EXTERNAL SHOCKS AND REAL EXCHANGE RATE MOVEMENTS IN KENYA

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Abstract

The study adopts an error correction model (ECM) used to capture the long-run and short-run dynamics of the impact of external shocks on the real exchange rate including terms of trade, net foreign exchange flows and openness based on monthly data for 1996 to 2007. The model also incorporates domestic variables such as real GDP growth, interest rates differential and government spending.

Although the real exchange rate (RER) is also influenced by domestic factors such as real output, government spending and interest rate differentials, external factors tend to play a significant role. The results show that external shocks to a large extent influence RER as demonstrated by the significance of the terms of trade and openness in the long-run and short-run estimations.

1.0 Introduction

Kenya, just like other developing countries has experienced a combination of exogenous shocks such as worsening terms of trade mainly on account of fluctuations in international commodity prices, oil price shocks and volatility in capital flows[1], which have created macroeconomic management policy challenges. External shocks require appropriate fiscal and monetary policies and the adoption of a flexible exchange rate regime to prevent emergence of unsustainable current account deficits, growing foreign debt burdens and steady losses of international competitiveness.

Kenya's vulnerability to external shocks is amplified by concentration in agricultural products exports2 such tea, coffee and horticulture, thus exposing the country to direct impact of fluctuations in global commodity prices. Moreover, given that oil import bills account for over 20 percent of total merchandise imports, oil price hikes in world markets are transmitted to domestic prices and could lead to a worsening of the country's balance of payment position.

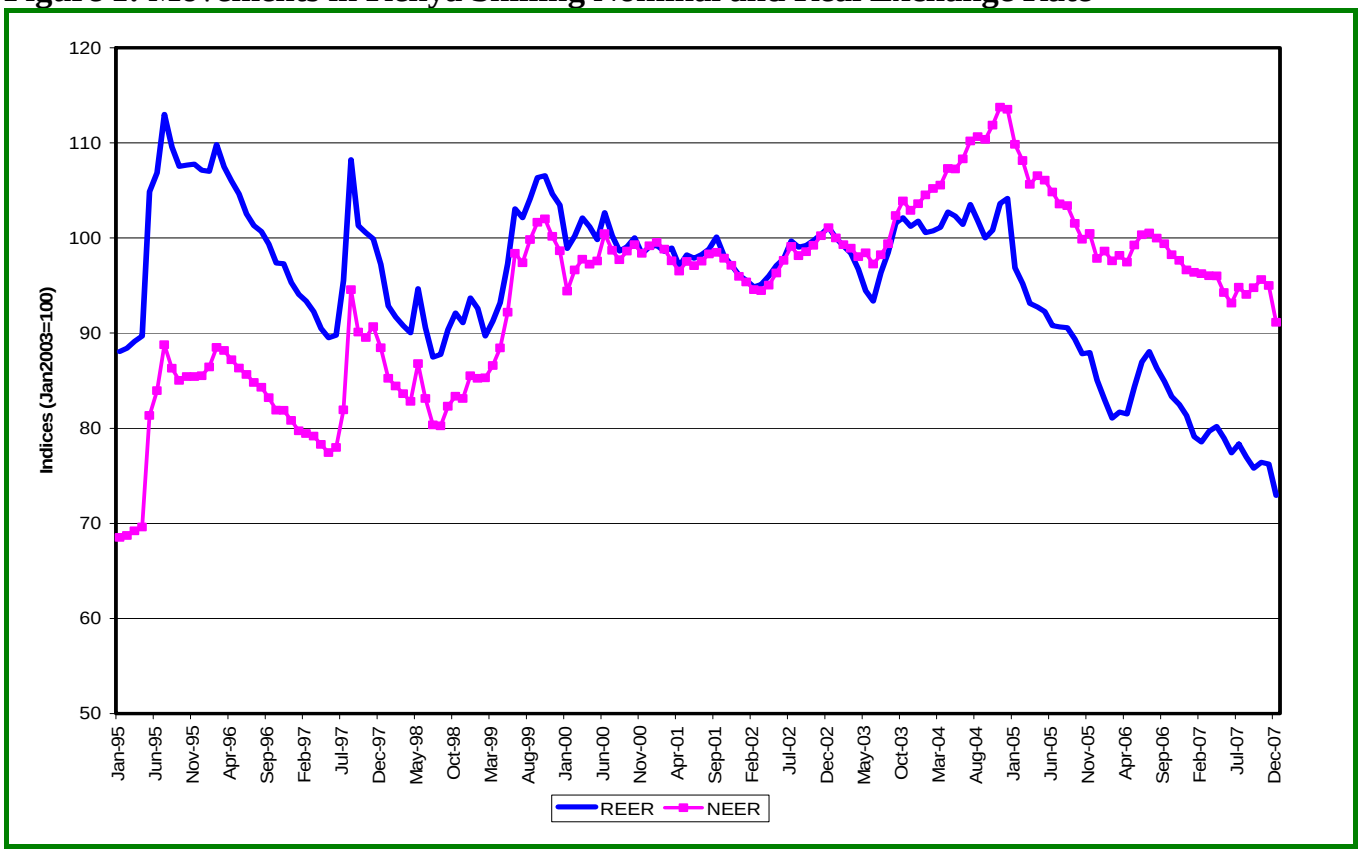
In the 1990s the Kenyan Government liberalized the financial, foreign exchange and domestic goods markets. The liberalization of the foreign exchange market in Kenya was gradual, from a fixed exchange rate regime up to 1982 to crawling peg during the period 1983 to 1993 before a floating exchange rate regime was adopted in 1993. Following the liberalization of the foreign exchange market, Kenya attained monetary independence to control inflationary pressures but lost the nominal anchor to tie domestic prices down and thus globalization effects are transmitted directly into the country.

