exports are expected to increase too.

- ***XPM*** is the value of exports of manufactured goods (thereafter referred to as MAN) expressed in US dollar terms.

- ***YMAN*** is economic activity index for export destination countries for manufactured goods, computed as a weighted average of import values (denominated in US dollars) for Uganda, Tanzania, and Rwanda**.** Uganda is a more important export destination country and therefore its weight is 60.7%, Tanzania's weight is 28.6% while Rwanda's is 10.7%.

Bounds tests are then carried out by estimating equations (2) and (3) and then testing the null hypothesis (H_o) of no long-run relationship against the alternative hypothesis (H_A) that there is a long-run relationship, that is:

H_o: $\alpha_p = \beta_l = \beta_m = 0$

Against the alternative hypothesis:

H_A: $\alpha_p \neq \beta_l \neq \beta_m \neq 0$

And for equation (3)

Ho: $\tau_p = \gamma_l = \gamma_m = 0$

H_A: $\tau_p \neq \gamma_l \neq \gamma_m \neq 0$

The calculated F statistic is then compared against the critical values given in Pesaran, Shin and Smith (1999).

2.3 Data and Sources

The data used in this study is obtained from different sources. Exports of agricultural commodities and manufactured goods in US dollar terms are obtained from the Monthly Trade Reports of the customs department of the Kenya Revenue Authority.

The nominal bilateral exchange rate (NOM) is expressed as the amount of domestic currency units per unit of the foreign currency. The nominal exchange rate is in index form with January 2000 as the base. The bilateral real exchange rate is given by the nominal bilateral exchange rate multiplied by foreign country consumer price index (CPI) divided by domestic consumer price index (CPI*).

To compute the real effective exchange rate, the bilateral real exchange rates are weighted; weights being dependent on the importance of the export destination country. In this study, an increase in the real effective exchange rate represents a depreciation or improved competitiveness.

Foreign countries' consumer prices are obtained from IFS. Motivated by the need to use monthly data, imports data given in US dollar terms were selected as a proxy for foreign incomes or economic activity for Uganda, Tanzania, Pakistan, Rwanda and Egypt. For the United Kingdom and Netherlands, it was possible to obtain monthly indices of industrial production and so these were used instead.

3.0 RESULTS

3.1 Unit Root Tests

As shown in table 1 below, the unit root tests indicate that the tea and coffee variables are stationary in levels thus rendering the Johansen cointegration test inappropriate for assessing the existence of long-run relationships between Kenyan exports with weighted real exchange rates and destination countries economic activity.

Table 1: Unit Root Tests

Variable	ADF Test (variable in levels)	ADF Test (On first difference)
MAN	-1.04	-6.2**
COFF	-4.02 **	N/A
HORT	-1.50	-5.85**
TEA	-4.88**	N/A
YAG	-1.97	-7.68**
YMAN	-0.21	-5.79**
REER	-2.27	-5.09**

Critical Values: 5% level= -2.897, 1% level = -3.512

** implies significant at 5%, ** - Significant at 1%*

Abbreviations

MAN- manufactured goods

COFF- coffee

HORT- horticulture

TEA- Tea

YAG- weighted index of economic activity (agricultural exports)

YMAN- weighted index of economic activity (manufactured goods)

3.2 Bounds Testing to the Analysis of Long-Run Relationships

After establishing the order of integration of the variables and noting that variables are either I(1) or I(0) we proceeded to test for the existence of long-run relationships between each export category and destination country incomes and weighted real exchange rates. Each estimated equation included an intercept and trend. Since the model contains two regressors, the 95% critical value bounds as given in Pesaran, Shin and Smith (1999) are (4.87, 5.85) for unrestricted intercept and unrestricted trend. The zero coefficient restriction results as given in table 2 below indicate that long-run relationships exist for exports of coffee, tea and horticulture as the calculated F values exceed the upper bound critical value of 5.85. The calculated F-value for the manufactured exports equation is below the lower critical bounds, so we could not reject the null hypothesis of no long-run

relationship. Nevertheless, we ultimately estimated an equation consisting of short-run dynamics.

