AN ANALYSIS OF EFFECTIVE EXCHANGE RATE IN KENYA (1970-2003)

By

James K. Maina

Reg. No. C/50/7630/2002

SUPERVISORS: **Prof. S.N. Ndung'u**

Prof. L. P. Mureithi

Prepared and submitted to the Department of Economics in Partial Fulfillment of the Degree of Masters of Arts in the University of Nairobi

December 2004

Declaration

This research paper is my original work and has not been presented for a degree in any other university.

James Kiumu Maina — Date 31/1/2005

This research paper has been submitted for examination with our approval as university supervisors.

Prof. S. N. Ndung'u — Date 02/12/05

Prof. J. P. Murai — Date 1/2/05

Acknowledgement

A special note of thanks is to Professor Njuguna S. Ndung'u of the AERC. As my supervisor he provided strong individual contributions, which were invaluable. His comments and guidance provided the much needed shaping of my paper. I also acknowledge the support of the IDS Library whose assistance in providing needed materials became my major source of data.

My fellow student colleagues were a source of needed consultation. I salute them.

Last but not least, I acknowledge the unwavering support and affection given to me by lovely wife, Joyce and my two cheerful daughters Jacinta and Sarah. Without their support, writing of this paper would have been a miserable bit of life.

Dedication

My dedication is to my Mother Jacinta and Father Geoffrey. They taught me the virtue of handwork.

My other dedication is to my Primary school teacher, Samuel Macharia Thuo. He always inspired me and instilled in me the good virtue of self-discipline.

Abstract

Since the mid 1970s, developing countries started altering their exchange rate regimes towards more flexible arrangements. The move was prompted partly by the desire to minimize the adverse effects on their economies of fluctuations in exchange rates of major currencies that took place since the advent of the generalized floating in 1973, and especially 1980s. Fundamentally, exchange rate has become an endogenous variable determined by key identifiable variables, while changes in the exchange rate in turn affect important macroeconomic variables. Understanding the determinants of and sources of real exchange rate movements and their impact on the competitiveness has therefore become an important focus of policy.

This paper attempts to calculate the effective exchange rates (nominal and real) for Kenya, and follows that with an assessment of the long-term determinants of the RER for the period 1970-2003. It identifies productivity, terms of trade, openness of the economy, foreign direct investment, and foreign real interest rate as some of the major fundamentals that drive changes in real effective exchange rate.

A recursive estimation of the real exchange rate model shows that movements in all the five fundamentals are important drivers of changes in the real exchange rate. The study shows that in order to achieve desirable economic outcome especially with regard to production and trade the Government must address the issue of RER alongside other important policy variables, and that policies that target RER must also address these fundamentals.

Table of Content

1.0 Introduction

1.1 Concept of the Real Exchange Rate

The exchange rate is the price of a currency in terms of another. It can be defined in terms of domestic or foreign currency, in which case one is a reciprocal of the other. The real exchange rate (RER) is an important concept in economics. It is a broad summary measure of the prices of one country's goods and services relative to those of another country or a group of countries, and is thus an important consideration when analyzing macroeconomic conditions in open economies (Ellis, 2001). The price can be rigidly fixed, or alternatively allowed to be market determined.

Since 1970s, many developing countries have altered their exchange rate regimes. They have moved away from pegging to a single currency towards either pegging to a basket of currencies or adopting a more flexible arrangement under which the domestic currency is frequently adjusted (Bijan et al. 1991). In the market determined case the exchange rate is determined by forces of demand for and supply of foreign currencies. The demand for foreign currency (say the dollar) takes place when residents in a country buy non-domestic goods, services and assets, or lend to non-residents. The supply of foreign exchange takes place when non-residents buy the country's goods, services and assets and use foreign currency to effect payments.

In the rigidly fixed case the nominal exchange rate is set by the government and indicates the number of domestic currency units per unit of foreign currency. The real exchange rate on the other hand, is determined by the market fundamentals. It can be defined as the relative prices of the tradables in terms of non-tradables. An increase in the real exchange rate is a real depreciation, which encourages domestic production of both exportable and importable goods.

Domestic production delivers two sets of goods – tradables and non tradables. Tradable goods (T- Goods)- exportables and importables, face foreign competition in world and

services and fresh perishable food stuffs) serving exclusively the domestic market are non-tradeable goods (n-goods), free of competition from abroad.

Domestic prices of tradable-goods are, through the exchange rate, passive reflections of their corresponding world prices. For non-tradable goods and services, prices are formed in the domestic market, and the exchange rate influences them only through the price of tradable-goods entering as inputs in their production. Tradable goods prices may move up and down pegged to the exchange rate, but non-tradable goods prices are relatively inflexible downwards.

A nominal exchange appreciation carries tradable goods prices downwards but leaves non-tradable goods prices unchanged, *Ceteris paribus*. Measured in terms of dollars, tradable goods prices do not vary but non-tradable goods prices rise. The outcome is real appreciation since, on average, domestic goods relative to foreign ones, become dearer than before. The greater the extent of real appreciation and deflation, the bigger the share of the non-tradable goods sector in the production basket. A measure of appreciation is the price of non-tradable relative to that of tradable goods.

An increase in the real exchange rate may occur as a result of one or all of the following: an increase in the nominal exchange rate; an increase in the world price of tradable goods including tariffs; and/ or a decrease in the domestic price of non-tradable goods including tariffs. Conversely, a decrease in the real exchange rate is a real appreciation, which discourages production of tradable goods. The real exchange rate is therefore, a significant part of the structure of incentives facing producers of the tradable goods including exports (youngblood, Dordunoo, Larrain, Younger and Grennes, 1992)

The computed real exchange rate may be bilateral, i.e. between a domestic economy and a foreign economy, or multilateral, i.e. between a domestic economy and a weighted average of more than one foreign economy (Kidane, 1994a and b; Elbadawi, 1992; and M'bet and Niamkey, 1993).

In order to estimate an exchange rate of a given currency at a given time, one needs to identify that country's major trading partners and then device an index that expresses an average change in the exchange rate of a particular currency against currencies of the partners. The simplest way to do this would be to calculate the simple arithmetic mean of individual bilateral exchange rate; however, this approach is valid only if each trading partner has the same share of trade with the particular country under study, which is not normally the case.

The most reasonable approach would be to have a weighted 'average' of bilateral exchange rates. This is what is called the effective exchange rate. Hirsch and Higgins (1970) were among the first to develop this concept and recognized that effective exchange rate should be an index and should not be expressed in absolute terms. They also identified that only the currencies of the major trading partners (not all the currencies) should be included.

1.2 Background to the Evolution of Exchange Rate in Developing Countries

Prior to the 1970s collapse of the International Monetary Fund's fixed exchange rate regime most African countries as well as most other developing countries pegged their currencies against the world's major currencies. However, since the mid 1970s, many developing countries stated altering their exchange rate regimes. They moved away from pegging to a single currency toward either pegging to a basket of currencies or adopting a more flexible arrangement under which domestic currency can be frequently adjusted. This was prompted partly by the desire to minimize the adverse effects on their economies of fluctuations in exchange rates of major currencies that took place since the advent of the generalized floating in 1973, and especially 1980s.

For example in the 1960s and 1970s, Kenya adopted a fixed exchange rate policy, where nominal rate was only adjusted occasionally. Economic observers are however generally agreed that the shilling was never grossly overvalued, with quantitative restriction on imports intensively applied only since 1971 (Ng'eno, 1991).