The Kenya shilling real exchange rate (RER) has gone through several phases since its liberalization in 1993. As shown in Figure 1, the shilling real exchange rate depreciated by 21.0 % in January 1995 to October 1999 followed by a period of relative stability in October 1999 to December 2004. Recently however, the shilling real exchange rate has experienced a strong appreciation. In December 2004 to December 2007, the shilling real exchange rate appreciated by 30.0 % representing a major deviation from its past levels. This appreciation of the shilling real exchange rate has also attracted public attention especially from exporters who have argued that the strengthening shilling is eroding their competitiveness.

[1] According to Khan (1986) external shocks such as deterioration in the terms of trade, the slow down in the economic activity in industrialized countries and the contraction in external financing have contributed to current account difficulties experienced by many developing countries.

[2] Agriculture based exports constitute over 40 percent of the total merchandise exports in Kenya

Figure 1: Movements in Kenya Shilling Nominal and Real Exchange Rate



Source: Central Bank of Kenya and Authors' Own Computation

In addition to the developments in the Kenya shilling exchange rates, there have been significant changes in the terms of trade, degree of openness[3] and the level of external inflows (table 1). The country's terms of trade remained fairly stable in 1994 to 2000, with an average decline of only 0.6% compared with an average decline of 2.6% in 2001 to 2006. However, in the 2005- 2006 period, the terms of trade declined by an average of 3.8%. Similarly, the degree of openness as measured by the ratio of total trade to GDP rose from an average of 41.0% to 42.7% while it averaged 46.2% in the 2005- 2006 period. Also, net external capital inflows as a ratio of GDP averaged 3.0% in 1994 to 2000 compared with an average of 2.6% in 2001 to 2006. The net external capital inflow in 2005 and 2006 was on average 3.9% of GDP.

Table 1: Terms of Trade, Openness and Net Capital inflows as a % of GDP

	Terms of Trade (1982=100)	Openness (Exports+Imports/GDP)	Net Capital Inflows as a % of GDP
1993	90.12	50.21	6.38
1994	101.12	47.98	-0.19
1995	94.93	53.12	2.92
1996	93.04	38.86	4.84

[3] This measures the country's commercial policy and the role of import and export tariffs. Openness is usually proxied by the ratio of exports plus imports to GDP.

1997	102.01	38.21	3.61
1998	100.00	35.80	4.38
1999	86.06	34.81	2.05
2000	84.03	37.99	3.28
2001	79.06	39.51	2.68
2002	77.57	40.47	-0.24
2003	81.36	40.00	3.59
2004	77.43	43.52	1.47
2005	71.76	47.34	4.00
2006	71.52	45.09	3.88

Source: Economic Survey and Authors' Computation

Questions have arisen in the policy arena and in most cases revolving around the possible reasons for persistent appreciation of the shilling real exchange rate. To what extent do changes in external factors influence the movements of the real exchange rate in Kenya? Empirical studies on the Kenyan economy explaining the impact of external shocks to real exchange rate movements are scanty. Therefore, this paper attempts to fill this existing gap by analyzing the role of external factors in determining movements in the real exchange rate in the post-liberalization period. Section 2 provides some analytical issues while section 3 gives the estimations and interpretation of the results. The summary and conclusions are given in section 4.

2.0 Analytical Issues

The effects of external shocks on the real exchange rate can be modeled following the framework adopted by Baffes et al (1997), Opoku-Afari (2004), and Chand (2001). A simple two-good structure is assumed consisting of traded and non-traded goods[4]. The real exchange rate is defined as the domestic relative price of traded to non-traded goods:

$RER = Ep_t/p_n = E_t + p_t - p_n$ ………………………………………. (1)

Where E is the local currency price of foreign currency and p_t and p_n are World prices of traded goods and non-traded goods respectively. Exchange rates are defined so that a rise implies depreciation. Thus an increase in the prices of non-traded goods reduces the RER index and leads to an appreciation.

In the analysis of traded and non-traded goods markets, Montiel (1999) defined the internal balance as the condition where the markets for non traded goods clears or where supply equals demand:

$y_n(e) = c_n + g_n = (1- \vartheta)ec + g_n \;;\; y_n' < 0$ …………….(2)

Where y_n is the supply of non-traded goods under full employment, e is the real exchange rate, c is total private spending (measured in traded goods), ϑ is the share of traded goods in total consumption and g_n is government spending on non-traded goods.

[4] The economy is assumed to produce traded and non traded goods. It also assume a small open economy and a price taker in the international trade.