Table 2: Bounds Tests

Export Category	**Calculated F-statistic**
TEA	7.1
HORT	7.7
COFF	16.9
MAN	3.2

As shown in table 3 below, the foreign long-run income elasticities are greater than unity for all export categories and highly significant for the coffee and horticulture equations and significant at 10% for the horticulture equation. The long-run real exchange rate elasticity however turns out to be positive and greater than unity for coffee but is negative and highly significant for horticulture. It is negative but insignificant for the tea equation.

Table 3: Estimated Long-run Coefficients: t-statistic [ ] and corresponding probability ( ) in parenthesis

Variable	Coffee Equation	Tea Equation	Horticulture Equation
YAG	2.8[2.74](0.01)	1.02[1.79](0.08)	2.37[2.49](0.01)
REER	1.14[1.19](0.23)	-0.5[-0.91](0.37)	-2.58[-2.63](0.01)

Abbreviations

MAN- manufactured goods
COFF- coffee
HORT- horticulture
TEA- Tea
REER- weighted real effective exchange rate
YAG- weighted index of economic activity (agricultural exports)

3.3 Estimated Models

We estimated an equation for each export category and report the results below:

(i) Error Correction Form of the Coffee Equation

The estimated model with a lag-length of 5 (i.e p=5) passes all diagnostic tests such as normality, serial correlation, ARCH test, heteroscedasticity and stability tests (Ramsey Reset test and Cusum). The error correction term is highly significant thus validating the long-run relationship. The long-run foreign income elasticity of exports is 2.8 while that of the real exchange rate is 1.1. Thus, foreign incomes have major impacts on exports in the long-run. In the short-run, the same picture is displayed. Foreign income elasticity of exports is 1.4 in the short-run and is highly significant. The real exchange rate has positive effects on coffee exports (elasticity equals 0.85) but is insignificant. The coefficient on the ECM is greater than unity implying a high speed of adjustment towards equilibrium.

Table 4: Error Correction (Coffee Equation)

Dependent Variable: D(LOG(COFF))
Sample(adjusted): 1998:07 2004:09

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-17.70450	2.434535	-7.272229	0.0000
@TREND	-0.020021	0.003071	-6.518510	0.0000
D(LOG(YAG))	1.416449	0.605405	2.339672	0.0230
D(LOG(REER))	0.858926	1.952125	0.439995	0.6617
D(LOG(COFF(-1)))	0.542691	0.125986	4.307542	0.0001
D(LOG(YAG(-1)))	-2.484391	0.852092	-2.915635	0.0051
D(LOG(REER(-1)))	-0.017362	1.743739	-0.009957	0.9921
D(LOG(COFF(-2)))	0.518070	0.109995	4.709956	0.0000
D(LOG(YAG(-2)))	-2.522254	0.905632	-2.785078	0.0073
D(LOG(REER(-2)))	0.152739	1.615068	0.094571	0.9250
D(LOG(COFF(-3)))	0.559119	0.114860	4.867814	0.0000
D(LOG(YAG(-3)))	-2.478648	0.952695	-2.601722	0.0119
D(LOG(REER(-3)))	-3.696508	1.629506	-2.268483	0.0272
D(LOG(COFF(-4)))	0.277092	0.119199	2.324616	0.0238
D(LOG(YAG(-4)))	-1.060916	0.862857	-1.229539	0.2241
D(LOG(REER(-4)))	-3.155471	1.733819	-1.819954	0.0742
D(LOG(COFF(-5)))	0.385095	0.110233	3.493478	0.0009
D(LOG(YAG(-5)))	-0.104652	0.647590	-0.161603	0.8722
D(LOG(REER(-5)))	-2.105667	1.778911	-1.183683	0.2416
ECM	-1.156344	0.159179	-7.264413	0.0000

R-squared	0.656475	Mean dependent var	-0.027801
Adjusted R-squared	0.537802	S.D. dependent var	0.364966
S.E. of regression	0.248123	Akaike info criterion	0.273391
Sum squared resid	3.386066	Schwarz criterion	0.891388

