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IMPACT OF THE REAL EXCHANGE RATE ON KENYA'S EXPORTS

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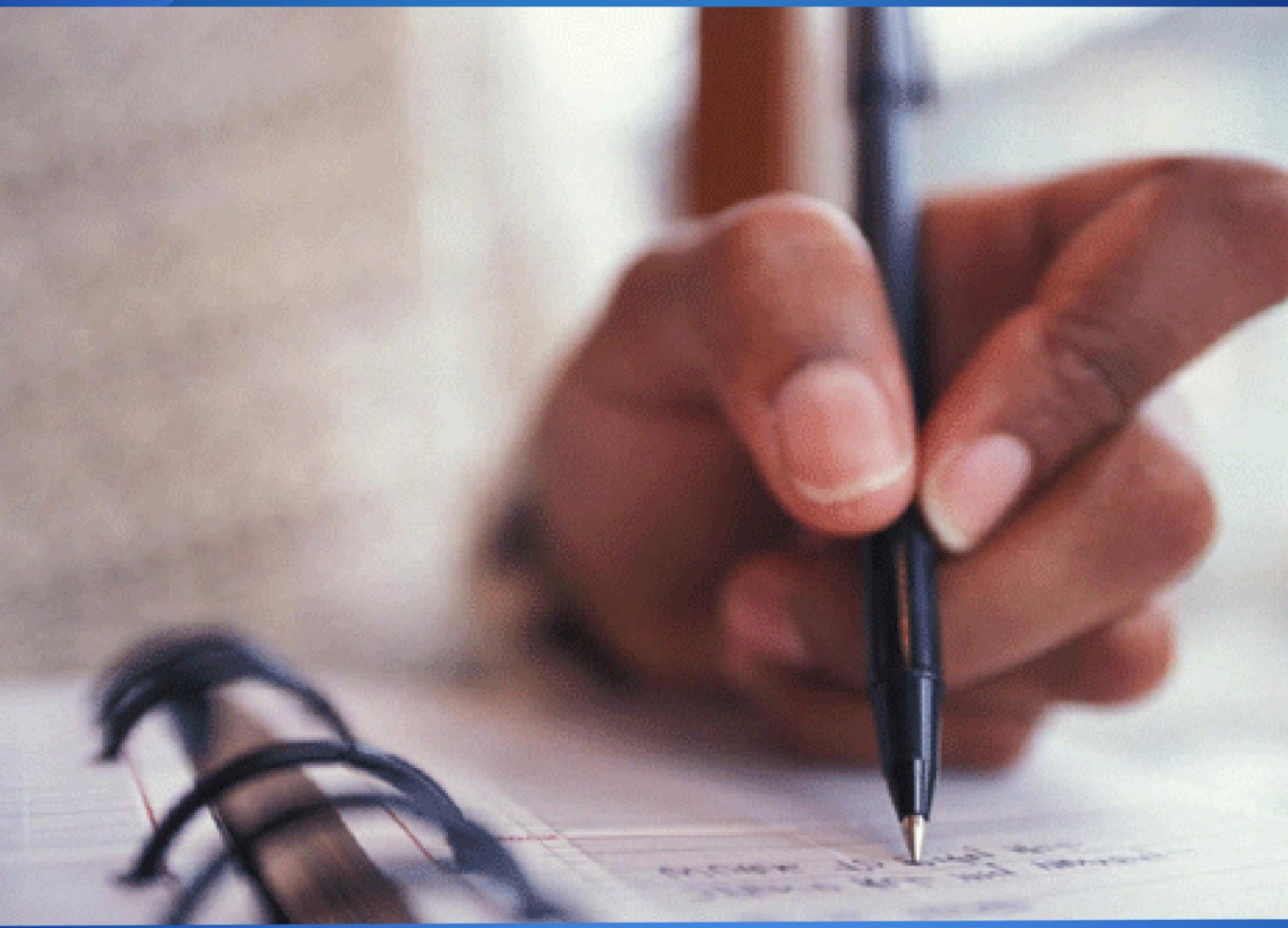

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Abstract

This study examines the relationship between the real exchange rate and exports in Kenya over the period 1999Q3 – 2012Q3. A vector error correction model (VECM), which postulates that real exports is a function of the real exchange rate and income of main trading partners is estimated. Results from the estimated long run cointegrating vector show that the real exchange rate has a significant effect on exports in the long-run. Foreign economic activity is found to have short-run positive effects on exports.