Therefore, in a position of internal balance, an increase in private spending creates an excess demand for non-traded goods at the initial real exchange rate. Restoration of equilibrium requires a real appreciation, which ends up promoting the supply of non-traded goods while increasing demand for traded goods.

Montiel (1999) defined the external balance as the current account balance that is compatible with long-run sustainable capital inflows:

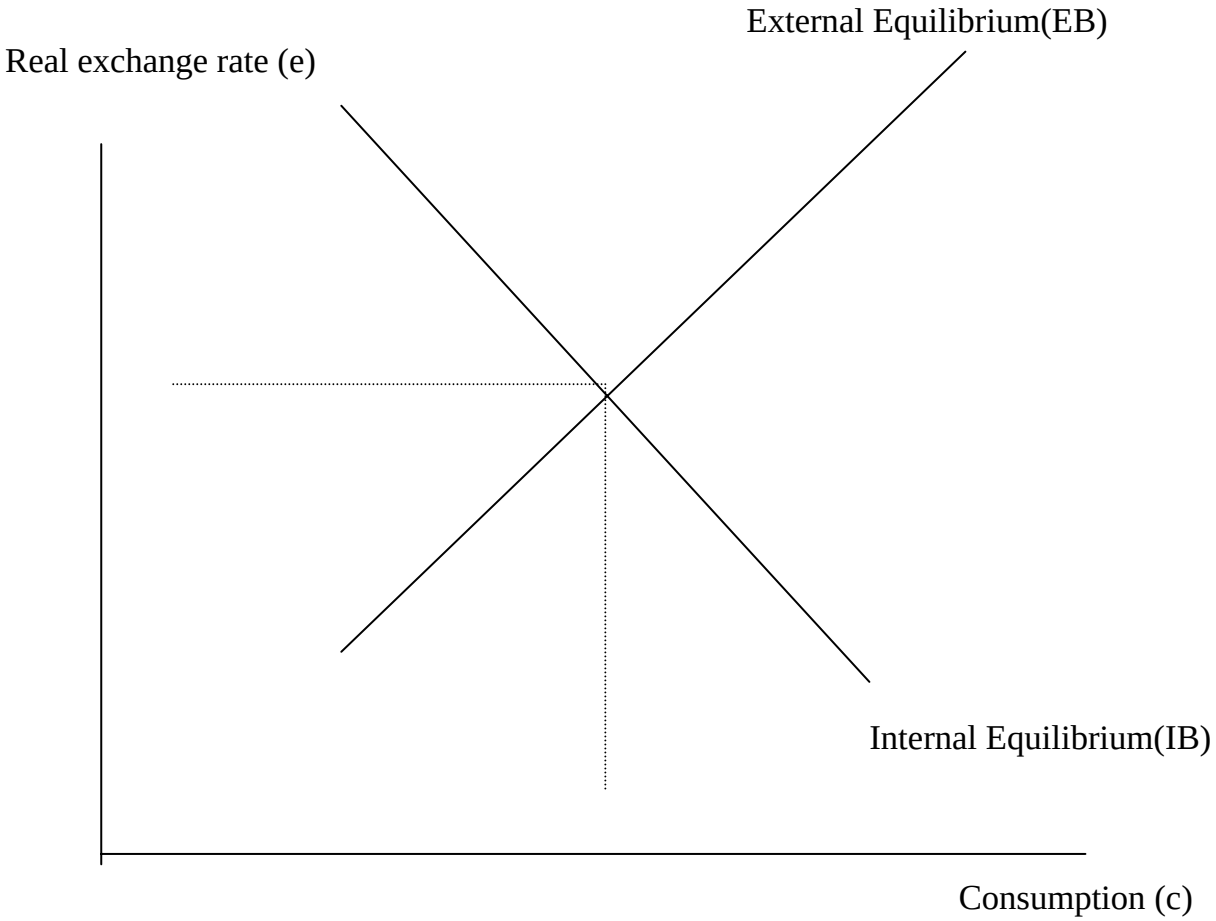
$f^{\circ} = y_T(e) - g_T - (\text{ᔓ} + \tau)c + z + rf$ ..……..... (3)

Where f°, is change in net foreign assets overtime, *f* is total net foreign assets, *b* is the trade balance, *z* is net foreign aid received by the government and *r* is real yield on foreign assets (measured in traded goods), y_T is domestic production of traded goods, g_T and c is government and private spending on traded goods, respectively. τ captures transaction costs associated with private spending while *rf* captures external debt service.

In equilibrium, $f^{\circ} = 0$ giving external balance locus along which we have a relationship between consumption and the real exchange rate. This shows a positive relationship between consumption and RER because; starting from equilibrium, an increase in private spending would generate a current account deficit at the original real exchange rate. To restore equilibrium the REER must depreciate to switch demand towards non-traded goods and supply towards traded goods.

Therefore, whereas an increase in private spending in internal balance yields an appreciation of the real exchange rate (or an increase in the supply of non-traded goods) a similar shock in external balance yields depreciation, which promotes an increase in the supply of traded goods. The overall effect of the two markets; that is internal equilibrium (IB) and external equilibrium (EB) produces the equilibrium real exchange rate that is consistent with the fundamentals determining the RER(figure 2).

