The Relationship among Real Exchange Rate, Current Account Balance and Real Income in Kenya

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Abstract

Persistent current account deficit is a chronic problem in many developing countries including Kenya. In an attempt to understand disequilibria dynamics in Kenya, this study sought to investigate the effect of real exchange on current account balance and additionally investigate whether the rate of import growth in Kenya is consistent to balanced economic growth as stipulated in Thirlwall law. The study is based on two main theories, the neoclassical elasticity approach and balance of payment constraint model. The former contend that balance of payment is influenced by the nature of import and export elasticities, while the later theory holds that long run economic growth rate may be achieved if growth of export is consistent with import growth rate. Informed by aforementioned theories, two main objectives were investigated: First was to determine the effect of real exchange rate change on current account balance in Kenya. Secondly was to determine the extent to which import growth rate is consistent with balanced economic growth in Kenya. The first objective was tested by regressing the trade balance against real exchange rate, foreign income and relative prices, degree of openness and government expenditure. The significance and signage of real exchange rate coefficient was used to determine whether Marshal-Lerner condition holds. To test the second objective, elasticity of income was estimated using an import function and compared to the theoretical income elasticity proposed in the balance of payment constraint model. Annual time series data from 1980 to 2011was modeled using ARDL model. The data were subjected to Stationarity test using Augmented Dickey Fuller (ADF) test and Phillip Perron test. Co-integration and Error correction model was applied to analyze short run and long run dynamic. The model was subjected to heteroskedasticity test and serial correlation test and an appropriate model used in the estimation. Student t test and Wald test were used to test for significance and compare hypothesized coefficient respectively. The results showed that Marshal-Lerner-Conditions hold in Kenya and the J-curve phenomena is supported by data. Secondly import growth rate is significantly higher than the level consistent with long run growth of the economy. One of the recommendations is to introduce policies that will trigger increase in demand for export and thereby drive the economy towards sustainable growth and development.

Introduction

1.1. Background of the Study

Current account balance (CAB) is a key component of the balance of payment (BOP) and of vital importance in macroeconomic analysis of an open economy. CAB measures current payments (outflows) and current receipts (inflows) between residents of a country and the rest of the world. IMF manual, as quoted in Kariuki (2009), explains that CAB comprises of factor income, balance of transactions of goods and services and current transfers. CAB is an important economic measure of how well an economy fairs in international economic transaction and a key indicator of the level of national savings, spending behaviour and investment.

Economic theory contends that whether current account balance disequilibrium -and more so current account deficit -is beneficial or detrimental to the economy depends on factors that gave rise to it. For example, the currency crisis in Mexico and Thailand in mid-1990 was linked to abrupt withdrawal of foreign financing amid a financial crisis. Large and persistent current account balances, an unsustainable import bill and inadequate export revenue, reversal of foreign financing highly disrupted private consumption, government expenditure and investment in the aforementioned economies (Kariuki, 2009; Ghosh and Ramakrishnan, 2006).

Generally, large and persistent current account deficit may signal ill-performance and vulnerability of the economy. Persistent CAB deficit is also a key indicator of low national savings and investment, lack of international competitiveness and structural economic problem such as an undeveloped financial system. Furthermore, trade imbalance means a potential loss of output, increased unemployment and unbalanced economic growth (Nusrate, 2008, Ogwuru, 2008; Ghosh and Ramakrishnan, 2006).

According to Ghosh and Ramakrishnan (2006) CAB deficit may be natural and even beneficial to developing countries. Intertemporal approach argument holds that capital- deficient countries with high investment opportunities and low national savings may rely on deficit, inform of foreign debt, to spur faster economic growth. This condition can only apply if net foreign borrowings are channelled to investments with higher returns than the cost of capital. Therefore, despite running large CAB deficit, developing countries maybe inter-temporally solvent provided current deficit (liabilities) will be covered by future revenues (Nusrate, 2008; Ogwuru, 2008).

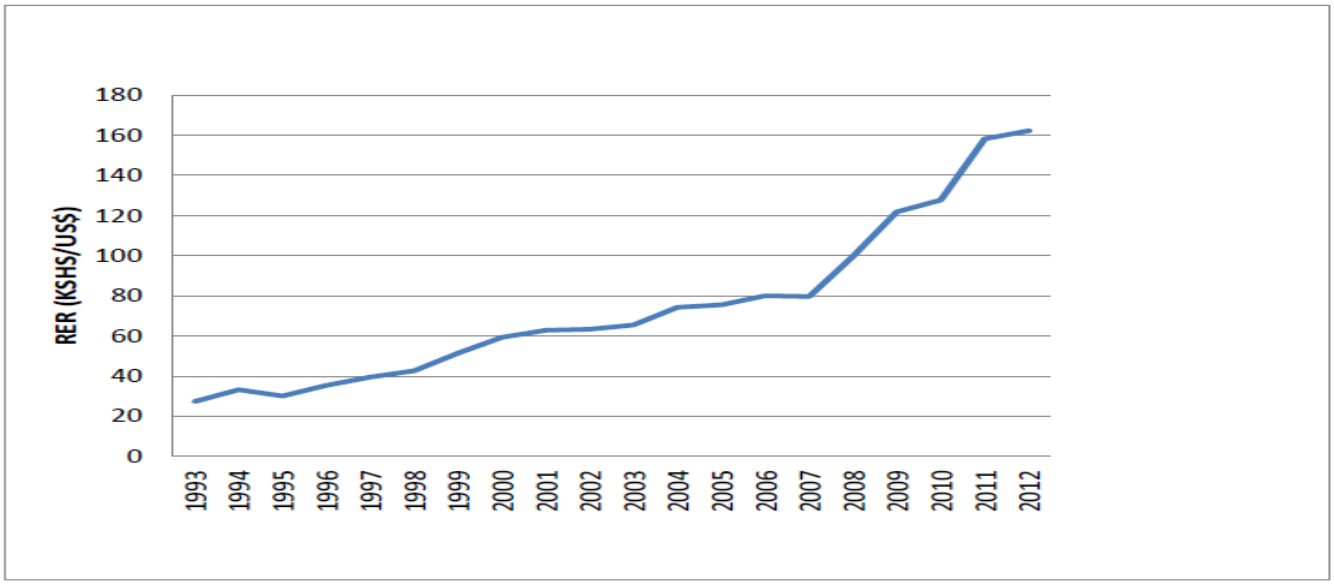
Marshal-Lerner condition and Thirlwall law argue that effectiveness of foreign trade policy is primarily dependent on income and price elasticities of exports and imports. As a measure of relative prices, real exchange rate is one of the most important and strategic macroeconomic fundamental that plays a key role in ensuring a country remains competitive in international trade. It's considered as a strategic tool of economic regulation that maybe formulated in such a way to influence commercial policies and international trade competitiveness of an economy (Dornbursch 1988; Ndung'u, 2001; Ozturk and Acarvci, 2010).