Following the dropping of the floating exchange rate in 1973, Kenya continued to determine the value of the shilling exchange rate through a peg to the US dollar. The peg was however later considered unsuitable because the benefit of maintaining the shilling exchange rate stability by pegging its value to the dollar was being offset by the cost of greater fluctuation of the dollar in relation to other major currencies. From 1975 the management of the shilling was therefore against a basket of currencies - the SDR, meaning that the shilling would not float independently, neither would it peg to any single major currency. The peg to the SDR was then modified in 1982 where the shilling exchange rate was to be determined through a peg to composite basket of currencies representing the bulk of Kenya's external trade. This was motivated by the need to reduce to a minimum the undesired exchange rate fluctuations in terms of the individual currencies in the SDR and to make it easier to manage the shilling exchange rate by disguising to some extent small exchange rate changes. The technicalities were then left to the Central Bank, thus removing them from political influence and control. This lasted up to 1990 when the dual exchange rate- the official and the Bearer Certificate (FOREX-C) market was introduced. The two rates were then merged in October 1993 to pave way to the complete float of the exchange rate, which was preceded by the abolition of all controls on imports and foreign exchange transactions.

1.3. The study problem

Prior to the collapse of the IMF's fixed exchange rate regime most African countries pegged their currencies against the world's major currencies. However, since the mid 1970s, many developing countries stated altering their exchange rate regimes. They moved away from pegging to a single currency toward either pegging to a basket of currencies or adopting a more flexible arrangement under which domestic currency could be frequently adjusted. This was prompted partly by the desire to minimize the adverse effects on their economies of fluctuations in exchange rates of major currencies that took place since the advent of the generalized floating in 1973, and especially 1980s. The shift in the exchange rate policy has made the market mechanism dominant in the management of foreign exchange

become an endogenous variable determined by key identifiable variables, while changes in the exchange rate in turn affect important macroeconomic variables. This raises the question as to the effectiveness of exchange rate of an African country's currency in influencing desired trade changes vis- a-vis that of major trading partners. In order to estimate the effectiveness of an exchange rate of a currency at a given time, one needs to identify that country's major trading partners and then device an index that expresses an average change in the exchange rate of a particular African currency against currencies of the partners.

Maintenance of competitiveness is a key concern to all countries more so the developing ones that require sustained stability for growth. Understanding the source of appreciation or rather movement in real exchange rate is therefore important for policy purposes. According to Dimitar et al (2004) study on many transition countries have shown that much of the recent real appreciation is either due to changes in fundamentals or part of the real convergence process. Real appreciation occurs in response to changes in terms of trade, capital inflows, net foreign asset position, or savings. Again appreciation of the real effective exchange rate in response to large, potentially temporary inflows of capital may adversely affect competitiveness of the external sector, posing a dilemma for policymakers. Furthermore, many currency and financial crisis in the 1990s originated in the exchange rate misalignments. Understanding the determinants of and sources of real exchange rate movements and their impact on the competitiveness has therefore become an important focus of policy.

1.4. Objectives of the Study

The study makes an attempt at calculating the effective exchange rates (nominal and real) for the Kenya shilling. It also makes an assessment of the long-term determinants of the RER of the Kenya shilling during the period 1970-2003.

The specific objectives include:

- Calculating the index of the effective exchange rate for Kenya.
- Presenting an empirical analysis of the long-term determinants of the real effective exchange rate of the Kenya shilling

Identifying the long run fundamentals that determine the long run equilibrium real exchange rate is considered important because the dynamic behavior of these variables is what ultimately determines the path followed by the real exchange rate overtime. A wide variety of shocks, that alter the value of the real exchange rate operating on both the demand and supply sides of the economy have been identified by economists using diverse analytical frameworks. This paper presents within a single analytical framework an assessment of the effect of some of the identified long-run fundamentals on the real exchange rate.

1.5 Justification

There seems to be a general agreement that sustained misalignment of real exchange rates will usually generate severe macroeconomic disequilibrium, and that the correction of external imbalances, namely the current account deficits, will only require both demand management policies and a devaluation of the real exchange rate. The most recent policy evaluations indicate that the more successful developing countries owe much of their success to their ability to maintain an appropriate level of the real exchange rate, especially with regard to their phenomenal success of their export orientation strategies.

Prior to the foreign exchange reform process, the foreign exchange markets in sub-Saharan African countries – like those of most less developed countries – were characterized by three main features: an excessively over- valued official exchange rate, a thriving black market in foreign exchange and official foreign exchange allocations based on import licensing arrangements mandated by the government. In order to rationalize the official exchange rate, the governments of these countries adopted a series of reform measures as part of the World Bank/IMF economic reform programmes. The over-riding objective of the foreign exchange reforms was to correct the fundamental distortions in the economy, achieve an international competitiveness and ensure a viable balance of payments.

The deregulation of the exchange rate has made the market mechanism dominant in the management of the foreign exchange. A more fundamental issue is that the exchange rate has become an endogenous factor determined by key identifiable policy and non-policy variables; changes in the exchange rate in turn have very important macroeconomic implications. Changes in the real exchange rate can have a number of both positive and negative impacts. in areas ranging from balance of payments to parallel currency to investment and employment. They can also affect inflation, output, import control and export growth:

As Ndung'u (1999), puts it, the real exchange rate has taken centre stage in most empirical models of adjustment and stabilization. This is because it plays a crucial role in the stabilization and adjustment process. In developing countries, the RER, being a measure of international competitiveness, has become a policy target and in most exchange rate regimes changes, the aim is to maintain a stable and competitive RER.

II.0 Empirical Evidence on Real Effective Exchange Rate

II.1 Empirical Evidence on the effects of real exchange rate changes on different macroeconomic variables in Several African countries

The empirical evidence for the effects of RER changes spanning from Ghana, Sudan Ethiopia, Kenya, Botswana, Tanzania and Uganda are presented below.

Younger, (1991) and Dordunoo, (1993) found that Policies adopted by Ghana that enhanced the exports of its products included the realignment of the exchange rate and decontrolling of trade and prices. The realistic exchange rates also attracted huge aid inflows and unrequited transfers. both private and public. to the tune of over $420 million per annum over the period 1984-1994, which partially led to the Dutch disease syndrome. Jebuni, et al., (1994) postulated that the evidence from Ghana suggested that liberalization with a real depreciation of the exchange rate is more likely to lead to improved export performance

Kidane, (1994a, 1994b), established an empirical evidence that the real exchange rate depreciation had a strong positive impact on Ethiopia's export of coffee, which is the major export of Ethiopia. The exchange rate elasticity is estimated at 1.9. Possible explanations for the elasticity may be substantial reduction in domestic consumption and/or decrease in coffee smuggling.

A study by Kagira (1994) inferred that Kenya's exchange rate policy had a positive impact on the performance of all categories of manufactured exports as evidenced by the empirical analysis and field survey results. This is supported by another study by Kidane, (1994b) and Ndung'u (1994). According to these studies all manufacturers interviewed indicated that any devaluation makes them consider increasing production for exports.

Nyoni, (1994) reviewed econometrics results fro Tanzania which conformed to the export supply theory, implying that depreciation in the real exchange rate induces an expansion of production and/or supply for export. This means that the pass-through effect is significant and in the right direction

Ssemogerere and Kasekende, (1994) conducted a study which investigated the constraints that prevented export receipts from increasing in response to the exchange rate reforms since 1981. The first conclusion was that exchange rate policies, unless pursued within a consistent macroeconomic stabilization framework, couldn't elicit a significant response from export producers. Second, it is clear that other constraints encompassing institutional reforms and infrastructural construction must also be addressed before a country can develop a dynamic comparative advantage.