Figure 2: Internal and External Equilibrium



We can solve for the combinations of private spending and the real exchange rate that are consistent with the notion of external balance by holding *f* at its steady state level. Setting the right-hand-side of equation (3) to zero and combining this with equation (2) we obtain the desired equilibrium real exchange rate:

$e^* = e^*(g_N, g_T, r^*f^* + z, \tau^*)$

Where * superscripts denotes steady state values of endogenous variables. Recognizing that transactions costs per unit are endogenous, they depend on the ratio of money holdings to private spending and hence on the nominal interest rates, the opportunity cost of holding domestic money.

Therefore, the final expression for the equilibrium real exchange rate in the Montiel model takes the form:

$e^* = e^* (g_N, g_T, z, r_w, \pi_t)$ ……..(4)
$e_1 < 0, e_2 < 0, e_3 < 0, e_5 < 0$

Where r_w is the world real interest rate and π_t is the rate of inflation in the domestic price of traded goods.

Equation 4 states that the real exchange rate consistent with both internal and external balance is a function of fundamentals; policy variables and exogenous variables. Empirical applications of the model estimate a version of equation 4 although the variables included as fundamentals differ across studies. Studies on the real exchange rates in African countries have found that openness, terms of trade (oil prices), productivity, capital flows, government expenditure, price differentials, real interest rate differential, money supply and net foreign assets are common factors that explain dynamics of the RER (see, Eita and Sichei, 2005; Koranchelian, 2005; Opoku-Afari, 2004; Aron *et al,* 1997; Mungule, 2004; Lim, 2006; Frankel, 2007; Elbadawi and Sato, 2005). Similarly, studies on other developing countries find RER to be mainly driven by productivity, terms of trade, openness, government fiscal account, current account balance and net foreign assets positions (see, Paiva,2006; Bergvall,2002, Dufrenot and Yehoue,2006; Zalduendo,2006). Studies on the Kenyan economy by Ndung'u (2000 & 2001) found that the changes in real interest rates differentials drive RER movements.

The present study attempts to carry the analysis forward and investigate the role of the external shocks on fluctuations of the real exchange rate in Kenya. Among the various combinations of the external shocks considered in the study includes terms of trade (oil prices), openness and net foreign exchange flows. The study also incorporated interest rate differentials, growth rate in real GDP and government spending to represent contributions of the domestic shocks to real exchange rate fluctuations in Kenya. Taking into account variables given in equation 4 and other variables identified in literature, we adopt the following model specification:

$$\ln reer = \alpha + \beta_1 \ln GDPR_t + \beta_2 \ln OILPRICE_t + \beta_3 \ln Open_t + \beta_4 \ln Gov\exp_t + \beta_5 nforex_t + \beta_6 \operatorname{int} diff_t + \varepsilon_t \quad \text{-----eq.5}$$

Where LNGDPR is the logarithm of real GDP, NFOREX is the net foreign exchange inflows, LOILPRICE is the log of oil prices representing terms of trade, LGOVEXP is log of total government spending, INTDIFF is interest rate differential given as 91-day Treasury bill less the libor rate, LOPEN is log of openness index which is the ratio of total trade to GDP, and ε_t is the error term.

Once the cointegrating equation given in eq. 5 is established, the following error Correction Model is estimated.

$$\Delta \ln reer = \alpha_0 + \alpha_1 ecm + \sum \beta_i \Delta \ln reer_{t-i} + \sum \lambda \ \Delta \ln GDPR_{t-i} + \sum \mathrm{T}_i \Delta \ln OILPRICE_{t-i} \sum \varphi_i \Delta \ln OPEN_{t-i} + \sum \varphi_i \Delta \ln GOVEXP_{t-i} + \sum \pi_i \Delta nforex_{t-i} + \sum \varpi_i \Delta indiff_{t-i} + \varepsilon_t \quad \text{-----eq.6}$$

Oil prices proxy for terms of trade shocks. An improvement in the terms of trade implies more favourable export prices. The increase in export earnings leads to a rise in aggregate demand thus resulting in price increases. Since the prices of tradables are determined in the international markets, the increase in prices will mainly affect non-tradables leading to an appreciation of the domestic currency. On the other hand, it is possible that increased export earnings could remove foreign exchange constraints thus enabling domestic producers to

increase the production of non-traded goods, hence lowering prices of non-traded goods. This so-called substitution effect, unlike the income effects described above, could therefore lead to a depreciation of the currency instead. Since oil price increases represent deterioration in terms of trade, the expected sign of the coefficient is positive.

Openness is a measure of trade policy or trade liberalization. Trade liberalization in itself implies dismantling of trade barriers and lowering of tariffs. Reduced tariffs leads to lower import prices or tradables and hence an appreciation of the currency. Therefore, a negative relationship is expected between real exchange rates and openness.