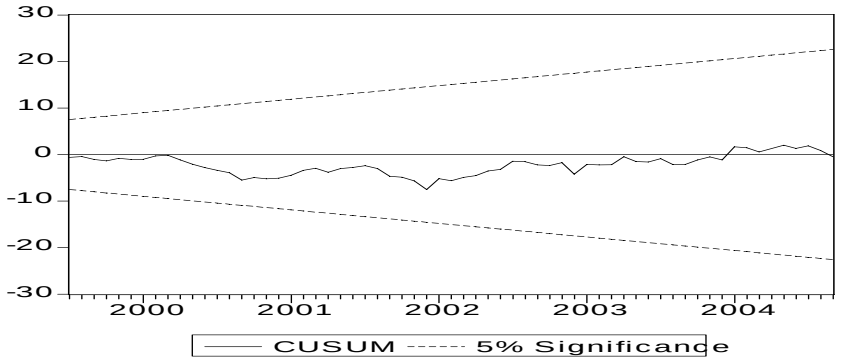
Log likelihood	9.747838	F-statistic	5.531822
Durbin-Watson stat	2.197968	Prob(F-statistic)	0.000000

Normality: J-B= 4.40(0.11) Serial Correlation: F= 2.29(0.11)

ARCH: F= 1.49(0.22) Heteroscedasticity: F= 1.33 (0.20)

Ramsey Reset Test: 0.56(0.46)

Figure 3: Plot of Cumulative Sum of Recursive Residuals for the Coffee Equation



Abbreviations

ECM= *LOG(COFF(-1))-2.8*LOG(YAG(-1))-1.14*LOG(REER(-1))*

COFF- coffee

REER- weighted real effective exchange rate

YAG- weighted index of economic activity (agricultural exports)

(ii) Error Correction Form of the Tea Equation

The appropriate lag length was found to be 3 (i.e p= 3). As shown below, the model satisfies all the diagnostic tests. The speed of adjustment is close to unity implying immediate adjustment towards equilibrium. The error correction term is also highly significant and is therefore supportive of the specified long-run equation. The long-run and short-run foreign income elasticities are more or less similar and around unity. The model again demonstrates the dominant role played by foreign economic activity as it turns out to be the variable with the most significant positive contemporaneous effects. The real exchange rate variable has the wrong sign and insignificant.

Table 5: Error Correction (Tea Equation)

Dependent Variable: D(LOG(TEA))
Sample(adjusted): 1998:05 2004:09

Variable	Coefficient	Std. Error	t-Statistic	Prob.

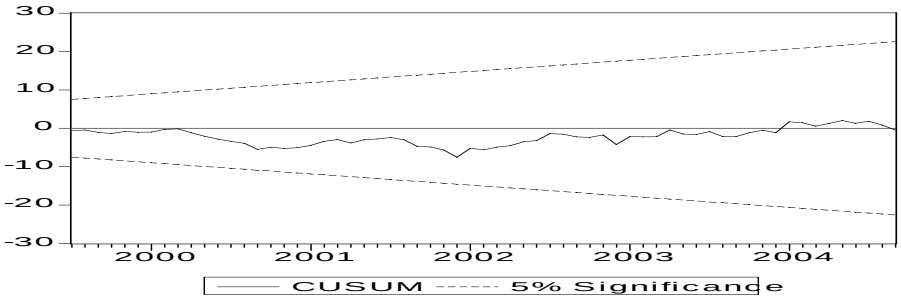
C	1.286255	0.283104	4.543401	0.0000
@TREND	-0.002915	0.001080	-2.699598	0.0089
D(LOG(YAG))	1.105539	0.349765	3.160803	0.0024
D(LOG(REER))	-1.080883	0.950014	-1.137755	0.2595
D(LOG(TEA(-1)))	0.156927	0.189420	0.828460	0.4105
D(LOG(YAG(-1)))	-0.509942	0.400571	-1.273039	0.2077
D(LOG(REER(-1)))	-1.135405	0.973394	-1.166440	0.2478
D(LOG(TEA(-2)))	-0.023131	0.151216	-0.152966	0.8789
D(LOG(YAG(-2)))	-0.725313	0.394515	-1.838495	0.0707
D(LOG(REER(-2)))	-0.434317	0.970840	-0.447362	0.6561
D(LOG(TEA(-3)))	0.003706	0.124045	0.029875	0.9763
D(LOG(YAG(-3)))	-0.611532	0.340702	-1.794916	0.0775
D(LOG(REER(-3)))	-0.656052	0.980727	-0.668944	0.5060
ECM	-0.987237	0.210616	-4.687387	0.0000
R-squared	0.582213	Mean dependent var		-0.005396
Adjusted R-squared	0.496003	S.D. dependent var		0.217287
S.E. of regression	0.154258	Akaike info criterion		-0.737416
Sum squared resid	1.499117	Schwarz criterion		-0.311269
Log likelihood	42.39051	F-statistic		6.753434
Durbin-Watson stat	1.877708	Prob(F-statistic)		0.000000