JEL Classification: F30, F31, F41.

Key Words: Real exchange rate, Exports, Vector Error Correction Model.

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1. Introduction

Numerous studies have been carried out to investigate if the real exchange rate is a significant factor in explaining exports, after controlling for other relevant factors. Despite the existence of these studies, very few have been undertaken for Kenya and the few that exist for Kenya do not consider the most recent period. This paper therefore seeks to fill the gap.

The study is motivated by four main factors. One, the economic blueprint for Kenya - the Vision 2030 blueprint - identifies the special role that exports are expected to play in propelling Kenya into middle income status by 2030. The choice of exports as a growth propelling factor is appropriate since the experience of countries that have managed to reduce poverty shows heavy reliance on export growth. China, South Korea, Taiwan, Singapore, Malaysia and other emerging economies have managed to uplift their economies partly due to exports expansion. Secondly, the anticipated growth of 10 percent annually for the next 20 years requires heavy imports of essential inputs such as farm machinery, transport equipment, fertilizers, fuel, among others, which can lead to unsustainable current account deficits unless the imports are well matched by exports. It is imperative that exports must expand in order for the country to sustainably finance its imports most of which are essential inputs in the production process. Thirdly, the exports sector can directly contribute to poverty reduction through creation of employment opportunities and alleviation of the negative aspects of unemployment such as poor health, lack of access to clean water, lack of access to education, environmental degradation, among others. These are goals that the country has set itself to accomplish as part of the Millennium Development Goals (MDGs). A thriving exports sector would therefore be a solution to various problems that the country seeks to address. The fourth motivating factor for this study is to understand the relationship between exports and the real exchange rate which involves computation of elasticities whose sign and magnitude have major implications for trade policy as well as for balance of payments. The sign and magnitude of these elasticities is critical in determining whether it makes economic sense to weaken the domestic currency as a way of promoting exports.

It is clear from the above discussion that if exports are to be an integral part of the economic growth targets as stated in the Vision 2030 development blueprint, it is critical that a clear understanding is sought about the factors that influence exports growth. While there are obviously numerous factors such as technology, quality of labour, infrastructure, legal and regulatory framework, trade policy, among others, that affect exports, this study seeks to find out whether the real exchange rate has been competitive for the export sector. The choice of the exchange rate is motivated on several grounds - first, the real exchange rate is directly related to the price of the exports and hence very important even if all other factors for exports were 'right'. Secondly, the real exchange rate is directly connected with domestic inflation through its computation hence by assessing its impact on exports the paper

will indirectly be assessing whether domestic inflation has been a boost or a constraint to export growth.

Several authors (including Cosar (2002); Were (2002); Prasad (2004); and Sami and Tarek (2007)) have empirical examined how the real exchange rate affect export performance. Other contributions (including among others, Sekkat and Varoudakis (2000); Cameron and Potts (2005); Bustaman and Jayanthakumaran (2006); and Nouira et al. (2011))[1] have shown that exchange rate management - in terms of indicators such as real effective exchange rate changes, real exchange rate volatility, and model-based measures of REER misalignment - matters for export performance. Sekkat and Varoudakis (2000) have shown specifically that Sub-Saharan African (SSA) manufactured exports respond significantly to real exchange rate incentives[2]. Piñeres et al. (2010) apply pooled time series techniques to analyze the short-run effects of real devaluations on disaggregated exports in Latin America for the period 1962-2003. They show that real devaluations in the short-run worsened exports for about 75% of export sectors in the region, and only in 5% of the industries studied experienced favourable effects from a real devaluation.