Government spending is expected to increase aggregate demand and exert an upward pressure on the prices of non-traded goods. This would then lead to an appreciation of the currency in the short-run. In the long-run, however, Government spending leads to an accumulation of domestic and foreign debts. Debt-service requirements in the long run could call for higher taxes and therefore a reduction in aggregate demand thus causing the real exchange rate to depreciate in the long-run. The sign of the coefficient is therefore expected to be negative in the short-run but positive in the long-run.

Capital inflows increase aggregate demand and exert upward pressure on prices of non-tradables, thus causing an appreciation of the real exchange rate.

Real economic growth is a proxy for technological progress or productivity growth. Its effects on the real exchange rate depends on how technological progress affects the prices of nontradables. On the one hand, productivity shocks increase incomes and raise demand in the economy. This is likely to exert pressure on prices of non-tadables to rise thus causing an appreciation of the currency. However, there is also a possiblility that the productivity shock could raise supply of non-tradable goods and therefore lower prices thus ultimately causing a depreciation of the currency. The effects of technological progress on the real exchange rate is therefore ambiguous and can only be determined empirically.

3.0 Data and Estimation Results

3.1 Data

The study uses monthly data covering the period 2000 to 2007. Data are sourced from the Central Bank of Kenya, the Central Bureau of Statistics Economic surveys, and online International Financial Statistics mainly on trading partner countries' consumer prices. Most of the variables are in logarithmic form such as the real exchange rate, terms of trade, openness, government expenditure and real GDP.

The real exchange rate (RER) is defined in terms of the nominal exchange rate (NER) adjusted for relative price levels, at a particular period, t. The relative price levels are obtained by taking the weighted average of the ratio of Kenya's CPI relative to CPIs of the country's major trading partners.

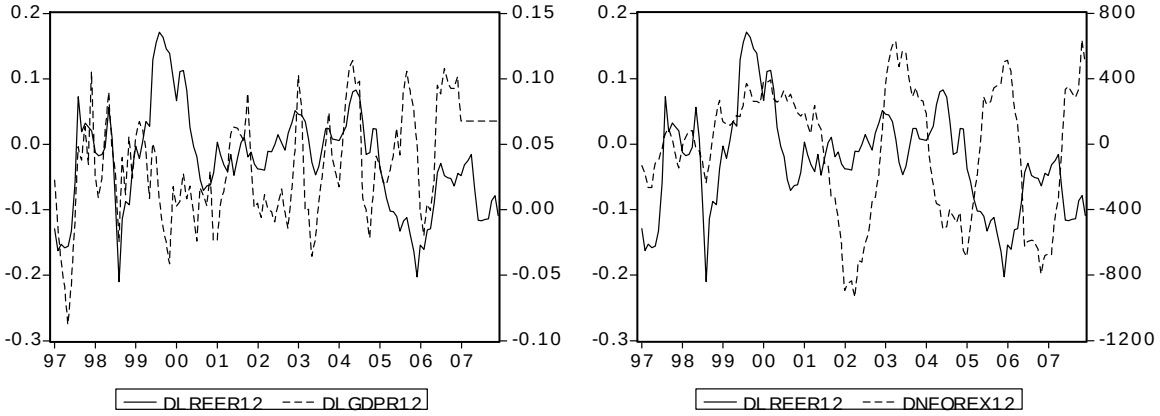
Trade and exchange rate restrictions are proxied by openness of the economy computed as (Export+Import)/GDP.

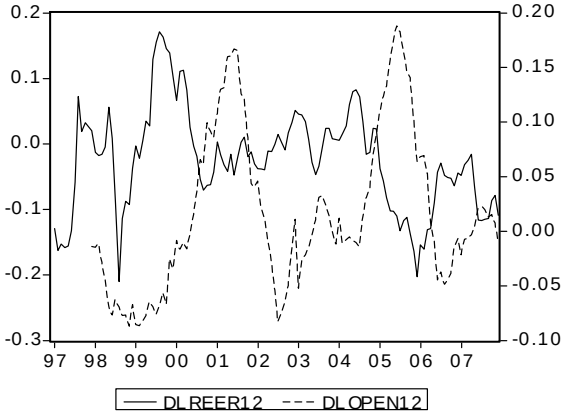
Net foreign exchange inflows are given as total receipts of foreign exchange less payments. The interest rate differential is the 91-day Treasury bill rate minus the London interbank rate (libor).

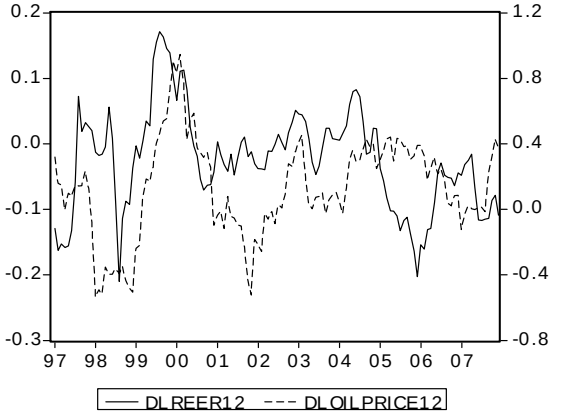
3.2 The Real Exchange Rate and its Fundamentals