Afolabi and Makinde (1994) adopted both trend analysis, and econometric modelling, which showed that the output impact of the real exchange rate adjustment was largely negative. In some cases, improvement in output was observed in some categories after the massive nominal exchange rate

II.2 Further Review of Studies of the RER in Developing Countries

Past literature on the response of the imports to the real depreciation in developing countries does not provide evidence of strong response of imports to exchange changes. This is mainly attributed to an "import compression" (or rationing) syndrome. This is because import restrictions have often been imposed or tightened in response to balance of payments deficits in developing countries. This means that even though other things being equal devaluation would reduce imports, a devaluation accompanied by an easing of import restrictions may or may not lead to reduced imports.

Both episodic and econometric evidence suggest that exchange rate adjustments and changes in import flows have historically been weakly associated, on average, in developing countries. Kamin (1988a) compared the evolution of a number of macroeconomic variables (imports, exports, trade balance, inflation) in countries that experienced discrete devaluations with a comparator group of non-devaluing countries. He found that, although the trade balance improved in the devaluing group, the groups imports actually grew more rapidly in the years following the devaluation than in the years preceding it – contrary to what one would expect if a devaluation increased the relative price of imports and imports were price sensitive. Similarly, Rose (1991) analyzed data for 30 developing countries using unit –root techniques and was unable to find a strong, stable effect of the RER on the trade balance. Pritchett (1991) sampled 60 non-oil exporting countries for a period 1965-1988 and the trade balance did not have any consistent empirical relationship to the real exchange rate, whether comparing across countries or in individual countries over time. In some instances the import elasticity sign did not tally with the expectation-being positive in some countries.

A strand of empirical evidence suggest that the common failure to find an impact of devaluation on import levels in developing countries is attributed to the fact that devaluation typically take place after an episode of import compression and are often accompanied by an easing of import restrictions.

For the real exchange rate adjustments to affect the exports, it must first alter the relative profitability of the factors (for example, land labor, capital) in producing exportables versus other domestic goods. There are some instances in which devaluation may not improve the real profitability of the exports. First devaluation increases the border price of export crops in domestic currency terms. However, if the increase in the border prices is not passed through the marketing system to producers, then no supply response should be expected. In some African countries, devaluation has been completely absorbed by increased margins of the marketing agencies, and the real prices received by farmers have not changed. Second, if the changes in the relative prices of other inputs occur simultaneously (for example, if fertilizer subsidies are cut or interest rates raised) then the net improvement in relative prices may be less than the increase in import prices.

The non-pass-through of devaluations to the domestic producer prices of export products- or "export repression"- can cause empirical problems in estimating export supply elasticities that is similar to those caused by relaxation of import compression at the time of devaluation. This means that, the exchange rate changes but the domestic price changes much less, so that in some cases it may difficult to detect the empirical effects of devaluation on exports. If the effects of the exchange rate changes are passed through to domestic producer prices, aggregate exports typically respond fairly strongly and swiftly to real exchange movements.

Studies have been undertaken to ascertain the determinants of the RER in developing countries. The degree of openness of the economy, measured as a ratio of trade to GDP, is an important determinant of the RER (Elbadawi and Soto 1997, and Baffes, Elbadawi, and O'Connell 1997). Reforms aimed at reducing tariffs and eliminating trade restrictions, hence increasing openness, are consistent with a depreciated RER. A sustained rise in capital flows raises domestic absorption and shifts composition of potential output towards non-traded goods, leading to an appreciation of the RER (Elbadawi and Soto 1997, and Baffes, Elbadawi, and O'Connell 1997). An increase in the ratio of government expenditure to GDP can depreciate or appreciate the RER (Easterly and Schmidt-Hebbel

1989). Government spending, however, tends to appreciate the RER because of the tendency to of the government to spend more than the private sector on non-traded goods. The small magnitudes of the estimated parameters suggest that the effects are minor. External terms of trade have yielded ambiguous results, but generally an improvement in the terms of trade tends to appreciate the RER suggesting that the spending effects, which tends to expand the demand for non-traded goods, of this variable dominate the substitution effect, which lower the cost of the imported inputs in the production of the non-traded goods (Edwards 1997, Baffes,Elbadawi, and O'Connell 1997). Increased share of investment in GDP depreciates the RER (Edwards 1997, Baffes,Elbadawi, and O'Connell 1997) because of the tendency of increased investment to shift spending towards traded goods given the high import content of investment.

According to Montiel (1999), a particular shock that has been associated with the emergency of capital inflows; a reduction in world real interest rate directly affects the external balance. The, the real exchange rate consistent with external equilibrium moves in direction opposite to the world interest rate. In this case when the world interest rate falls, the external balance locus moves upwards and the equilibrium real exchange rate, actually depreciates.

He adds that the effect of productivity shock in the traded goods sector is to increase demand for labour in that sector thereby increasing the equilibrium real wage. In turn this causes the non-traded goods sector to release labour, which is absorbed by the traded goods sector. At a given real exchange rate, the traded goods sector expands, while the non-traded goods sector contracts By increasing the production o0f the traded goods, the shock gives rise too an incipient traded surplus, so that a real appreciation is required to restore the external balance Thus, differential productivity growth in the traded goods sector creates an appreciation of the equilibrium real exchange rate.

The analysis of the effects of the terms of trade changes is quite similar to that of productivity shocks to the traded goods sector. An improvement in the terms of trade

and non-traded sectors to the expanding exportables sectors. An improvement in the terms of trade results in a contraction in output of non-traded goods. The resulting excess demand in the non-traded goods market causes the internal balance schedule to shift downwards. The implication is that, as in the case of favourable productivity shock, the external balance locus shifts downwards. The incipient improvement in the traded balance requires a real appreciation to keep the traded balance at its sustainable level. Thus the effects of the terms of trades improvement is an appreciation of the real exchange rate.

A number of empirical models have been used to estimate the RER in developing countries (Rodriguez 1989, Edwards 1989, Elbadawi and Soto 1997, Baffes,Elbadawi and O'Connell 1997). Econometrics models of the RER can be separated into three broad categories: studies that focus on the implication of a particular theory for the evolution of the exchange rate; models that try to parameterise either structural or reduced form specifications of theoretical relationships; and models that use calibrated parameters and proposed structural relationships to replicate some of the observed characteristis of the RER (Elbadawi and Soto 1997). Tests of theory implications have tended to concentrate on monetary models such as the flexible – price model cum Purchasing Power Parity (PPP) hypothesis. Estimated monetary models have been shown to frequently to present wrong signs, low in– sample fit and poor out – of - sample forecasts (McDonald and Taylor 1992) Parameterised models are the most frequently used tool to analyze the evolution of the RER. The structure of the models has changed during the last decade as a result of dynamic time-series analysis.

A study by Dimitar et al (2004) indicated that RER is driven by fundamentals, including labour productivity, terms of trade, world real interest rates, gross savings, and foreign direct investments.

Other studies have indicated that much of the real appreciation is due to the Balassa-Samuelson effect or movement in fundamentals. Halpern and Wyplozz(1997),studied former socialist economies and found that real appreciation rises due to an increase in

the capital market. Much of the real appreciation was attributed to: better quality of traded goods improving the terms of trade, wage adjustments in the non-traded goods sector exceeding those in trded goods sector, wages initially exceeding productivity in the traded goods, and the Balassa- Samuelson effecty according to which productivity in the traded goods rises faster than in non-traded sector driving wages in the latter up beyond productivity. A range of other studies has also explained RER movement in terms of productivity differentials, net foreign asset positions or other fundamentals.

II.3 Development of an effective exchange rate

Balassa (1987) considers two definitions of the real exchange rate – the traditional and the modern. The traditional approach estimates the nominal effective exchange rate and then deflates it by relative price movement of a given and partner country, in order to achieve the real exchange rate indicator. This real exchange rate is referred to as the real effective exchange rate. The modern approach estimates the ratio of price indices of traded and non-traded goods. This study will consider both approaches in the determination of the effective exchange rates indices.