Cosar (2002) estimates the price and income elasticities of aggregate export demand for Turkey using quarterly data for the period 1989 – 2000. Turkey's real exports are modeled as a function of foreign GDP (as a proxy for foreign income of each of the main trading partners) and the real exchange rate with respect to each of the trading partners. The results indicate that the real exchange rate (price) elasticity of total export demand is less than 1 while the income elasticity is found to be greater than one.

Were *et al* (2002) analyze export performance in Kenya by estimating a distributed lag model of exports in which the real exchange rate, real foreign income and total investment as a proportion of GDP are explanatory variables. Three separate equations are estimated each for real volume of tea exports, real volume of coffee exports and real volume of exports of other goods and services. Results show that real exchange rate depreciation leads to higher exports.

Prasad (2004) estimates an equation for the determinants of exports in Fiji over the period 1968 – 1998. In the study, the dependent variable is the logarithm of real exports which is regressed on logarithm of trading partner income and the logarithm of the REER. Results indicate significant

[1] Using a sample of 52 developing countries Nouira et al., (2011) show that during the period 1991-2005, most of these countries used a proactive exchange rate devaluation policy in order to foster the price competitiveness of manufactured exports.

[2] This is consistent with Balassa (1990) who shows that in a panel of 16 Sub-Saharan African (SSA) countries, those countries which successfully promoted exports experienced real exchange rate depreciation, leading to a significant increase in the domestic relative price of tradables to non-tradables.

effects of incomes of trading partners, the real effective exchange rate and agricultural supply side shocks. As expected, results showed a positive relationship between the volume of Fiji's exports and incomes of the trading partners. Similarly, the study found that the relationship between Fiji's export volume and exchange rate depreciation was almost one-on-one implying that a weaker currency was good for exports. In a related study, Veeramani (2008) finds that the appreciation of the REER led to a fall in the dollar value of India's merchandise exports, and that the extent of the negative relationship between the REER and exports declined since 2002.

Bustaman and Jayanthakumaran (2006) apply an ARDL bounds testing procedure to investigate the short run and long-run impacts of exchange rate volatility on Indonesia's exports of priority commodities to the U.S. They find that, for most of the commodities, a depreciation of the Rupiah against the dollar led to an increase in export volume in the long run, although their effects were insignificant (except for cocoa). A similar result is also reported by Cameron et al., (2005) for Ugandan coffee export earnings.

Sami and Tarek (2007) estimate an exports equation for Tunisia in which the volume of Tunisian exports is the dependent variable and the real GDP of trading partners (used as proxy for foreign income) and the real exchange rate are the explanatory variables. The sample period is 1987 – 2004. Results show that the real exchange rate is a significant determinant of Tunisian exports. However, the study cautions that a mere weakening of the domestic currency does not improve Tunisian exports because the exports are inelastic with respect to the real exchange rate

Various approaches have been adopted by these authors to study the relationship between real exchange rate and exports. In virtually all studies, the real exchange rate and income of the partner state are included. Others have included variables to capture supply side shocks. For instance, Prasad (2004) included sugar cane production per hectare to capture supply side shocks while Were *et all* (2002) use investment to GDP ratio – a proxy for capital formation – to capture supply constraints. Some use time series data while others use panel data estimation. The literature review thus provides a rich set of information on how various authors have studied the link between export performance and the real exchange rate.

Our study covers the period 1999Q3 to 2012Q3. The rest of the paper is organized as follows: in section 2, we provide an overview of the methodology. Section 3 discusses the results, while section 4 concludes.

2. Methodology

The export demand equation assumes that external buyers make their decisions on the basis of relative prices (proxied by real exchange rate) and the growth of external demand or incomes as follows:

$$LogX_t = F[\log(RER)_t, Log(FY)_t] \quad (1)$$

where X = value of exports; FY = world income or economic activity; RER = real exchange rate.

The Johansen approach begins with the estimation of an autoregressive model of the form:

$$X_t = \delta + \theta_1 X_{t-1} + \theta_2 X_{t-2} + \ldots + \theta_k X_{t-k} + \varepsilon_t \quad (2)$$

$$t = 1, 2, \ldots, T$$

Where: X_t is a vector of N variables,

θ_i are $N \times N$ coefficient matrices,

ε_t is IID N -dimensional vector with zero mean and covariance Ω.