According to Dornbusch (1988), the effectiveness of currency depreciation as a way of improving current account deficit depends on; first, its ability to redirect demand for exports and imports in the right direction and by the right magnitude may determine whether an open economy benefits from trade with the rest of the world. Bird (2001 as cited in Mudida, *et al* 2012) noted that floating exchange rate may not suit developing countries since demand and supply elasticities may be relatively low compared to developed countries. To this end, highly volatile exchange rate owing to unfavourable terms of trade and direct shocks from global trade may further promote current account imbalances (Ghosh and Ramakrishnan, 2006).

1.2. Exchange Rate Movement and Current Account Performance in Kenya

From independence to date, Kenya has pursued three exchange rate policies the fixed exchange rate policy (1963-1991), floating exchange rate policy (1992 – 1997) and the managed float policy (1998 to date) (Mudida *et al*, 2012; Kiptui and Kipyegon 2008). Figure 1.1 shows the real exchange rate trend from 1993 to 2012 estimated using bilateral trade between United States and Kenya

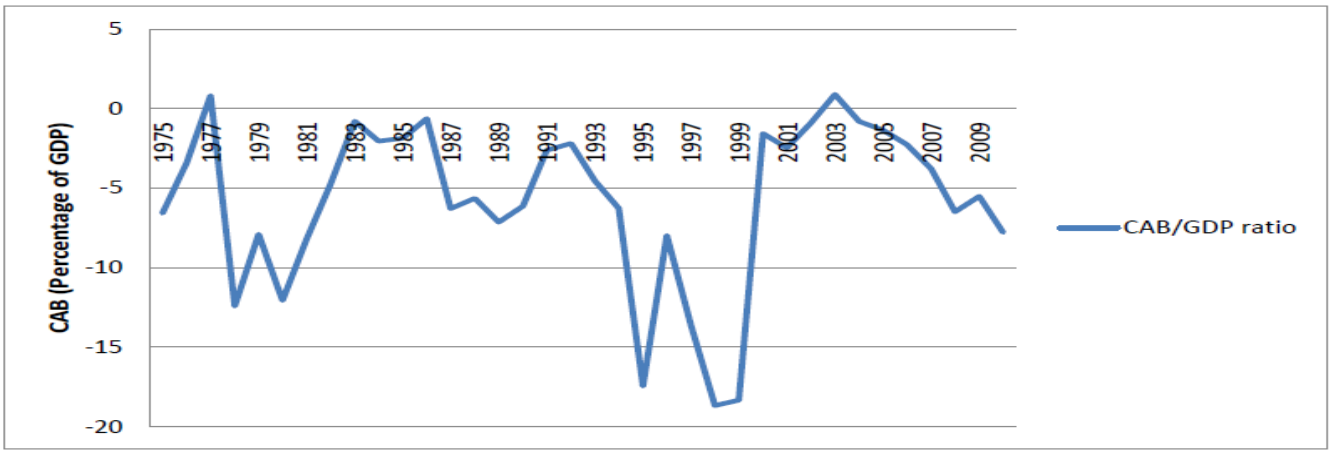
Figure 1.1: Trending Real Exchange Rate in KSHS/US$(1993 to 2012)



Source: World Bank Database

Figure 1.1 shows that the real exchange rate trend has been rising gradually from 1993 to 2012. Evidently, the slope of real exchange rate significantly increased from 2007 to 2012, this may be attributed to inflationary pressure caused by excess liquidity in the Kenyan economy during this period. Figure 1.2 shows the current account performance over the three exchange rate policy regime pursued in Kenya

Figure 1.2: Trending Current Account Balance to GDP ratio from 1975 to 2010



Source: World Bank data base

Figure 1.2 shows that over the last 38 years, with exception of surpluses recorded in 2003/2004 financial year, Kenya has experienced a large and persistent current account deficit.

One of the main reasons that may explain persistent CAB deficit is the nature of exports and imports. The Kenyan economy was largely dependent on agriculture which provided employment to the largest proportion of the working population, accounting for two thirds of the economy's GDP and up to 40 per cent of the country's export (Kariuki, 2009). Generally, the biggest percentage of Kenyan exports includes agricultural products such as tea, coffee and horticulture. Although agricultural horticultural exports and few manufactured goods are exported, majority of exports have high elasticity of demand which makes them highly responsive to fluctuations in international prices. On the other hand, the composition of imports are largely price inelastic goods which include machine and equipment, medical and pharmaceutical products, petroleum, motor vehicle, telecommunication equipment among others (Ndung'u 2001; Kariuki, 2009;Mudida *et al*, 2012).

CAB surpluses registered in 2004 may be attributed to increased tourism and private current transfers from remittances by Kenyan residents abroad. However, despite increase of trade volume, the import ratio has been accelerating factor than export ratio thus explaining the CAB/GDP trend. The average export to GDP ratio over the period 1985 to 2006 is 20 per cent compared to import to GDP ratio of 34 per cent (Kariuki, 2009).

From independence to 1970's Kenya recorded significant growth owing to rapid development policy adopted by the government. The GDP growth of over 6.5 per cent year-on-year was attributed to increased public investment, pursuance of import substitution strategy and upsurge of both small scale and large scale farming. Kenya's reputable performance was attributed to strong macroeconomic fundamentals including low rates of interest rate, strong exchange rate and a manageable current account deficit (Kariuki, 2009).

However, the remarkable trend was reversed in the period 1970's to 1980's. A growing import bill coupled with slowing down of agricultural export earnings and rapidly growing population led to decreased growth and unsustainable increase in current account deficit. The problem was compounded by the oil crisis in 1973 which led to increase in oil prices by 46 percent. In addition, the collapse of East African community and second oil crisis in 1979 further led to worsening of the economy's performance during this period (Ndung'u 2001; Kiptui and Kipyegon 2008, Mudida *et al*, 2012).