We have since recognized that the effective exchange rate should be an index and be expressed in relative terms. Hirsch and Higgins (1970) defined an effective exchange rate of any given currency as 'the percentage 'direct' change in the numeraire rate minus the weighted percentage 'indirect' change in the numeraire rates of other currencies.

When considering the choice of a base period in the calculation of an index, Rhomberg (1976) argues that the base date should be chosen in such a way that the period is as close to the equilibrium rates as possible. Weighting is an important issue in constructing an effective exchange rate index and the choice of weights depends on the objective of the study or on the economic analysis. In that case one may have as many weights and indices as the number of policy issues that one want to analyze.

In order to estimate an exchange rate of a given currency at a given time, one needs to

average change in the exchange rate of a particular currency against currencies of the partners. In order to compute an effective exchange rate one takes a basket of different currencies, select a (more or less) meaningful set of relative weights, then computes the effective exchange rate of that country's currency.

The weights for indices are designed to indicate changes in import and export competitiveness. On the import side, producers of import substitutes compete in the domestic market against foreign suppliers in satisfying demand for particular types of goods. The importance attached by the importing country to a foreign supplier (competitor) is related in a straight forward manner to the latter's share (in terms of value) in imports of the particular good. In other words, for each type of goods that a country imports, a set of weights for the foreign suppliers is computed based on bilateral import trade data.

The aggregation procedure yields a set of weights that is exactly equivalent to one based on the share of each foreign supplier in a country's total imports. This means that as far as the data requirements are concerned,, the computation requires only information on a country's total imports by country of origin.

An exporter of a particular type of goods is considered as facing competition in an export market both from domestic suppliers and from other foreign producers. It should be noted that the weight is thus the importance of country j as a market for country i's total exports of goods.

The weights for each country are computed with no prior restrictions on the number or type of countries to be considered as potential competitors. This means that the set of potential competitors is not arbitrarily restricted to any sub-group of countries. Therefore, the number of countries included in the set of weights computed for each country is potentially very large. In truncating the number of countries included, partner countries with the smallest computed weights are eliminated under the proviso that coverage of trade does not fall below a certain percentage.

II.4.0 The various indices

Several indices for effective exchange rate may computed depending on the objective for which the study is done. However of interest to this study is the multilateral (real and nominal) effective exchange rate, which is described below.

II.4.1 Multilateral real exchange rate index

To convert a set of bilateral indices into a multilateral real exchange rate index, a weighted average of the bilateral indices (rer_{it}) needs to be taken. While an arithmetic weighted average of these indices is straightforward to calculate, there are statistical reasons to prefer a geometric average of the indices. In particular, in contrast to an arithmetic average, a geometric average treats increases and decreases in exchange rates symmetrically and is not affected by the choice of base year. Following Ellis, (2001), the weighted average of the real bilateral exchange rates is thus generally calculated as:

$$rer_i = \prod_{i=1}^{i} rer_{i,t}^{w_i}$$

Where the weights, *wi*, which are applied to each bilateral real exchange rate, sum to one. In the above formulation, the weights used to construct the real exchange rate index are held constant overtime. It may, however, be desirable to allow the weights to change periodically, in order to ensure that movement in the real exchange rate provides a meaningful picture of the net effect of movements in bilateral rates at different times. If the weights are allowed to vary, the index must be spliced together at every period that the weights are changed. Otherwise, movements in the index would be misleading, as they would reflect both changes in the underlying real bilateral exchange rates as well as changes in the weights overtime.

There are several conceptually correct methods for calculating an index with changing weights. One that is commonly used can be characterized as a spliced Laspeyres index. Without going into details, suppose that the weights applied to each bilateral real exchange rate change from w^1 to w^2 at time B. Then for $t \geq B$, the spliced real exchange rate index

$$rer_t = rer_{t-1} \cdot \frac{\prod_i rer_{i,t}^{w_i^t}}{\prod_i rer_{i,B-1}^{w_i^t}}$$

If the composition of countries in the basket has changed for the new set of weights, the set of bilateral exchange rates used for both parts of the second term in this expression are those included in the current - period set of weights.

III.0 Methodology

III.1 Calculation of Multilateral real exchange rate (Real Effective Exchange Rate) index

To compute the real effective exchange rate we started by obtaining the bilateral exchange rates between the Kenya shilling and the currency of the main trading partners. We then calculated the average of the weighted bilateral exchange rate to get the nominal effective exchange rate. In calculating the average, we preferred the geometric mean to the arithmetic mean because geometric mean treats increases and decreases in exchange rates symmetrically and is not affected by extreme values. We used both the shares of exports and imports of the main trading partners to the total exports/imports as the weight. To obtain the real Effective Exchange Rates we deflated the nominal effective exchange Rate by ratio of foreign to domestic prices. Here we used the United States Wholesale Price Index (WPI) to proxy for the foreign prices since this index represents mainly the tradable goods and is considered to be fairly stable, while Kenya's Consumer Price Index (CPI) was used to proxy for domestic prices. This is because the CPI represents mainly the non – tradable goods. We then used year 2000 as the base year to obtain the index of the effective exchange rate. The choice of the year 2000 as the base year was preferred because this is the year that the Balance of payments was crossest to the equilibrium level during the study period.

We calculated the index with changing weights to reflect the changing composition of the countries in the basket of the main trading partners. The weights are changed every five

during the entire five-year period. This method of computation of effective exchange rate is based on Ellis (2001). Countries selected to enter the basket are those whose share of imports exports to/from Kenya constitute not less than 1% of the total imports/exports. This allows a great proportion of the imports/exports to be covered.

III.2 Basic Assumption

The model we use in this study is based on the assumption of a small open economy that takes world prices as given. Theoretical literature suggests that the dynamics of RER behavior depend on a number of fundamental determinants. These are those variables that, in addition to the RER play an important role in determining a country's internal and long-run external sustainable equilibria.

III.3 Choice and Definition of Variables

We constructed proxies in lieu of direct measures of the stance of the trade policy. We shared the argument that a more liberal trade regime, other things equal, means high trade volumes. We therefore used the ratio of current trade to current GDP, $\left(\frac{exports + imports}{GDP}\right)$ to proxy for openness (*OPEN*).

Following Edwards (1989) and Elbadawi (1993), if we assume that the long-run relationship is linear in simple transformation (e.g. logs) of the variables and that the disturbance term η_t is a mean zero stationary variable we can get a steady-state or long-run relationship between the RER and a set of macroeconomic fundamentals;

$$\ln e_t = \beta' F_t + \eta_t \quad \text{.....1}$$

Where e is the real exchange rate, F is a vector of the fundamentals. Vis. Terms of Trade

Direct Investment *(FDI)*. According to theory, the steady – state is dynamically stable which means that shocks that cause the exchange rate to diverge from its equilibrium in the short-run should produce eventual convergence in the absence of new shocks.

We have represented our equation (1) above into a long run relationship as follows;

$$RER = \alpha_0 + \alpha_1 FDI + \alpha_2 PRODC + \alpha_3 TOT + \alpha_4 OPEN + \alpha_5 FINTR + \mu \ldots\ldots\ldots 2$$

(NB; Equation 2 presents only some of the fundamentals that would enter the RER model for ease of estimation.)

Where the variables are as were defined above, α_0 is a constant while $\alpha_1, \alpha_2, \alpha_3, \alpha_4$, and α_5 are coefficients, and μ is the residual term.