This VAR framework can be transformed into an error correction model (ECM) of the form:

$$\Delta X_t = \delta + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{k-1} \Delta X_{t-k+1} + \Pi X_{t-1} + \varepsilon_t \quad (3)$$

The Π matrix contains information on the long-run relationship among the given variables.

The Johansen approach applies maximum likelihood technique to estimate the system by imposing the restriction $\Pi = \alpha\beta'$ given the number of cointegrating relationships, r. In this case, α is $n \times r$ and measures the speed of adjustment to equilibrium of the dependent variable; β' is $r \times n$, where r represents the rank of Π or simply the cointegrating relationships·

The Johansen procedure involves checking the rank of long-run matrix Π. If $\Pi = 0$, there are no cointegrating relationships. If $\Pi = n$, then there is full rank, implying that the variables must be stationary in levels. If $0 < r < k$, then r cointegrating vectors exist if the variables in X_t are $I(1)$ and the rank of the matrix Π is said to be r. There are r cointegrating vectors despite non-

stationarity of the variables in X_t. The test for cointegration is carried out using the Trace test statistic and Maximum eigenvalue test.

3. Discussion of results and analysis

This study covers the period 1999 Q3 to 2012 Q3. The data on exports of goods and exchange rates were obtained from the Central Bank of Kenya. Trade data is compiled by the Central Bank based on data obtained from the Kenya Revenue Authority's Monthly Trade Report (MTR). The real exchange rate is computed using bilateral nominal exchange rates and consumer price indices of eight major trading partners. The currency weights are as follows: US$ (0.58), UK£ (0.11), Japanese Yen (0.01), Uganda shilling (0.06), Tanzania shilling (0.04) Euro (0.18), India Rupee (0.02) and Chinese Yuan (0.01).

The real exchange rate is computed as follows:

$$RER = \sum_{i=1}^{8} w_i \frac{e_{it} p_{it}^{f}}{p_t^{d}} \tag{4}$$

Where p^d is the price level of the home country, p^f is the price level of the foreign country i and e_i is the nominal exchange rate between the currencies of foreign country i and the home country expressed as the domestic currency units per foreign currency unit so that RER increase signals a depreciation.

Data on exports and industrial production index of advanced economies were adjusted for seasonable effects using the Holt-Winters method. The variables used in the estimation were tested for unit roots (see Table 1) and were found to be integrated of order one when tested with augmented Dickey Fuller and Phillips Perron unit root tests. All the variables became stationary when differenced once.

Table 1: Unit Root Tests

Variable	ADF Statistic	PP Statistic
L*n* EXP	-1.603 (0.475)	-1.472 (0.541)
L*n* FY	-2.252 (0.191)	-2.323 (0.168)
L*n* RER	-0.270 (0.923)	-0.388 (0.904)

Note: The results in this table indicate the stationarity tests on levels of the variables. When differenced once, all the variables become stationary.

Given that all the variables were found to be integrated of order one, a VAR model consisting of the three endogenous variables was estimated and the Johansen test of cointegration applied. The Johansen test identifies one cointegrating vector using both the Trace and the Maximum eigen value tests (see Table 2). A vector error correction model was therefore estimated with five lags of each variable. In the VAR estimation the Akaike information criteria identified five lags as the optimal lag length. Other information criteria such as Hannan-Quinn also identified five lags as optimal. The long-run cointegrating vector estimated using the Johansen approach showed that the real exchange rate has significant effects on exports in the long run (see Table 3). A depreciation of the currency leads to export growth. This result is significant at 5% level of significance. Foreign economic activity (provided by industrial production index of the advanced economies) did not have significant effects on exports in the long run. However, it has positive effects on exports as expected. Real exchange rate elasticity was found to be quite low, at 0.29 and is consistent with findings in previous studies which show that export demand price elasticity for agricultural products are low.