Prolonged economic problems led to adoption of SAP's in early 1980 are which included adoption of crawling peg. However, the economy stagnated during the period1980 to 1991 due to vulnerabilities, external shocks and lack of proper implementation. In 1992, significant increase in inflation which was attributed to general elections of 1992 put pressure on the local currency forcing it to depreciate (Ndung'u 2001; Kiptui and Kipyegon 2008;Mudida *et al*, 2012).

Liberalization of interest rate in 1993 led to adoption of floating exchange rate policy and managed float thereafter. This means that Kenya lost its anchor to major currency thus exposing the domestic economy to direct shocks from international trade. Evidently, rapid depreciation of Kenya shilling from 1993 to 1999 was accompanied by an unfavourably large current account balance. Large deficit was attributed to both internal and external shocks such as drought in 1993 and distortion due to speculative tendencies in the foreign exchange market. However, a break from past trend was witnessed between the years 2003 and 2007. The Kenya shilling appreciated in real terms and the current account balance improved remarkably (see figure 1.2). However, the 2007 post-election violence and 2011 currency crisis led to a reversal of this trend as the exchange rate resumed the depreciation trend and worsening of current account balance (Ndung'u 2001; Kiptui and Kipyegon 2008; Mudida *et al*, 2012). .

Kenya is currently pursuing a managed float policy which requires minimum intervention by the monetary authority. Liberalization inhibited the use of exchange rate as a tool for correcting external imbalances and further exposes the country external shocks and global trade effects. Bird (2001, as cited in Mudida *et al*, 2012) asserted that floating exchange rate may be volatile and hence vulnerable to speculative attacks as witnessed in Kenyan 2011 exchange rate crisis where potential gains from depreciation were offset by inflation in the economy. In this regard, given that significant exchange rate movement are accompanied by changes in terms of trade as depicted by CAB performance, there is need to understand the impact of real exchange rate on current account balance and economic performance under the current policy arena.

1.3. Statement of the Problem

Kenya has and continues to experience large and persistent current account balance deficit over the last three decades. Evidence shows that imports have not only grown at a faster rate but they are relatively price-inelastic compared to exports (Kariuki, 2009).

Theoretical and empirical literature identify real exchange rate management as the main policy instrument that influence trade policies and current account balance (Ozturk and Acaravci, 2009; Ghosh and Ramakrishnan, 2006). However, due to liberalization, Central Bank of Kenya has lost its control of exchange rate as the anchor shifted from nominal exchange rate to inflation targeting (Kariuki, 2009; Mudida *et al*, 2012).

Large current account deficit may be beneficial to developing countries if foreign debt complement low capital formation of the internal economy and consequently stimulates economic growth (Kariuki, 2009; Ozturk and Acaravci, 2009). On the other hand, empirical literature shows that running a large and persistent current account deficit may be risky and even detrimental to the economy (Ghosh and Ramakrishnan, 2006).

Against this background, increased international trade and global interdependence, prompts the need to understand the effects of real exchange on current account balance and economic growth. Kenya, like many other developing countries, runs a large CAB deficit. To this end, the real debate is the extent to which real exchange rate policies pursued by the economy are sufficient in eliminating current account deficit and more importantly, promoting competitiveness of foreign trade in developing countries. This may be investigated by testing whether real exchange rate targets and policies pursued by Central Bank of Kenya conform to Marshal-Lerner conditions and Thirlwall hypothesis.

A great part of international macroeconomics literature focuses on issues that arise when the current account balance is in disequilibrium and its implication on foreign trade competitiveness. The bulk of empirical studies have focused on determinants of international trade flows with particular emphasis on the relationship between current account balance and key macroeconomic variables (Kariuki, 2009; Tsikata, 2013).The main issue is to evaluate the relationship among real exchange rates, running a large current account deficit and long run economic growth. Additionally has the persistent current account deficit been caused by changes in real exchange rate.

1.4. Research Questions

(i). What is the effect of real exchange rate changes on current account balance in Kenya?
(ii). Is import growth rate consistent with long run economic growth in Kenya?

1.5. Objectives

(i). To determine the effect of real exchange rate changes on current account balance in Kenya?
(ii).To determine if import growth rate is consistent with balanced economic growth in Kenya

1.6. Significance of the Study

This study is of particular significance to monetary policy authority when formulating exchange rate policy as it may guide the authority in setting the appropriate exchange rate level that supports long run economic growth rate. Additionally, the study may guide ministry of trade and industrialization in formulating external trade policies that may ensure the rate of growth and volume of export and import conform to sustainable economic performance in Kenya. This study attempts to test whether Thirlwall law applies in Kenya, therefore, the study will add knowledge on this area.

1.7. Organization of the Study

The research project consists of five chapters. Chapter one introduced the topic, statement of the problem, research questions, research objectives to be addressed and also the significance of the study. Chapter two focused on theoretical and empirical literature related to the study with the aim of highlighting the theoretical model to be used for investigation and the research gap. Chapter three reviewed the methodology and research design adopted by the investigation. Chapter four presented the research findings and lastly, the summary, conclusion and recommendation are provided in chapter five.

Literature Review

2.1. Introduction

This chapter presents relevant theoretical and empirical literature which forms the grounds for investigating the research problem stated in the previous chapter.

2.2. Theoretical Review

Theoretical review focuses on neoclassical and Keynesian theoretical theories of Balance of payment. Both neo-classical and Keynesian approaches focused on monetary factors in the determination of balance of payments. However, Keynesian theories and neoclassical theories take different approaches.

2.2.1. The Monetary Approach to the Balance of Payments

The monetary approach to balance of payment holds that balance of payment disequilibria can be explained by disequilibrium between money supply and demand for money According to this approach increase in prices as a result of nominal depreciation of domestic currency may reduce real money supply. Reduction of money supply will in turn lead to reduction in spending and ultimately improve the trade balance. To this end, balance of payment problems may be solved by restoring the balance between money supply and demand.

One of the main criticisms of the monetary approach is that it ignores the real side of the economy. In this regard, monetary approach does not explore the origin of balance of payment disequilibrium. Moreover, the use of interest rate to attract foreign currency inflow may have counterproductive effect on the real income and output of the economy and therefore worsen the balance of payment position in the long run.