Normality: J-B= 3.78(0.15) Serial Correlation: F= 1.18(0.31)

ARCH: F= 0.00(0.95) Heteroscedasticity: F= 1.23 (0.26)

Ramsey Reset Test: 0.37(0.55)

Figure 4: Plot of Cumulative Sum of Recursive Residuals for the Tea Equation



Abbreviations

*ECM= LOG(TEA(-1))-1.02*LOG(YAG(-1))+0.5*LOG(REER(-1))*

REER- weighted real effective exchange rate

TEA- Tea

YAG- weighted index of economic activity (agricultural exports)

(iii) Error Correction Form of the Horticulture Equation

This model once again demonstrates the importance of foreign economic activity as a determinant of export demand as the foreign income variable shows significant

contemporaneous effects with an elasticity close to one. The real exchange rate has positive effects but then these effects are not significant. Furthermore the long-run foreign income elasticity turns out to be high, at 2.37.

Table 6: Error Correction (Horticulture Equation)

Dependent Variable: D(LOG(HORT))
Sample(adjusted): 1998:07 2004:09

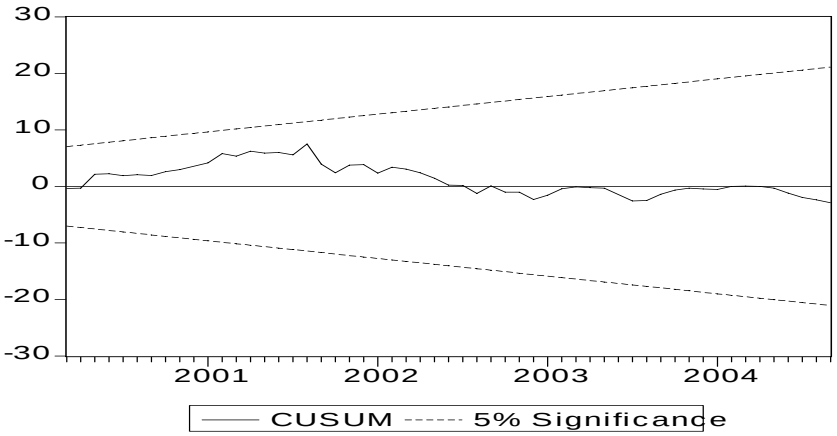
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.414530	0.692422	4.931285	0.0000
@TREND	0.013954	0.003090	4.516532	0.0000
D(LOG(YAG))	0.940109	0.451000	2.084497	0.0418
D(LOG(REER))	1.051321	1.458391	0.720877	0.4740
D(LOG(HORT(-1)))	0.601095	0.191961	3.131345	0.0028
D(LOG(YAG(-1)))	-1.399911	0.697130	-2.008108	0.0496
D(LOG(REER(-1)))	0.650819	1.472881	0.441868	0.6603
D(LOG(HORT(-2)))	0.492552	0.181269	2.717244	0.0088
D(LOG(YAG(-2)))	-1.477857	0.727935	-2.030205	0.0472
D(LOG(REER(-2)))	1.794460	1.282751	1.398916	0.1675
D(LOG(HORT(-3)))	0.445119	0.164456	2.706614	0.0090
D(LOG(YAG(-3)))	-1.200821	0.704219	-1.705182	0.0938
D(LOG(REER(-3)))	-0.809976	1.273487	-0.636030	0.5274
D(LOG(HORT(-4)))	0.313748	0.148707	2.109849	0.0394
D(LOG(YAG(-4)))	-0.896638	0.614179	-1.459898	0.1500
D(LOG(REER(-4)))	1.602099	1.236442	1.295733	0.2005
D(LOG(HORT(-5)))	0.260059	0.129707	2.004974	0.0499
D(LOG(YAG(-5)))	-0.679056	0.457430	-1.484501	0.1434
D(LOG(REER(-5)))	1.123427	1.251687	0.897531	0.3733
ECM	-1.055099	0.215777	-4.889766	0.0000