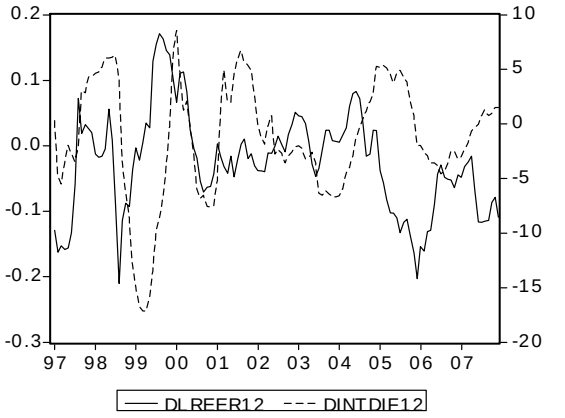
As shown in figure 3 and table 2, changes in the real exchange rate are negatively related with changes in net foreign exchange inflows, real GDP, government spending, interest rate differential and openness. On the other hand, changes in the exchange rate are positively related with oil prices implying a positive relationship between terms of trade deterioration and exchange rate depreciation. These relationships are corroborated by the correlation coefficients reported in Table 2.

Figure 3: Trend of Real Exchange Rate and its Fundamentals









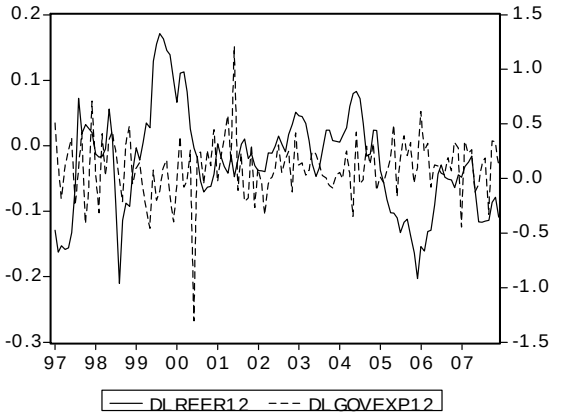


Table 2: Correlation Matrix

	REER12
REER12	1
Nforex12	-0.04
GDPR12	-0.10
OILPRICE12	0.25
GOVEXP12	-0.18
INTDIF12	-0.18
OPEN12	-0.40

3.3 Time series Properties of Data

3.3.1 Unit Root Test

Prior to model estimation, the time series properties of the data are confirmed using the Augmented Dickey fuller (ADF) test on the level and differenced value of the variable. The unit root test results are reported in Table 3, which reveal that all the variables are integrated of order one.

Table 3: Summary of Unit Root Test Results

Variable	ADF (Level)	ADF (difference)	conclusion
real exchange rate	-0.62(0.86)	-9.99(0.00)	**I(1)**
real GDP	3.82(1.00)	-4.26(0.00)	**I(1)**
Net foreign exchange inflows	-1.03(0.74)	-6.79(0.00)	**I(1)**
Oilprice	1.50(0.99)	-10.87(0.00)	**I(1)**
Openness	-0.53(0.88)	-8.91(0.00)	**I(1)**
Government expenditure	1.33(0.99)	-7.84(0.00)	**I(1)**
Interest rate differential	-2.08(0.25)	-7.30(0.00)	**I(1)**

Note: The significance level is given in parenthesis

3.3.2 Co integration Test

Therefore, having established that all the variables have a unit root, Johansen co integration test was used to examine whether the variables are co integrated or not and the results are reported in Table 4. The test showed one co integrating vector at 1% level of significance based on the trace test and the eigen values. This implies that it is possible to determine the long run relationship between the real exchange rate and its fundamentals and formulate a single equation Error Correction Model (ECM).

The resulting long-run cointegrating equation for the real effective exchange rate is given as follows:

DLREER = 34.869-0.0001*DNFOREX- 2.838*DLGDPR +0.149*DLOILPRICE +0.522*DLGOVEXP - 0.012*DINTDIFF - 0.95*DLOPEN

Where DLREER, DLGDPR, DLOILPRICE, DLGOVEXP, and DLOPEN are changes in the logarithms of real exchange rate, real GDP, oil prices, government spending and openness, respectively. DNFOREX and DINTDIFF are respectively changes in net foreign exchange inflows and interest rate differentials.

3.4 Granger Causality

Granger causality results with 11 lags of each variable indicate causality from changes in oil prices, changes in interest rates differentials and changes in government expenditure to changes in real exchange rates, all significant at 1% level of significance. Causality from changes in real output to changes in real exchange rates is significant at 5% level while causality from openness to changes in real exchange rate is significant at 10% level.

Table 5: Granger Causality

Null Hypothesis:	Obs	F-Statistic	Probability
nforex does not Granger Cause dlreer	121	0.8334	0.6072
dlGDPR does not Granger Cause dlreer	121	2.2176	0.0191
doilprice does not Granger Cause dlreer	121	2.8262	0.0030
dintdiff does not Granger Cause dlreer	121	4.2119	0.000
dlopen does not Granger Cause dlreer	121	1.7062	0.0851
dlgovexp does not Granger Cause dlreer	121	2.3734	0.0120

3.5 Estimation Results

A general model is estimated with five lags of each variable and a lagged error correction term and the results reported in Table A1. A preferred model is derived through reduction of the insignificant variables in the model. Following this general to specific approach, the preferred results are reported in Table 6 below.