The following time series were used:

- *The real effective exchange rate (rer)* – This is a weighted average of bilateral real exchange rate. An increase in the index is a real depreciation of the shilling.

- *Foreign Direct Investments (FDI)* - We obtain this by deflating the foreign direct investment by the Kenya's 1995 based CPI.

- *Productivity (prodc)* - This is proxied by a ratio of GDP at current prices divided by the number employed. This would mean that an increase in employment relative to GDP would result to a decreased productivity while a decrease would improve productivity. This has been used to proxy for the total productivity for the whole economy.

- *Terms of trade (tot)* - The numerator is the index of the Kenyan export value index to proxy for the export prices. The denominator is the Kenya's import value index

- *Degree of Openness (open)* – this proxies the government policy stance. It is obtained by the ratio of trade at current price to GDP at current prices. $\left(\frac{exports + imports}{GDP}\right)$.

The world real interest rate(foreign interest rate) – We obtain this by deflating interest rate for the US dollar by the inflation in the United States.

All the series were scanned for unit roots.

We expect that the adjustment in equation generated from the *rer* function (2) is not instantaneous, so that we developed a general autoregressive distributed lag, equation 3 as;

$$RER = \sum_{i=1}^{k} \alpha_{1,i} RER_{t-i} + \sum_{i=0}^{k} \alpha_{2,i} FDI_{t-i} + \sum_{i=0}^{l} \alpha_{3,i} PRODC_{t-i} + \sum_{i=0}^{k} \alpha_{4,i} TOT_{t-i} +$$

$$\sum_{i=0}^{k} \alpha_{5,i} OPEN_{t-i} + \sum_{i=0}^{k} \alpha_{6,i} FINTR_{t-i} + \mu_{1t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where μ_{1t}, is assumed to be a well-behaved white noise process and k is the lag length. Equation three expresses rear effective exchange rate RER in terms of its own past values and the present and lagged values of the fundamental variables. We do not assume that the variables are stationary. Therefore, we express equation 3 in terms of differenced RER and lagged differences of the fundamental variables. This is because we do not assume that variables are stationary, and we assume they are integrated of order 1.

However, we would loose long run information contained in the data, which would be important to the theoretical model, if we use differenced variables. We therefore reparameterised it with the use of error correction mechanism. But we need to know whether the RER and Fundamental variables are cointegrated. We do this by subjecting the

that there exists a long run (cointegrating) relationship between the variables. We then proceed to obtain a reparameterization of an error correction model equation. If we assume that there is only one cointegrating vector (*ver*) which is uniquely identified and whose parameters have a structural interpretation, then we can reformulate the error correction term as equation 4a below;

$$ECM = RER - \beta_2 FDI - \beta_3 PRODC - \beta_4 TOT - \beta_5 OPEN - \beta_6 FINTR \quad \text{.....4a}$$

So that the error correction model equation will take the form equation 4b below;

$$\Delta RER = \sum_{i=1}^{k-1} \alpha_{7,i} \Delta RER_{t-i} - \sum_{i=0}^{k-1} \alpha_{8,i} \Delta FDI_{t-i} + \sum_{i=0}^{k-1} \alpha_{9,i} \Delta PRODC_{t-i} + \sum_{i=0}^{k-1} \alpha_{10,i} \Delta TOT_{t-i} +$$

$$\sum_{i=0}^{k-1} \alpha_{11,i} \Delta OPEN_{t-i} + \sum_{i=0}^{k-1} \alpha_{12,i} \Delta FINTR_{t-i} + \alpha_{13} (ECM)_{t-1} + \mu \quad \text{.....4b}$$

Where the term in the brackets represents the error correction term, which, contains the long run information about the model.

The error correction term coefficient α_{13} shows the amount of disequilibrium or strength of adjustment that is transmitted each period to the Real Effective Exchange Rate (RER).

We then look for sequential reductions of the reparameterised model in order to arrive at the preferred reduced equation. Since there is no unique reduction path we look at possibly redundant variables that may be validated by the usual F tests.

IV.0 Empirical Results

IV.1 Test for unit roots

The empirical analysis used annual data over 1970-2003, which constitute 34 observations.

After conducting both the Augmented Dick Fuller (ADF) and Phillips Peron (PP) stationarity tests all the series were found to be nonstationary in levels. However both tests concluded that all the series are stationary in the first difference i.e. I (1). *See table 1 below;*

Tested against the critical value of -3.5562 for ADF and -3.5624 for PP the estimated value for all the series in levels fell on the right hand side i.e. they are less negative than the critical value. In the first difference the estimated value for all the series fell on the left hand side of the critical value i.e. they are more negative than the critical value in both ADF and PP tests. Since this is one tailed test we conclude that all the series are I (1) process.

Table 1.

Test for Unit Roots

Variable	RER	FDI	FINTR	OPEN	PRODC	TOT
ADF levels	-3.231421	-3.095158	-2.022791,	-2.049564	0.780861	-3.514410
Phillips-Peron levels	-3.49985	-3.14589	-2.808665	-2.301288	-3.166645	-3.322408
ADF 1st Difference	-6.084106	-6.465002	-4.968420	-4.854890	-4.142890	-6.518618
Phillips-Peron Test 1st diff	-8.48855	-8.19445	-7.004276	-6.514017	-14.98137	-6.930949
Level of Integration	I (1)	I (1)	I (1)	I (1)	I (1)	I (1)
ADF5% critical Value= -3.5562 PP 5% critical value =-3.5614						

IV.2 Cointegration Analysis

Here we want to establish whether real exchange rate, foreign interest rate, terms of trade, openness, foreign direct investment and productivity drive each other. We use Engle-Granger Two-Step procedure. This requires that we make a strong assumption that there is only one unique cointegrating vector in a space of 6 variables i.e. *rer*. We then perform ADF unit root test on the residual estimated from the cointegrating regression. A computed ADF value, which is more negative than the critical value, leads us to conclusion that the residual from the regression is I (0) i.e. it is stationary and therefore the variables are cointegrated. We need to note here that since the estimated residual is based on the estimated cointegrating parameter the ADF critical significance values are not quite appropriate.

The results for stationarity test of the error term (*res)* is presented below

Table 2

Cointegration Test (Unit Roots Test for the Residue/error term of equation 2)

ADF Test Statistic	-4.756467	1% Critical Value*	-3.6661
		5% Critical Value	-2.9627
		10% Critical Value	-2.6200

As shown from the table the error term was found to be stationary and we therefore concluded that the variables in the equation are cointegrated. This suggests that a long run relationship exist between *rer* and the variables in the equation. Having established cointegration status we would want to know whether the equation we used is properly specified. We do this by subjecting the longrun relationship equation to Ramsey RESET test. The empirical results of the long run relationship (equation 2) is presented below:

RER = 0.4150751476 - 0.1592557207*LNFDI + 0.125179028*LNPRODC - 1.080912936*LNTOT + 1.80155668*LNOPEN + 0.2080258363*LNFINTR

NB: A positive sign suggests an increase in the exchange rate and hence a depreciation. The vice versa holds for a negative sign which implies an appreciation exchange rate

The signs of this long run equation are explained in the following five paragraphs;

Theoretically an improved terms of trade (tot) leads to improved exports earning, the result of which is to improve current account position and hence an appreciated real exchange rate. There is a bulk of empirical literature on the effect of changes in the terms of trade (ToT) on the real exchange rate that is consistent with theory. They include, Edwards (1989), Elbadawi and Soto (1995) who noted that improvement in the terms of trade appreciates the real exchange rate (RER). The negative sign is therefore consistent with expected results. The size of the elasticity (-1.08) suggests that a 10% improvement in the terms of trade results in exchange rate appreciation of 10.8%.