2.2.2. Elasticity Approach: B-R-M Condition

One of the most important neoclassical theories that are applied in determination of balance of Payment (BOP) is the elasticity approach. The model focuses on the supply side giving importance to supply of foreign exchange in determination of balance of payment equilibrium dynamics (Brooks, 1999). It holds that BOP disequilibria are caused by distortion in relative prices in the foreign exchange market and lack of competition in the international market. According to this theory, trade balance in foreign currency terms is:

$$BOT_f = P_{fx}X - P_{fm}M \quad \text{.....Eqn 2.1}$$

Where BOT_f: - Represent Balance of Trade in foreign currency
P_{fx}: - Price of exports in foreign currency
P_{fm}: - Price of imports in foreign currency

Currency depreciation (or devaluation) will manifest as a price effect and volume effect such that:

$$\Delta BOT_f = \left(P_{fx}\Delta X + X\Delta P_{fx}\right) - \left(P_{fm}\Delta M + M\Delta P_{fm}\right) \quad \text{.....Eqn 2.2}$$

Where Δ :- Rate of Change

Let be the foreign value of exports such that:- $V_{fx} = P_{fx}X$

Let be the foreign value of imports such that:-$V_{fm} = P_{fm}M$ Then:

$$\Delta BOT_f = V_{fx}\left(\frac{\Delta X}{X} + \frac{\Delta P_{fx}}{P_{fx}}\right) - V_{fm}\left(\frac{\Delta M}{M} + \frac{\Delta P_{fm}}{P_{fm}}\right) \quad \text{.....Eqn 2.3}$$

Given elasticity of demand and supply of exports and imports as follows:-

$e_x = \frac{\Delta X}{X}/\frac{\Delta P_{dx}}{P_{dx}}$ is the domestic export supply elasticity

$\eta_{x=}\frac{\Delta X}{X}/\frac{\Delta P_{fx}}{P_{fx}}$ is the foreign export demand elasticity

$e_m = \frac{\Delta M}{M}/\frac{\Delta P_{dm}}{P_{dm}}$ is the domestic import supply elasticity

$\eta_m = \frac{\Delta M}{M}/\frac{\Delta P_{fm}}{P_{fm}}$ is the foreign import demand elasticity

Assuming foreign currency and domestic currency are related such that $P_{fm} \times$

$E = P_{dm}$ where E is the exchange rate, then equation 2.3 can be presented as:-

$$\Delta BOT_f = V_{fx}\left(\frac{\eta_x - 1}{1 + {\eta_x}/{e_x}}\right) +$$

$$V_{fm}\left(\frac{\eta_m\left(1 + {1}/{e_m}\right)}{\left({\eta_m}/{e_m}\right) + 1}\right) \quad \text{.....Eqn 2.4}$$

The B-R-M model presented in equation 2.4 holds that balance of trade depends upon the initial volume of trade and supply of exports and imports and demand and supply elasticities. The inclusion of foreign and domestic economies' effect on balance of trade, the model introduced two important analytical contributions.

First, inclusion of international terms of trade in the analysis and secondly, inclusion of exchange rate depreciation (or devaluation) in real terms given domestic and foreign price levels are determined exogenously by international market forces (Mudida *et al*, 2012; Bahmani, Oskooee and Ratha, 2004). The B-R-M model demonstrated that depreciation has a positive effect on the volume of domestic exports and reduces the volume of domestic imports.

2.2.3. Marshall-Lerner Condition

The Marshal-Lerner (M-L) condition is a special case of neoclassical elasticity approach theory but introduces a more tractable theoretical platform for BOP analysis. It therefore plays a vital role in evaluation of balance of payment problems in the economy. It is based on two assumptions: First, there exists infinite elasticity of supply of all goods in the market which means that domestic and foreign prices of all goods and their substitutes are constant. Second, autonomous expenditure or consumption of all goods is constant in monetary terms meaning that fluctuation of foreign exchange rate affects demand. Elasticity approach argument is best presented using the Marshal-Lerner condition (Mudida *et al*, 2012).

The argument is presented as follows from equation 2.4 but introduces a simpler model. Given the assumption that elasticity of imports and exports are infinitely elastic that is $(e_m = e_x = \infty)$. Then equation 2.4 collapses to:

$$\Delta BOT = V_{fx}(\eta_x - 1) + V_{fm}(\eta_m) \quad \text{.....Eqn 2.5}$$

Commencing from a balanced foreign trade such that value of foreign exports is equal to the value of foreign imports that is $V_{fx}/V_{fm} = 1$ then manipulation of the right hand side of equation 2.5 may be presented as:

$$\frac{V_{fx}}{V_{fx}}(\eta_x - 1) + \frac{V_{fm}}{V_{fx}}(\eta_m) \rightarrow (\eta_x - 1 + \eta_m) \quad \text{.....Eqn 2.6}$$

This means that for $\Delta BOT > 0$ then$\eta_x + \eta_m > 1$ in absolute terms. This is the M-L condition which holds that, currency devaluation or depreciation to have a positive impact on the trade balance if and only if the absolute sum of price elasticity of imports and exports is greater than unity (Bahmani, Oskooee andRatha, 2004). Starting from a position of trade surplus implies that⁄. In this case the M-L condition will not hold because:

$$\frac{V_{fx}}{V_{fx}}(\eta_x - 1) + \frac{V_{fm}}{V_{fx}}(\eta_m) \rightarrow \eta_x + \frac{V_{fm}}{V_{fx}}(\eta_m) < 1 \quad \text{.....Eqn 2.7}$$

Finally, starting from a position of trade deficit such that $V_{fx}/V_{fm} > 1$ then

$$\frac{V_{fx}}{V_{fx}}(\eta_x - 1) + \frac{V_{fm}}{V_{fx}}(\eta_m) \rightarrow \eta_x + \frac{V_{fm}}{V_{fx}}(\eta_m) > 1 \quad \text{.....Eqn 2.8}$$

Equation 2.8 shows that the M-L is not a necessary condition but a sufficient one because to improve trade balance, the percentage increase in export must exceed the proportional change in depreciation (or devaluation) (Bahmani, Oskooee andRatha, 2004).