Table 6: Regression Results –Error Correction Model

Dependent Variable: DLREER

Variable	Coefficient	Std. Error	t-Statistic
C	-0.0042	0.0016	-2.6071
DLGDPR	0.2445	0.0643	3.8035
Dnforex (-2)	-0.00002	0.00002	-0.7394
DLOILPRICE (-2)	0.0376	0.0191	1.957
DLOPEN (-1)	-1.3003	0.1386	-2.1664
DLGOVEXP (-5)	0.0102	0.0049	2.0962
DINTDIFF (-4)	-0.0040	0.0012	3.2378
Dum 97	0.1151	0.0191	6.0351
Dum98	-0.0442	0.01868	-2.3686
ECT(-1)	-0.0321	0.0094	3.4278

Summary statistics

R-squared	0.50	Normality (Jarque – bera)	1.97(0.37)
		Heteroskedasticity: ARCH	
Adjusted R-squared	0.45	Test	F=0.62(0.43)
Durbin-Watson stat	1.98	Serial correlation	F=0.77(0.46)
		Ramsey Reset Test	F=0.25(0.61)

Except for net foreign exchange inflows, all the variables included in the error correction model turn out to be highly significant. Real GDP growth and changes in interest rate differential are highly significant at 1% level. An increase in the domestic interest rate relative to foreign rates tends to exert a significant negative effect on the real exchange rate.

Real GDP growth has a depreciating effect on the exchange rate. Productivity shocks following higher GDP growth cause a depreciation of the currency.

Similarly, Government spending has a depreciating effect on the real exchange rate and is significant at 5% level.

Openness tends to appreciate the real exchange rate and is significant at 5% level. Openness reduces prices of traded goods thus causing an appreciation of the currency.

As expected, increase in oil prices, representing a deterioration of terms of trade, leads to a depreciation of the currency and is significant at 5% level.

Signs on the short-run and long-run coefficients are similar in the case of net foreign exchange inflows (negative), oil prices (positive), interest rate differential (negative), openness (negative) and government expenditure (positive). There are differences relating to the sign of the coefficient on real GDP which is positive in the short-run but negative in the long-run. Real GDP therefore has a depreciating effect in the short-run but as productivity gains are realized in the long-run, the real exchange rate appreciates.

Overall, the model performs well and passes all diagnostic tests such as normality, serial correlation, heteroskedasticity and stability (Ramsey Reset) tests.

3.6 Misalignment of the Real Exchange Rate

Following Mkenda (2001) and Aurequa (2001), we calculated the misalignment of the real exchange rate by taking the trend component of the estimated cointegrating equation to represent the equilibrium long-run trend. The misalignment is then derived by subtracting the equilibrium real exchange rate from the actual real exchange rate, that is;

$$\text{Misalignment} = \frac{(REER - EREER)}{EREER}$$

Where REER is the actual real exchange rate while EREER is the equilibrium real exchange rate defined as the trend part of the estimated real exchange rate cointegrating relationship. The Hoddrick – Prescott (HP) filter is used to extract the trend part from the estimated cointegrating relationship.

As shown in figure 4 below, it can be demonstrated that the recent appreciation of the shilling is in line with the fundamentals. The appreciation predicted by the fundamentals is in fact steeper than the realized appreciation. The shilling therefore, is not overvalued going by the misalignment of the real exchange rate from equilibrium. There are times when the

shilling was overvalued particularly noticeable in the period just after liberalization.

Figure 4:Misalignment of Actual REER from Equilibrium REER (hpequilreer)

4.0 Conclusion and Policy Recommendations

The study investigated the effect of external shocks on the real exchange rate in Kenya. Results from cointegration and error correction estimations show that oil prices and openness have significant effects on the real exchange rate. Oil price increases, being a proxy for terms of trade deterioration, cause a depreciation of the real exchange rate in the short and long-run. Openness, which tends to dampen prices of traded goods causes an appreciation of the real exchange rate in the short and long-run. Capital inflows have appreciating effects on the real exchange rate in short and long-run periods but is not highly significant in the short-run.

It is found that though external shocks have major effects on the real exchange rate, domestic shocks also play a role. The results show that the interest rate differential has significant negative (appreciating) effects in the short and long-run. On the other hand, government spending has significant positive (depreciating) effects on the real exchange rate in the short-run and long-run while real GDP growth has positive (depreciating) effects in the short-run but negative (appreciating) effects in the long-run.

The finding that reduced government spending appreciates rather than depreciating the real exchange rate in the short-run contradicts the commonly held view that fiscal restraint could be used to counter appreciation of the currency.