In theory policies that promote openness in trade are consistent with improved imports and trade. This is because a liberalized economy strives to remove restrictions to trade. But increased import has a negative effect on the current account position. This in effect means a depreciated exchange rate. A point to not here is that since there are two forces at work, the sign on the coefficient will depend on whether or not changes in imports are more rapid relative to exports. If the imports change more rapidly than exports then we expect a depreciated currency. An appreciated exchange rate results if exports improve more than the imports. However it is important to note that both increases in imports and exports reflect increased trade, which would imply increased openness. The estimated coefficient on the openness variable in our equation is positive. This supports the notion that trade liberalizing reforms depreciates the equilibrium real exchange rate. This can be explained by the fact that during the study period imports improved more than the exports. The size of the elasticity (1.802), suggests that a 10% improvement in the government's trade policy stance results in 18% increase in the real exchange rate (a depreciation).

In theory improved labour productivity results in increased output, which in turn translates to improved exports. Increased export earning leads to an improved current account position and hence appreciates the real exchange rate. In addition effect of productivity increase in the traded goods sector is to increase demand for labour in that sector, thereby

release labor to the traded sector. For improved labour productivity Harrod-Balassa-samuelson effect requires that the coefficient be negative. This is collaborated by Chobanov (2004) who noted that an increase in productivity would be expected to lead to appreciation of the currency. At a given real exchange rate the traded-goods sector expands while the non-traded goods sector contracts. Our estimated coefficient was however found to be positive. This is perhaps because contrary to Harrod-Balassa-Samuelson effect which expects all labor to be allocated between the traded and non-traded sectors, the situation in Kenya is such that, there is excess labour and therefore a demand for labour in the traded sector do not necessarily mean that it will come from the non-traded goods sector. This in effect means that an expansion of the traded goods sector does not necessarily mean a contraction of the non-traded sector rather an increase in income in the traded sector may mean an increased demand for non-traded goods.

Economic theory requires that an increase in capital inflow improve the current account position, which in turn leads to an appreciation of the domestic currency. The sign of the coefficient associated with the capital inflow or the foreign direct investment is therefore expected to be negative. This suggests that an increase in the level of foreign direct investment leads to a reduction in the real exchange rate – appreciation. The sign of our estimated coefficient conforms with theory, which stipulates that an increase in the level of transfer receipts would lead to an appreciation of the real exchange rate.

According to theory a positive change in the Foreign Interest Rate results in an increased outflow of capital since owners of capital will transfer their wealth to foreign countries to earn more. This results into a depreciated domestic currency. This is because an increase in foreign relative to local interest rate would be expected to redirect capital from the domestic market to the foreign market (an increase in capital outflow). This in effect leads to a decline in net foreign assets and hence to depreciation. Our empirical result has a positive (+ve) coefficient, which is consistent with theory. What this means is that if the foreign interest rate increases more rapidly than the domestic interest rate, it will cause the domestic currency to depreciate in real terms while the reverse would result in an

The relation of the above equation was subjected to specification test. The Ramsey RESET specification test showed an F-statistic of 0.2358 with probability of 0.0.6388. which shows that there is no significant evidence of misspecification.

We therefore proceed to the dynamic RER equation (error correction model).

$$\Delta RER = 0.2603 - 0.747^{*}\Delta RER(-1) + 0.0982^{*}\Delta RER(-2) - 0.522^{*}\Delta RER(-3) - 1.1641^{*}\Delta FDI + 0.0347^{*}\Delta FDI(-1) + 0.0493^{*}\Delta FDI(-2) + 0.1554^{*}\Delta FDI(-3) + 0.029^{*}\Delta FINTR + 0.3945^{*}\Delta FINTR(-1) - 1.5499^{*}\Delta FINTR(-2) - 0.033^{*}\Delta FINTR(-3) - 2.47^{*}\Delta OPENS + 1.119^{*}\Delta OPENS(-1) - 1.6778^{*}\Delta OPENS(-2) + 2.1139^{*}\Delta OPENS(-3) + 3.152^{*}\Delta PRODC - 0.3281^{*}\Delta PRODC(-1) - 0.308^{*}\Delta PRODC(-2) - 0.370^{*}\Delta PRODC(-3) - 2.371^{*}\Delta TOT + 0.2849^{*}\Delta TOT(-1) - 0.3719^{*}\Delta TOT(-2) + 0.046^{*}\Delta TOT(-3) - 0.3963^{*}ECM(-1)$$

From the reparameterized model and using sequential reduction of redundant variables we arrived at the reduced form (preferred equation), the results of which are provided in table 3 below.

From table 3 short run FDI, FINTR and openness appreciates, while productivity deprecates the real exchange rate. This could be because the effect of increased FDI would almost swiftly improve the current account through improved inflow of capital. Productivity on the other hand depreciates the real exchange rate in the short run increased income that would be associated with improved productivity would trigger more imports in terms of inputs and consumables. Openness appreciates the RER since in the short run relaxed restriction on imports translates into cheaper imported inputs which goes a long way to improve production. which implies also improved exports. In the table, D86 represents shock in 1986. which coincided with period when the 1990's macroeconomic crisis started.

Table 3. **Preferred model results**

C	0.761596 (2.5322)
Δ FDI (-1)	-0.147810 (-8.263060)
Δ PRODC	0.137691 (-4.536165)
Δ FINTR (-2)	-0.838949 (-16.59536)
Δ OPEN (-2)	-3.826663 (-9.934995)
Δ OPEN (-3)	1.1743 (4.163308)
Δ PRODC (-3)	-0.165475 (-6.510429)
D86	-1.85 (-4.363)
ECM (-1)	- 0.2687 (-4.557)

Adjusted R-squared 0.8803

Ramsey RESET Test

F-statistic=0.2358 Probability=0.6388

ARCH Test (1-3lags)

F-statistic=0.7515 Probability =(0.944 to 0.99)

Breusch – Godfrey Serial Correlation LM Test

F-statistic =1.812 Probability=0.576

Normality Test

Jarque Bera statistic = 1.1781 Probability = 0.5549

The values in the parenthesis are the t-statistics

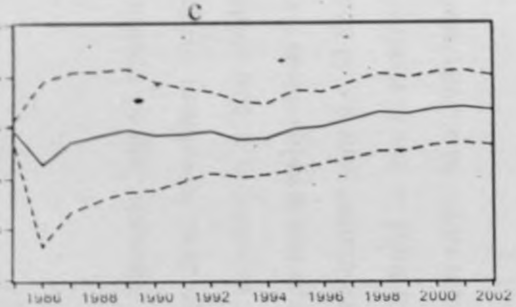
The Jarque-Bera Statistic suggests normal distribution, which reflects unbiased estimators. The Breusch-Godfrey asymptotic test reiects the case for autocorrelation, which means that

Tests for the ARCH residuals show a case of homoscedasticity. which implies constant variance in all the observation. This is confirmed by the white heteroscedasticity test. which points to no heteroscedasticity. The Ramsey RESET test shows no significant evidence of misspecification i.e. there is no specification bias in the equation.

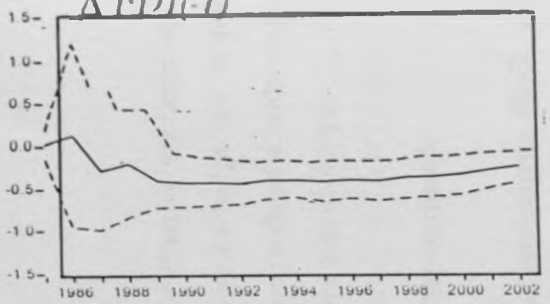
Overall the relation has survived a formidable battery of tests.