2.2.4. Balance of Payment Constraint Model

The Balance of payment constrained model, otherwise known as Thirlwall Law' has gained a lot of popularity. Balance of payment constrained model formulated in 1979 by Thirlwall adopted a Keynesian view of aggregate demand and output but fundamentally incorporates the neoclassical elasticity approach in its formulation. According to this theory, export is the only component of national output that provides foreign reserves which consequently allows the growth other demand components in an open economy (Bahmani, Oskooee and Ratha, 2004).

BOP constraint model explains that if an economy's rate of import exceeds the rate of exports then balance of payment deteriorates which in turn impedes economic growth. Balance of payment constraints model holds that faster income relative to export growth may only cause balance of payment disequilibrium because it increases demand for imports relative to export thus worsening the BOP position. BOP constraint model conjectures that BOP equilibrium can only be maintained by export led growth.

According to theory the relationship between export and growth is circular and cumulative to the extent that export led growth increases productivity which further increases competitiveness and revenue growth from exports (Bahmani, Oskooee andRatha, 2004).

Of particular interest to economists and policy makers in developing countries is the impact of changes in exchange rate on current account balance and economic growth. Therefore, two main theories attempt to explain issues and dynamics among exchange rate policies, current account deficit and economic performance (Dornbusch, 1988; Kariuki, 2009; Ozturk and Acaravci, 2009; Mudida *et al*, 2012). First, the Marshal-Lerner condition stipulates that real exchange rate depreciation (or devaluation) may potentially improve current account balance if and only if price elasticities for demand of imports and for demand of exports exceed unity in absolute terms. Secondly, Thirlwall law categorically argues that the relative magnitude of income elasticities for imports and exports determine growth by imposing a balance of payment constraint on demand.

2.3. Empirical Review

There has been extensive empirical investigation that attempts to evaluate balance of payment problems. This section reviews empirical research relevant to the area of interest to this study. Given the sharp differences between balance of payment position in developed and developing countries, this study focused on literature in Africa with particular emphasis given to Kenya in an attempt to review literature that was relevant to this study.
Onafowara (2003) investigated the effect of real exchange rate changes on trade balance in three Asian countries namely Malaysia, Indonesia and Thailand. The study used quarterly data from 1980 to 2001. Using Vector error correction model and impulse response method, the results indicated a positive long run relationship between exchange rate and trade balance in all countries under consideration. Comparatively, the results showed that real exchange rate shocks worsened Thailand and Indonesia's balance of trade with respect to major economies such as Japan and the U.S. In all cases, Cointegration analysis shows that there exists a stable long run relationship among current account balance, real income, real exchange rate, and real foreign income.

Ogwuru (2008) used time series data from 1970 to 2005 to evaluate the impact of current account balance on the domestic interest rate, exchange rate, money supply and foreign capital flows in Nigeria. Using an error correction model, it was established that depreciation of Naira (Nigerian currency) which allegedly reduces in import demand and increase of Nigeria's export, does not act to improve the Nigeria's current account balance.

Britto and McCombie (2009) examined whether Thirlwall law applies in Brazil but factored in capital inflow into the equation. The study used Autoregressive distributed lag model to estimate import demand function. The study estimated the import demand function and compared the estimated income elasticity from import demand function to the hypothetical income elasticity calculated by dividing average exports over average income as given in Thirlwall's law. The results showed in the short run, Thirlwall law did not apply in Brazil meaning that balance of payment constraint is one of the real inhibitors of short run economic growth in the country. However, the long run model showed that there is a stable relationship between relative prices and current account movement.

This means that Thirlwall law holds in the long run. The paper also showed that including capital inflow explains the model balance of payment dynamics further thus recommending that Thirlwall hypothesis should be extended to accommodate capital inflow. The study also observed that if there is a significant co integrating vector between series of actual growth rates calculated using estimated income elasticity from imports can be interpreted economically as the existence of an equilibrium growth rate around which two series fluctuate in this case the regressions uses exponential growth rate of actual and hypothetical growth rates compatible with balance of payments and extend to include interest rate payments (Moreno-brid, 2003).

Kariuki (2009), used intertemporal approach to investigate determinants of current account balance in Kenya. Using Annual time series data from 1970 to 2006, the study applied error correction model and Engle-Granger co integration in an attempt to investigate the short run and long run relationships. It was established that there existed one co integrating relationship between real exchange rate and economic growth rate, relative prices, degree of openness and level of money supply. The study also found out that current account balance was positively influenced by favourable terms of trade, depreciation in real exchange rate, economic growth and fiscal balance. Shocks such as oil crisis, coffee boom were found to have a significant negative impact on current account balance.

This study shows that degree of openness has an important implication on current account balance in the economy. It is worth noting that, Kariuki (2009) did not evaluate the application of Thirlwall law in Kenya.
Ozturk and Acaravci (2010) utilized an Autoregressive Distribution lag model to investigate the Thirlwall law which states that balance of payment position constrained economic growth in South Africa. Using monthly time series data from 1984 to January 2006, the study found out that Thirlwall hypothesis was supported in South Africa meaning that equilibrium income was equal to the actual income growth in South Africa. The study also established that imports were co integrated with relative prices and equilibrium growth rate. This implies that policies geared towards reducing import elasticity and enhancing export growth may lead to improvement of balance of payment.

Mudida *et al* (2012) examined whether Marshal-Lerner condition was applicable in Kenya. Using fractional integration and co integration methods the study utilized quarterly data from 1996 to 2011. It was established that there exists a co integrating relationship between balance of payment and real exchange rate and real income. The study also proved that although the convergence process or J-curve effect was slow, the Marshal-Lerner condition was satisfied in the long run. However, Mudida *et al,* (2012) did not factor in important control variables such as degree of openness in the economy. Moreover, the data was limited to 1996q1 to 2011q4. This study incorporates data from 1970 to date in order to capture the long run dynamics between the key variables.

2.4. Overview of Literature

The literature reviewed shows that there is a clear evidence that effect of exchange rate and elasticity of exports and imports ultimately affect trade balance and economic growth of an economy. The conjecture that the degree to which real exchange rate depreciation improves trade balance is subject to elasticity approach has gained popularity in both theoretical and empirical investigations The balance of payment constraint model, otherwise known as the Thirlwall law, has been identified as a superior model as it combines neoclassical supply oriented approach with Keynesians' effective demand concept (Thirlwall, 1979 as cited by Ozturk, L. and Acaravci, 2010).