R-squared	0.457577	Mean dependent var	0.016536
Adjusted R-squared	0.270194	S.D. dependent var	0.213910
S.E. of regression	0.182741	Akaike info criterion	-0.338321
Sum squared resid	1.836676	Schwarz criterion	0.279676
Log likelihood	32.68702	F-statistic	2.441938
Durbin-Watson stat	2.042400	Prob(F-statistic)	0.005221

Normality: J-B= 29.0(0.00) Serial Correlation: F= 0.66(0.52)

ARCH: F= 3.47(0.07) Heteroscedasticity: F= 0.79 (0.76)

Figure 5: Plot of Cumulative Sum of Recursive Residuals for the Horticulture Equation



Abbreviations

ECM= *LOG(HORT(-1))-2.37*LOG(YAG(-1))+2.58*LOG(REER(-1))*

HORT- horticulture

YAG- weighted index of economic activity (agricultural exports)

(iv) Short-run Dynamics of Manufactured Goods Equation

As stated earlier, we did not confirm the existence of a long-run relationship between manufactured goods, foreign incomes and real exchange rates. However, we proceeded to estimate a model incorporating the short-run dynamics. As shown below, the results indicate that foreign economic activity has significant contemporaneous effects, but the elasticity this time is low, at 0.3. Real exchange rates have positive but insignificant contemporaneous effects on exports of manufactured goods.

Table 7: Short-run Dynamics (Manufactured Goods Equation)

Dependent Variable: D(LOG(MAN))
Sample(adjusted): 1998:07 2004:12

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.006650	0.015975	0.416292	0.6787
D(LOG(YMAN))	0.343170	0.175144	1.959362	0.0547
D(LOG(REER))	0.721641	0.968342	0.745234	0.4590
D(LOG(MAN(-1)))	-0.714301	0.123132	-5.801092	0.0000
D(LOG(YMAN(-1)))	0.468793	0.211883	2.212511	0.0307
D(LOG(REER(-1)))	-1.450372	0.925338	-1.567397	0.1223
D(LOG(MAN(-2)))	-0.164736	0.152657	-1.079124	0.2849
D(LOG(YMAN(-2)))	0.329614	0.221828	1.485895	0.1425
D(LOG(REER(-2)))	-0.125574	0.890401	-0.141030	0.8883

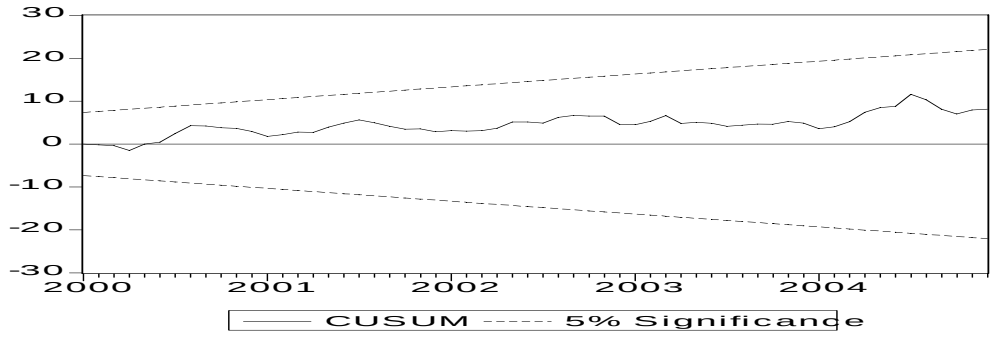
D(LOG(MAN(-3)))	0.106967	0.155580	0.687538	0.4944
D(LOG(YMAN(-3)))	-0.014729	0.225104	-0.065434	0.9480
D(LOG(REER(-3)))	0.008903	0.870285	0.010230	0.9919
D(LOG(MAN(-4)))	-0.114295	0.161252	-0.708796	0.4812
D(LOG(YMAN(-4)))	-0.273984	0.221899	-1.234722	0.2217
D(LOG(REER(-4)))	0.288031	0.861458	0.334353	0.7393
D(LOG(MAN(-5)))	-0.161451	0.142880	-1.129975	0.2630
D(LOG(YMAN(-5)))	-0.244064	0.180839	-1.349621	0.1822
D(LOG(REER(-5)))	-0.062419	0.876497	-0.071214	0.9435
R-squared	0.539569	Mean dependent var		0.002736
Adjusted R-squared	0.409114	S.D. dependent var		0.176121
S.E. of regression	0.135382	Akaike info criterion		-0.962254
Sum squared resid	1.099703	Schwarz criterion		-0.418398
Log likelihood	55.52789	F-statistic		4.136045
Durbin-Watson stat	1.960566	Prob(F-statistic)		0.000022