Table 2: VAR cointegration test Statistics

Hypothesized no. of cointegrating equations	Eigenvalue	Trace Statistic	Maximum Eigenvalue Statistic
= 0	0.441	51.835** (42.915)	30.839** (25.823)
= 1	0.235	20.996 (25.872)	14.205 (19.387)
= 2	0.120	6.791 (12.518)	6.791 (12.518)

Note: ** denotes rejection of the null hypothesis of no cointegrating vectors at 5% significance level. Numbers in parenthesis are the critical values at 5% significance level.

Estimation of Co-Integrating and Adjustment Coefficients

Table 3: (a) Normalized Co-integrating Coefficients

D(L*n* EXP)	Constant	D(L*n* FY)	D(L*n* RER)	Trend
1.00	3.21	–0.27	–0.287**	–0.0096*
		(0.256)	(0.190)	(0.009)
		[–1.056]	[–2.404]	[–10.396]

(b) Adjustment Coefficients

L*n* EXP	L*n* FY	L*n* RER
–0.807*	–0.032	0.063
(0.157)	(0.073)	(0.142)
[5.154]	[–0.438]	[0.445]

Note: Standard errors are in parenthesis and t statistic in the brackets; * denotes significant rejection of null hypothesis at 1% level of significance; ** denotes significant rejection of hypothesis at 5% level of significance

The results in Table 3(a) above imply that we have the following cointegrating vector:

$$LnEXP = -3.21 + 0.27LnFY + 0.287LnRER + 0.0096@Trend \quad (5)$$

A trend variable introduced in the long run cointegrating vector produced significant positive effects suggesting a change in the structure of exports with positive effects on export earnings. An error correction model incorporating the short run properties confirmed the significance of the error correction term thus confirming existence of the long run cointegrating vector (see Table 4). The adjustment coefficient is found to be -0.74 implying a relatively fast adjustment to equilibrium.

Table 4: Results of the Error Correction Model; Dependent variable: Δ L*n* EXP

	Coefficient (Standard Error)	t-value
Constant	–0.006 (0.005)	-1.138
Δ L*n* EXP(-1)	0.644* (0.11)	5.87
Δ L*n* EXP(-3)	0.514* (0.127)	4.053
Δ L*n* EXP(-5)	0.241** (0.11)	2.183
Δ L*n* FY(-1)	0.624** (0.234)	2.661
Δ L*n* FY(-4)	-0.568** (0.218)	-2.605
Δ L*n* FY(-5)	0.543** (0.204)	2.664
Δ L*n* RER	-0.36** (0.149)	-2.413
Δ L*n* RER(-1)	0.586* (0.146)	4.02
Δ L*n* RER(-3)	0.291 (0.174)	1.673
ECT	-0.744* (0.104)	-7.179
	Diagnostic tests	
Adj-R^2	0.67	
LM(1)	3.339	ARCH(1) 1.117
LM(2)	1.683	ARCH(2) 0.968
Lm(3)	1.442	ARCH(3) 0.595
Ramsey RESET	0.364	Normality 1.188

Though foreign economic activity does not show strong effects in the long run, it has significant effects in the short run as indicated by significant positive effects on lag 1 and lag 5. In the short-term, the real exchange rate has significant negative contemporaneous effects which are followed by significant positive effects over time. The immediate effects of depreciation is to reduce exports but with positive adjustments thereafter. The model fulfills conditions of non-autocorrelation, normality and homoscedasticity of disturbance terms. The model passes the test for functional form and there is no evidence of instability.

4. Conclusion

The objective of this study was to examine the effect of the real exchange rate on Kenya's exports. A vector error correction model was estimated which included also foreign economic activity as an independent variable.

The results have shown that the real exchange rate has significant long run effects on exports. In the short-run however, the contemporaneous effects of the real exchange rate is negative but subsequent effects are positive, resulting in positive long run effects of real exchange rate on exports. Foreign economic activity was found to have insignificant long run effects on exports. Nonetheless, foreign economic activity has significant short run effects. In conclusion, the results of the study suggest that exchange rate policy remains important in the pursuit of an export promotion agenda. It is important to ensure that the exchange rate is not over valued to ensure exports competitiveness. However, the benefits of pursuing an appropriate exchange rate policy are accrued in the long-run.

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