Balance of payment constraint model which assumes ML conditions have become the underlying assumptions for those who support devaluation or depreciation as a mean to stabilize the foreign exchange market and to improve the trade balance. However, Thirlwall law aims at observing the long run relationship between economic growth, growth of exports and import elasticity and therefore offers a different and more superior basis of analyzing the impact of real exchange rate on current account balance and economic growth and in the short run and the long run Empirical literature significantly supports the assertion that developing countries have shown that devaluation or depreciation may cause a negative effect on the trade balance in short – run, but improvement in long – run. Evidence from Kenya shows that external shocks and domestic macroeconomic variables affect the economy's balance of trade position. In addition, the M-L condition is satisfied in the long run even though convergence is slow.

Despite numerous studies proving existence of short run and long run relationship between real exchange rate movement and current account balance no study has investigated whether Thirlwall condition is satisfied in Kenya. There is no study which has looked at real exchange rate effect on current account balance and economic growth simultaneously. This study attempts to fill this gap and also adding to the existing literature by bridging the gaps mentioned above.

Methodology

3.1. Introduction

This chapter presented the methodology used in the investigation of the study. The chapter is organized as follows. First, the research design and theoretical framework adopted was presented. Second the empirical model used to address the objective was modelled. Lastly, data used for analysis and its sources, definition and measurement of variables, data analysis procedures were discussed in this chapter.

3.2. Research Design

This study investigated the effects of real exchange rate on current account balance and economic growth. Time series research design under the guidance of non –experimental research design was adopted in the study. Annual time series data which includes identified dependent and independent variables were used for investigation. Appropriate regression analysis method was applied to measure the relationship between variables, the direction and the magnitude (Mugenda, 2008).

3.3. Theoretical Framework

The balance of payment constraint model introduced by Thirlwall adopts three main equations which namely export demand function, import demand function and balance of payment equilibrium. Using log-linear equations, the equations can be presented such that:

$$\text{Export demand function: } X_t = \eta\left(P_{dt} - P_{ft} - e_t\right) + \varepsilon Z_t \quad \text{.....Eqn 3.1}$$

$$\text{Import demand function: } m_t = \psi\left(P_{ft} + e_t - P_{dt}\right) + \pi y_t \quad \text{.....Eqn 3.2}$$

$$\text{BOP Equilibrium: } m_t + P_{ft} + e_t = P_{dt} + x_t \quad \text{.....Eqn 3.3}$$

Where mt and xt are import and export growth in period t respectively. η, ψ and π are elasticity of export, import and income respectively P_{dt} and P_{ft} are rate of change of domestic and foreign prices respectively while e_t is the rate of growth of real exchange rate. ε is the world income elasticity of export Z is the rate of growth of world income while *y* is the growth in real output (Ozturk and Acaravci, 2010; Britto and McCombie, 2009). Equation 3.3 shows that at BOP equilibrium the value of imports should be equal to the value of exports assuming no capital account.

Letting ($P_{dt} - P_{ft} - e_t$) assuming no capital account transactions take place, Equation 3.1 and 3.2 can be modeled to get the growth of trade balance (tb) such that:

$$tb_t = x_t - m_t \quad \text{.....Eqn 3.4}$$

$$\Rightarrow tb_t = \eta(TOT) + \varepsilon Z_t - \psi(TOT) + \pi y_t \quad \text{.....Eqn 3.5}$$

$$\Rightarrow tb_t = (\eta - \psi)(TOT) + \varepsilon Z_t + \pi y_t \quad \text{.....Eqn 3.6}$$

Thirlwall hypothesis assumes balance of payment equilibrium meaning that equation 3.3 holds. (Ozturk and Acaravci, 2010; Britto and McCombie, 2009).Substituting equation 3.1 and 3.2 into equation 3.3 yields:

$$-\psi(TOT) + \pi y_t + P_{ft} + e_t = P_{dt} + \eta(TOT) + \varepsilon Z_t \quad \text{.....Eqn 3.7}$$

$$\Rightarrow \pi y_t = P_{dt} - P_{ft} - e_t + \eta(TOT) + \psi(TOT) + \varepsilon Z_t \quad \text{.....Eqn 3.8}$$

$$\Rightarrow \pi y_t = (TOT) + \eta(TOT) + \psi(TOT) + \varepsilon Z_t \quad \text{.....Eqn 3.9}$$

$$\therefore y_t^{**} = \frac{(1+\eta+\psi)\left(P_{dt} - P_{ft} - e_t\right) + \varepsilon Z_t}{\pi} \quad \text{.....Eqn 3.10}$$

Assuming that Marshal-Lerner condition holds, then it follows $\eta + \psi = -1$ that which means that equation 3.10 collapses to:

$$y_t^{**} = \frac{\varepsilon}{\pi} Z \quad \text{.....Eqn 3.11}$$

Or simply

$$y_t^{**} = \frac{x_t}{\pi} \quad \text{.....Eqn 3.12}$$

Equations 3.11 or 3.12 define the Thirlwall law which forms one of the bases of analysis (Ozturk and Acaravci, 2010; Britto and McCombie, 2009).

3.4. Model Specification

3.4.1. Model Testing Marshal –Lerner Condition

The theoretical model in equation 3.6 forms the basis of analyzing M-L condition. It expresses the balance of payment growth function as a function of growth of domestic and foreign incomes and growth of real exchange rate (Ozturk and Acaravci, 2010; Britto and McCombie, 2009). To effectively capture growth double log linear model is adopted. The empirical model tested is as follows:

$$CAB = \beta_o + \beta_1 Y_t + \beta_2 Z_t + \beta_3 RER_t + \beta_4 GEX_t + \beta_5 (OP)_t + \mu_t \text{.....Eqn 3.13}$$

Kenya has had two main exchange rate regimes starting from fixed exchange rate policy (1963-1991), floating exchange rate policy (1992 – to date). In addition, empirical literature identified fiscal expenditure, degree of openness and interest rate differentials as important determinants of balance of trade. Therefore equation 3.13was used to test the first objective.