The following are plots for the important regression parameters to assist us to judge the stability of the parameters. From the figures we can conclude that the parameters are stable because their residuals fall within the bands.

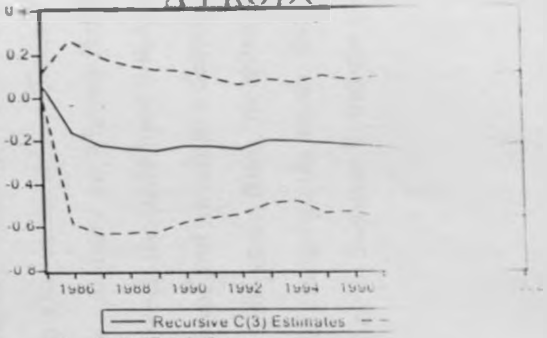
C



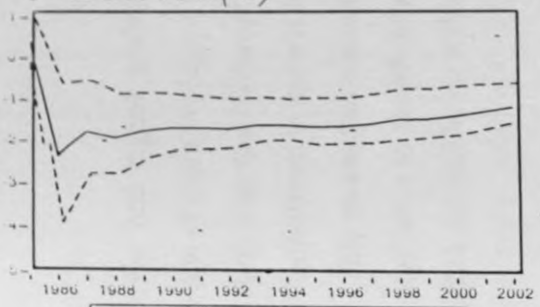
Δ FDI(-1)



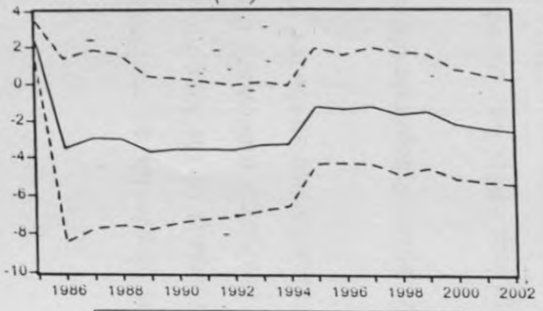
Δ PRODC



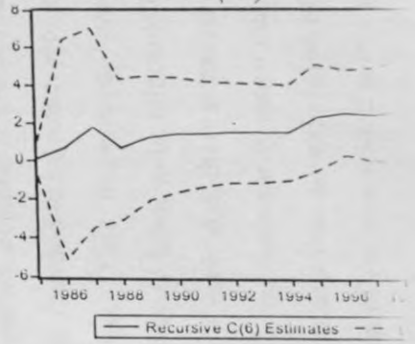
Δ FINTR(-2)



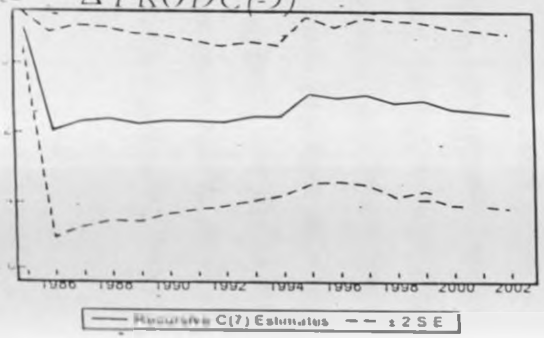
Δ OPENS(-2)



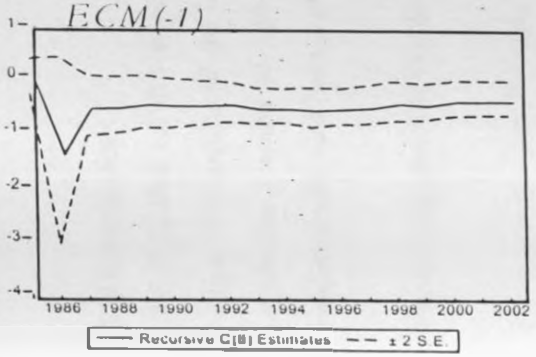
Δ OPENS(-3)



Δ PRODC(-3)



ECM(-1)



In the preferred equation, current and lagged productivity changes, lagged openness changes, lagged foreign interest rate changes and lagged foreign direct investment changes are significant variables in the Real Effective Exchange Rate equation. It is also evident from the table that about 27% of adjustment in the real exchange rate misalignments takes place during the current period. This means that a shock in the current year would about four years to absorb. The long time taken to absorb the shocks could be due to rigidity in prices especially the wages, which keep oscillating within certain ranges in a considerable period of time.

V.0 Conclusions

The objective of this paper was to provide an analysis of the effective exchange rate in Kenya. We analyzed the determinants of the long-run effective exchange rate in Kenya within the context of a simple analytical framework that accommodated a wide range of fundamentals that have a potential influence on the real exchange rate in Kenya.

The determinants of the long-run real exchange rate identified here included;

Productivity. The Balassa-Samuelson effect was introduced as productivity shock, which would be expected to favour traded-goods sector. Here the real exchange rate is expected to appreciate, both because excess demand is created in the non-traded goods sector and also because the traded balance tended to increase. However Our estimated coefficient was however found to be positive. This is perhaps because contrary to Harrod-Balassa-Samuelson effect which expects all labor to be allocated between the traded and non-traded sector, the situation in Kenya is such that, there is excess labour and therefore a demand for labour in the traded sector do not necessarily mean that it will come from the non-traded goods sector. This in effect means that an expansion of the traded goods sector does not necessarily mean a contraction of the non-traded sector rather an increase in income in the

traded sector may mean an increased demand for traded goods and therefore the traded balance may not necessarily improve.

Change in International Economic Environment. Here we considered *terms of trade* (ToT), *Availability of external transfers (represented by FDI)* and the *world interest rate*. The improvement in the terms of trade and the foreign direct investment flows tend to appreciate the real exchange rate. The former does that by improving the trade balance and the latter by through positive effects on current account. Lower world interest rate cause capital inflows, which reduce the country net creditor position over time and the long-run net loss of net interest receipt requires a real depreciation to maintain an external balance.

Government Policy Stance on Trade. The degree of *openness* of the economy, measured as a ratio of trade to GDP, is an important determinant of the RER. Reforms aimed at reducing tariffs and eliminating trade restrictions, hence increasing openness, are therefore, consistent with a depreciated RER.

The study has shown that the RER is an important variable in the economy of Kenya that is influenced by important Economic fundamentals. It is evident that RER moves with changes in the fundamentals. This means that in order to achieve desirable economic outcome especially with production and trade the Government must address the issue of RER alongside other important policy variables.

The analysis also showed that RER responds to movements in the fundamentals- openness, productivity terms of trade, foreign interest rate and foreign direct investment. This shows that policies that target RER must also address these fundamentals.