Normality: J-B= 0.87(0.65) Serial Correlation: F= 0.19(0.83)

ARCH: F= 0.009(0.93) Heteroscedasticity: F= 0.96 (0.54)

Ramsey Reset Test: 0.09(0.77)

Figure 6: Plot of Cumulative Sum of Recursive Residuals for manufactured Goods Equation



Abbreviations

*ECM= LOG(COFF(-1))-2.8*LOG(YAG(-1))-1.14*LOG(REER(-1))*

MAN- Manufactured goods

REER- weighted real effective exchange rate

YAG- weighted index of economic activity (agricultural exports)

In short, the role played by foreign economic activity in influencing Kenya's exports comes out very clearly from the results (table 7). The real exchange rate which is the focus of this study does not appear to have significant short-run effects. However, it has long-run effects as shown by the high elasticity in the case of coffee. Nevertheless, the

real exchange rate effects are not as strong and as consistent as the income effects on exports.

Table 8: Summary of the Elasticities

Model	Foreign income elasticity		Real exchange rate elasticity	
	Short-run	Long-run	Short-run	Long-run
Coffee	1.4	2.8	0.86	1.1
Tea	1.1	1.0	-1.1	-0.5
Horticulture	0.94	2.37	1.05	-2.58
Manufactured goods	0.34	-	0.72	-

4.0 CONCLUSION

The study sought to examine the role of the real exchange rate in influencing the demand for Kenya's exports in an export demand framework which also includes economic activity for specific export categories: tea, coffee, horticulture and manufactured goods. Bounds testing and ARDL approaches to the analysis of long-run relationships and error correction modeling are applied. The null hypothesis of no long-run relationship is accepted in the case of manufactured goods but rejected for the rest of the export categories considered in this study.

The results indicate that the real exchange rate has positive effects in the short-run but these effects are found to be statistically insignificant. Nevertheless, the short-run elasticities are high and positive as in the case of coffee and manufactured goods which are close to unity. Therefore the effects of the real exchange rate are more likely to be long-run in nature rather than short-term. Concerns over short-run effects of the real exchange rate appreciation are therefore unwarranted. The results could also indicate that

the real exchange rate fluctuations have not been to levels that harm export growth, that is, there could exist threshold levels at which exchange rate fluctuations harm exports.

The results confirm the dominant role played by economic prosperity of the export destination countries as demonstrated by significant positive long-run and short-run elasticities. The short-run income elasticities are close to one for tea, horticulture and coffee. The long-run income elasticities are high, ranging from 1.0 for tea to 2.4 for horticulture and 2.8 for coffee. Therefore, the results indicate that the income variable is highly significant and coefficients (elasticities) larger compared to the elasticities of the real exchange rate variable suggesting that incomes play an important role not only in the long-run but also in the short-run.

Therefore the argument that real exchange rate appreciation has adversely affected exports is not strongly supported by the analysis as increased foreign economic activity dominates as the most important factor explaining export growth.

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