3.4.2. Model testing Thirlwall Condition

Equation 3.11 or 3.12 imposes an upper limit to an open economy's the long run growth rate. An unsustainable long run growth exists if actual growth in income is greater than the long run growth rate assuming a balanced equilibrium because import growth rate is higher than export growth rate that is $\dot{Y} > \dot{Y}^{**} => \dot{M} > \dot{X}$ Therefore the empirical model used to test Thirlwall condition starts from the import demand function as follows:

$$LnM_t = \alpha_o + \theta(\ln P_M - lnP_X) + \hat{\pi} Y_t + \mu \text{.....Eqn 3.14}$$

Where P_M and P_X are prices of unit value of imports and exports respectively. To this end, $(\ln P_M - lnP_X)$ represent the relative prices and $\hat{\pi}$ is the estimated income elasticity from equation 3.14. To test the hypothesis income elasticity $\dot{\pi}$ that ensures that imports and exports are growing at the rate consistent with balance of payment equilibrium was estimated as follows

$$\dot{\pi} = \bar{x}/\bar{y} \text{.....Eqn 3.15}$$

Where $\bar{x}$ and $\bar{y}$ are average exports and income over the period under investigation (Britto and McCombie, 2009).

3.5. Definition and measurement of variables

Trade Balance (TB): It refers to the current account balance which entails the difference between exports and imports in monetary terms. It is measured by a ratio of exports to imports as percentage of GDP.

Domestic Income (Y): It refers to the aggregate value of goods and services domestically produced within a given period. It was measured by the real quarterly gross domestic product GDP of Kenya.

Foreign Income (Z): It refers to the aggregate value of goods and services produced by foreign trade partners within a period of time. It is measured using a proxy which is the production index of the United States

Real Exchange Rate (e): It is the product of the nominal exchange and the ratio of prices between two countries. Given that US dollar is the De facto international currency; it was used to measure the real exchange rate between the Kenya shilling and the United States Dollar.

Government expenditure (GEX): It refers to the total spending by the government in a year. It was measured using the actual fiscal budget.

Degree of Openness (OP): It refers to the degree to which an economy trades with other economies. It was measured using the ratio of export and imports over GDP in a given period.

Imports (M): Refers to total goods and services imported into Kenya from other countries. It was measured using total value in Kenya shillings within one year

Exports (X): Refers to total goods and services exported from Kenya to other countries. It was measured using total value in Kenya shillings within one year

Prices of Export (PX): It refers to the unit value of an export from Kenya. It was measured using selected Key exports from the country

3.6. Data Sources and Data Analysis

Annual time series data for the period ranging from 1980 to 2011was used for this investigation. The main sources of data included the government of Kenya's statistical abstracts, International Financial Statistics, World Bank, the Kenya National Bureau of Statistics databases and the Central bank of Kenya

3.7. Data Analysis and Testing Procedure

First, Stationarity test was conducted using Augmented Dickey-Fuller (ADF) and Phillips -Peron (PP) tests. After satisfying Stationarity conditions, an ARDL model was estimated based on equations 3.13 and 3.14. The AIC and SBC criteria was used to determine the appropriate number of lags. Both regression models were subjected to Heteroskedasticity and serial correlation diagnostic tests. Breusch-Pagan test was used to test for heteroskedasticity in the stochastic term while Durbin-Watson was used to test for serial correlation. OLS was used to estimate both model in absence of heteroskedasticity. If presence of serial correlation and/or heteroskedasticity is detected, Newey-West estimator was used to correct for such violations (Wooldridge, 2000; Mugenda, 2008)

Regression model estimating, Equation 3.13 was subjected to Cointegration test using Johansen test. If Cointegration is established, error correction model was used to estimate both short run and long run models. To address the first objective which seeks to investigate effects of real exchange rate on current account balance, the coefficient of identified independent variables was evaluated using student's-test at 5 percent level of significance (Johansen, 1998; Wooldridge, 2000). Impulse response function was used to investigate the effect of real exchange rate on current account balance To test the second objective which is whether Thirlwall conditions is satisfied in the Kenyan economy, the income elasticity coefficient estimates from regression model given by equation 3.14 was compared to the theoretical income elasticity as defined by equation 3.15. The null hypothesis adopted is that there is no significant difference between estimated and theoretical income elasticity $H_0: \hat{\pi} = \dot{\pi}$. Wald test was used to test whether there is a significant difference between the estimated and the theoretical income elasticity at 5 percent level of significance (Britto and McCombie, 2009; Ozturk and Acaravci, 2010).

Research Findings

4.1. Introduction

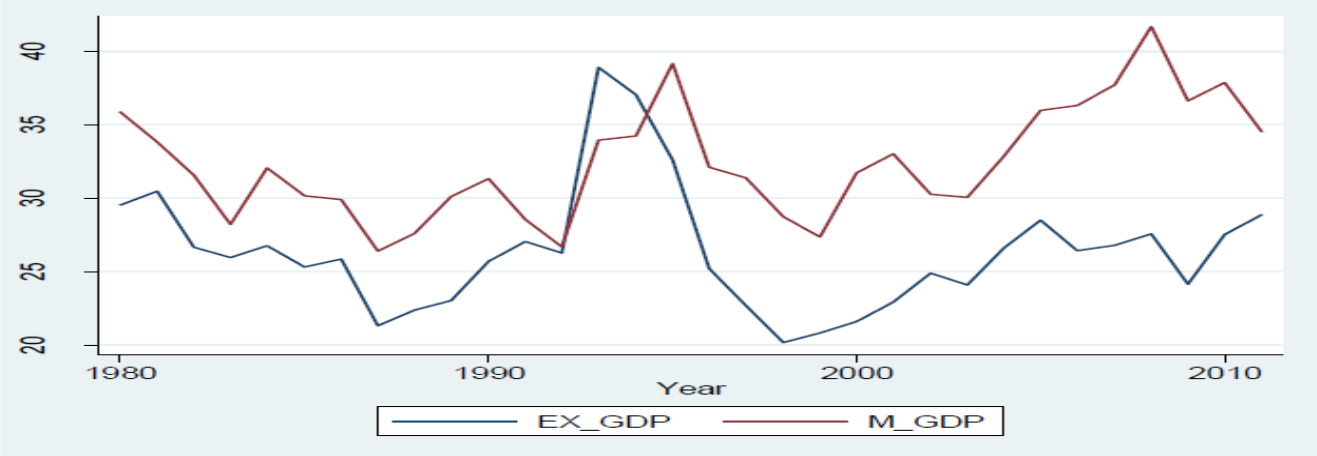
This chapter presented the study findings. Due to data unavailability problems, annual data from 1980 to 2011 was used for analysis. The chapter is organized as follows. Firstly, a brief review of descriptive statistics is conducted and mainly focuses on the trend of key variables over the period under the study.