Appendix 1. Indices of Effective Exchange Rate

	Kenya			
year	Export weighted real effecnve exchange rate index	Export weighted Nominal effecnve exchange rate index	Import weighted nominal effecnve exchange rate index	Import weighted réal effective exchange rate index
1970	0 9642	11.0786	2.2366	0 1947
1971	0 9489	10 9305	2 3539	0.2044
1972	0 8454	9 6626	2.2285	0 1950
1973	0 7726	9 0644	2 4316	0 2073
1974	0 6517	7.6605	2 0599	0 1752
1975	0 6497	7 0821	2 4356	0 2235
1976	0.6185	6.3207	2 5345	0.2480
1977	0.9266	8.7443	2 6160	0.2772
1978	0 6205	5 3948	2 1028	0 2418
1979	0.7074	6 4307	2 5809	0.2839
1980	0 8167	7 4032	2 4078	0.2656
1981	0 6566	5 8159	1.7283	0 1951
1982	0.7528	5 6551	1 8968	0.2525
1983	0 8475	5 7515	1.3791	0.2032
1984	0.8722	5 5048	1 4241	0,2256
1985	0 9594	5 3307	1 0612	0 1910
1986	0 8163	4.2019	0.0211	0.0041
1987	0.7274	3.5792	1 8178	0.3694
1988	0 7298	3.3614	1 8586	0 4035
1989	0 6600	2 8235	1 7449	0 4079
1990	0 6789	2 6005	2.2136	0.5779
1991	0.8591	2.7984	1.1057	0.3395
1992	0 7233	1 8008	1.2873	0.5170
1993	0.7555	1.3083	0.8051	0.5226
1994	0 7456	1 0135	0 9429	0 6936
1995	1.7217	2 4059	1.3704	0 9806
1996	0 5183	0 6810	1.0380	0.7900
1997	0 5640	0 6446	1 1165	0.9769
1998	0 5888	0 6397	1 1138	1.0252
1999	1 3216	1 4364	1.3747	1.2648
2000	1 0000	1 0000	1 0000	1 0000
2001	1 0372	0 9583	0 1648	0.1784
2002	0 8676	0 8480	0.9169	0 9597

Source: Author's Computation - Based on Data from International Financial Statistics and Direction of Trade Statistics

References

.Afolabi, J.A and Makinde A.O. (1994). "Output Response to Exchange Rate Adjustments in the Nigerian Economy", *AERC Research Report*, Nairobi, Kenya.

Atta. J. K., Jefferis, K.R..,Manathoko, I. and Siwawa-Ndai, P.(1999) "Exchange Rate Policy and Price Determination in Botswana". *AERC Research Paper 93*, Nairobi Kenya.

Aghevli, B. B., Khan,M.S., and Montiel,P.J., (1991), " Exchange Rate Policy in Developing Countries: Some Analytical Issues". *Occasional Paper* 78, IMF, Washington D.C.

Balassa, B. (1987). "Effects of Effective Exchange Rate Changes in developing Countries". *Indian Journal of Economics*

Bond.M., (1975), "Export Demand and Supply for Groups of Non-Oil Developing Countries", *IMF's Staff Papers 32(1)* 1985, IMF. Washington D.C.

Dordunoo, C.K. (1993), "A Development Oriented Macroeconomic Model of Ghana (Dynamic simulation, Policy Analysis, and Forecasting), *Ph.D. Dissertation, Temple University; University Microfilm Incorporated, No.9316473*, Michigan.

Dordunoo, C., Odubogun. K. Ssemogerere.G. and Kasekende.L (1997). "A Comparative study of Foreign Exchange policy Management in Ghana, Nigeria and Uganda". *AERC Special Paper twenty-seven*, Nairobi, Kenya.

Easterly, W. and Schmidt-Hebbel K. (1993). " Fiscal Deficit and Macroeconomic Performance in Developing Countries", The World Bank Research Observer Vol. 8. No.2

Edwards,S. (1989), "Real Exchange Rates, Devaluation and Adjustments: Exchange Rate Policy in Developing Countries".The MIT Press. Cambridge, Massachusetts London, England.

Elbadawi, I. (1992), "Real Overvaluation, Terms of Trade Shocks and Costs of Agriculture in Sub-Saharan Africa: The case of Sudan". *Journal of African Economies* Vol.1 No.1. Oxford University Press.

Elbadawi, I. A. and Soto, R. (1997). "Real Exchange Rates and Macroeconomic

Adjustment in Sub-Saharan Africa and Other Developing countries", *Journal of African Economies*,Vol. 6 No. 3 (AERC Supplements) pp74-120. Oxford University Press.

Ghei, N and Pritchett, L., (1999), "Exchange Rate Misalignment: Concepts and measurement for developing Countries", *A World Bank Research Publication*, PP467-496, Oxford University Press, Washington D.C.

Ghulam S. and Dale G.A., "Estimating US Soybean Exports: A simultaneous Supply/Demand Approach." *Journal of Economic Studies* vol. 1. 1990. Kathryn Toledano, MCB Universty Press Limited.

Ghurra,D and Grennes,T., (1994) "Aggregate Trade Responses to Economy Wide Distortions in Sub-Saharan Africa." *Journal of Economic Literature* 35.

Hirsh, F. and Higgins, J. (1970), "An Indicator of Effective Exchange Rate",*IMF Staff Papers*, Vol. 17: 453-87.

Jebuni, C.D., Oduro A.D., and K. A. Tutu, (1994), "Trade, Payments and Liberalization and Economic Performance in Ghana". *AERC Research Paper 27*, Nairobi, Kenya.

Kadenge, P. G. (1998), "Essays of Macroeconomic Adjustment in Zimbabwe: Inflation, Money Demand, and the Real Exchange rate", Doctoral Thesis at the University of Gothenburg, Gothenburg, Sweden.

Kagira, B.M.(1993), "Constraints of Manufactured Export in Kenya", Revised Final Report, AERC, Nairobi, Kenya.

Kamin, S.B., (1988), "Devaluation, External Balance and Macroeconomic Performance : A Look at the Numbers." *Priceton Studies in International Finance* 62.

Kasekende, L. and Ssemogerere G. , (1994), Exchange Rate Unification and Economic Development: The case of Uganda, (1987-92)", *World Development, Vol.22, No.8.*

Kidane, A. (1994). "Indices of Effective Exchange Rates: A Comparative Analysis of Ethiopia, Kenya and the Sudan". *AERC Research Paper 29*, Nairobi, Kenya.

Luci, E. (2001) "measuring the real exchange rate; pitfalls and practices" *World Bank Research Department Paper No.2001- 04*. www.rba.gov.au/statistics

Martin,M and Ngola, G. (1995) "Forging Links: Economic Research and Policy Making

Montiel, P. (1997). "The Theory of Long-run Equilibrium Real Exchange Rate".Mimeo. The World Bank, Washington.

Mwega F.M., (1996) "Import Demand Elasticities and Stability During Trade Liberalisation: A Case Study of Kenya." *Journal of African Economies*, Vol2, No.3.

Ndung'u, N. S. (1997) "Price and Exchange Rate Dynamics in Kenya: An Empirical Investigation (1970 – 1993)". *AERC Paper 58*, Nairobi, Kenya.

Nyoni, T.S. (1994). *"The Dutch Disease Economics of Foreign Aid in Tanzania"*, AERC, Interim. Report. Nairobi. Kenya

Ogun, O. (1999). "Real exchange Rate Movements and Export Growth: Nigeria 1960 – 1990" *AERC Paper 82,* Nairobi, Kenya.

Pritchett, L. (1988), Import Demand Elasticities in Developing Countries: Estimates and Determinants." Unpublished Ph.D Dissertation, Massachusetts Institute of Technology, Cambridge, Mass.

Rhomberg, R. R., (1976)." Indices of Effective exchange Rates", *IMF Staff papers Vol. 23,* Washington.

Ssemogerere, G.N. and Kasekende, L.A. (1994). "Constraints to the Development and Diversification of Non-Traditional Exports in Uganda 1981-1990", *AERC Research Paper 28*, Nairobi, Kenya.

Valentino P. (2001). "Multilateral and bilateral measures of effective exchange rates in a World model of traded goods".http://www.economicswebinstitute.org/glossary/exchrate.htm.

Wickham, P. (1987). "A Revised Scheme for Indicators of Effective Exchange Rates". *IMF Working Paper 87*, Washington.

Younger, S.T. (1992). "Testing the Link Between Devaluation and Inflation: Time Series Evidence From Ghana", *Journal of African Economies Vol.1* No.3, pp 369-394.