References

Amano A. and N. Simion 1995. Exchange Rates and Oil prices, *Working Paper 95-8, Bank of Canada*

Amano R. and Norden S. 1995. Exchange Rate and Oil Prices, *Working Paper Series No. 95-8, Bank of Canada.*

Aron J., Elbadawi I. and B. Kahn 1997. Determinants of Real Exchange Rate in South Africa, *Working Paper Series no 97-16, Centre for study of African Economies, Institute of Economic and statistics, Oxford University*

Baffes J, I. Elbadawi and S. O'Connell (1997), Single- Equation Estimation of the Equilibrium Real Exchange Rate

Barnett W. and C. Ho Kwag (2005) *Exchange Rate Determination from Monetary Fundamentals: an Aggregation Theoretic Approach*, Department of Economics University of Kansas and POSCO Research Institute

Bergvall A. 2002. *What Determines Real exchange Rate? The Nordic Countries***,** Department of Economics, Upsalla University, Sweden

Broeck M. and T. Slok (2006) "Interpreting real exchange rate movements in transition countries", *Journal of International Economics 68(2006) pp 368-383*

Chand S. (2001) How Misaligned is the Australian Real Exchange Rate, The Australian National University.

Civcir I (2003) *The Long-run Validity of Monetary Exchange Rate Model for a High Inflation Country and Misalignment: The Case of Turkey*, Faculty of Political Sciences, Ankara University

Closterman J. and B. Schnatz 2000. The determinants of euro-dollar exchange rates: synthetic fundamentals and non existing currency, *discussion paper 2/00, Economic Research group of the Deutsche Bundesbank*

Defrenot J.and E, Yehoue, 2006. Real exchange rate misalignment: A panel co integration and Common Factor Analysis, *IMF Working Paper no. 05*/164 *Washington D.C:* International Monetary Fund.

Eita J. and M. Sichei, 2006. *Estimating the Equilibrium Real exchange rate for Namimbia, Department of Economics working paper series 2006-08,* University of Pretoria

Elbadawi A and R. Sato, 2005. Theory and Empirics of Real exchange rates in Sub-Saharan Africa and other Developing countries, *Preliminary report part of World Bank project*

Frankel J.(2007) “On the Rand: Determinants of South African Exchange Rate”, *Faculty Research Working paper Series 07-015, John F. Kennedy School of Government, Harvard University.*

Hopper G. (1997) “What Determines the Exchange Rate: Economic Factors or Market Sentiments?” *Business Review, pp 17-29, Federal Reserve Bank of Philadelphia*

Koranchelian T. 2005. The Equilibrium Real exchange Rate in a Commodity Exporting Country: Algeria’s Experience, *IMF Working Paper no. 05*/135 *Washington D.C:* International Monetary Fund.

Lim A. 2006. Exchange Rate Misalignment: An Application of Behavioral Equilibrium Exchange Rate (BEER) to Botswana, *IMF Working Paper no. 06/140 Washington D.C:* International Monetary Fund.

Mungule K. 2004, The *determinants of the Real Effective Exchange Rate in Zambia*, AERC Research Paper No. 146 Nairobi: African Economic Research Consortium.

Munro A. (undated) “What Drives the New Zealand Dollar?” *Bulletin, Vol. 67, No. 2, Reserve Bank of New Zealand*

Ndung’u N.S 2000. The Exchange Rate and the Interest Rate differential in Kenya: A monetary and Fiscal Dilemma *KIPPRA Discussion Paper No. 10 Nairobi: Kenya Institute for Public Policy Research and Analysis.*

Ndung’u N.S 2001. *Liberalization of the foreign exchange market in Kenya and short term capital flows problem***,** AERC Research Paper No. 109, Nairobi: African Economic Research Consortium

Ndung’u, N.S. 1999. *Monetary and Exchange Rate Policy in Kenya.* AERC Research Paper No. 94. Nairobi: African Economic Research Consortium.

Opoku-Afari 2004. Measuring the Real Effective Exchange Rate in Ghana, *Credit Research Paper no. 04/11, UK: Center for Research in Economics and Development and International Trade,* University of Nottingham

Opoku-Afari M.; Morrissey O. and T. lyord, 2004. Real Exchange Rate Response to capital inflows: A Dynamic Analysis for Ghana. *Credit Research Paper no.04/1, UK: Center for Research in Economics and Development and International Trade, University of Nottingham, UK.*

Paiva C. 2006. External Adjustment and the Equilibrium Exchange rate in Brazil, *IMF Working Paper no. 0*6/221 *Washington D.C:* International Monetary Fund.

Razin O and S. Collins (1997) *Real Exchange Rate Misalignment and Growth,* Georgetown University

Simwaka K. (undated) *Monetary Model of Exchange Rate: Empirical Evidence from Malawi,* Research and Statistics Department, Reserve Bank of Malawi

Were M. Geda A. and S. Karingi, 2001**.** Kenya's Exchange Rate Movement in a Liberalized Environment: An Empirical Analysis. *KIPPRA Discussion Paper No. 10 Nairobi: Kenya Institute for Public Policy Research and Analysis.*

Youngblood C. 2004. Equilibrium Real Exchange Rate Framework, Trade and Investment Reform Program, *Improved Policy Reform and Financial Intermediation USAID Contract No. 641-C-00-98-00229*

Zalduendo J. 2006. Determinants of Venezuela's Equilibrium Real exchange Rate, *IMF Working Paper no. 0*6/74 *Washington D.C:* International Monetary Fund.