Secondly, the time series stationary conditions of key variables are provided. Lastly, the estimated results and inferential statistics provided.

4.2. Descriptive Statistics and Stationarity Analysis

Figure 4.1 in the shows the trend of value of imports as a percentage of GDP and value of exports as a percentage of GDP in Kenya from 1980 to 2011.

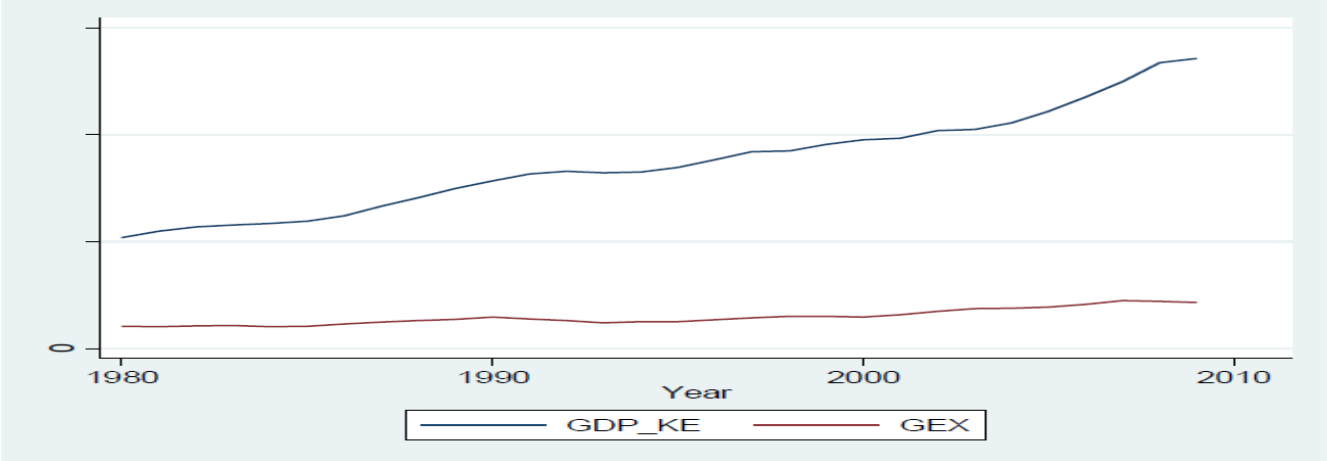
Figure 4.1: Trending Import and Export as a Percentage of GDP from 1980 to 2011



Source of the data: Various Statistical Abstracts

The results show that both imports and exports trend around a mean of 30 percent of GDP. However, import volume is greater that the export volume and the gap significantly widen in the last decade. Figure 4.2 shows the trend of GDP compared to government expenditure for the period 1980 to 2011.

Figure 4.2: Trending GDP and Government Expenditure from 1980 to 2011



Source: UNCTAD

Figure 4.2 shows that both GDP and Government expenditure steadily grew over the period. However, it is worth noting that GDP grew at a faster rate than government expenditure a fact that may explain the diminishing role of government in the overall economy. Comparison of Kenya's CPI and nominal exchange rate shows that both variables have an upward trend, however, it is worth noting that over the last decade from 2000 to 2010, domestic currency registered a higher rate of inflation as compared to depreciation rate of the Kenya shilling.

This section also investigated stationary conditions for all key variables. Table 4.1 provides summary of stationary conditions of each series.

Table 4.1: Stationarity Tests Results

Variable	Type of the Test and test statistic				Conclusion
		ADF Test		PP Test	
		Test statistic	Critical value	Test statistic	Critical value	
Current account Balance)	Level	4.462	-2.983	4.642	-2.983	Non -stationary
	1st Difference	-2.206	-1.701	-2.206	-2.986	Stationary with a drift
Real Exchange Rate(RER)	Level	0.907	-2.983	0.097	-2.983	Non-stationary
	1st Difference	-7.142	-2.986	-7.142	-2.986	Stationary
Domestic Income(GDP_KE)	Level	2.279	-2.989	2.279	-2.989	Non -stationary
	1st Difference	-2.764	-1.706	-2.764	-2.992	Stationary with a drift
Foreign Income(GDP_US)	Level	-0.851	-2.983	-0.858	-2.992	Non -stationary
	1st Difference	-4.307	-2.986	-4.307	-2.986	Stationary
Openness of the economy	Level	-2.583	-1.701	-2.583	-2.989	Stationary with a drift
Imports	Level	-0.244	-2.989	0.244	-2.989	Non -stationary
	1st Difference	-5.284	-2.992	-5.288	-2.992	Stationary
GEX	Level	0.389	-2.989	0.271	-2.989	Non -stationary
	1st Difference	-3.367	-2.983	-3.367	-2.992	Stationary
$Log(P_M) - log(P_X)$	Level	-3.048	-2.983	-3.305	-2.983	stationary

Critical values at 5 percent significant level
Source: Author

It can be observed that with exception of openness of the economy and natural log of difference in imports and export prices all variables were integrated of order 1 *I(1).* Co integration test was conducted to establish whether co movement exists. The results show that among the five non stationary variables modelled in 3.13; there was at most two co integrating relationship. Co integrating relationship was established between current account balance and real exchange rate on one hand and Current account balance and Gross domestic product on the other.

4.3. Estimated Results

This section presents the regression model results. The section is organized thematically based on the objectives.

4.3.1. Effect of Real Exchange rate on Current Account Balance

This objective sought to find out the impact of real exchange rate on current account balance. Firstly, the data was subjected to co integration test. Table 4.2 shows co integration results.

Table 4.2: Co Integration Test

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.944202	80.80869	44.49720	0.0000
At most 1 *	0.804377	45.68390	38.33101	0.0060
At most 2	0.650384	29.42578	32.11832	0.1030
At most 3	0.422965	15.39586	25.82321	0.5989
At most 4	0.347894	11.97137	19.38704	0.4179
At most 5	0.255524	8.262089	12.51798	0.2310

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4.3: Vector Error Correction Model

D(CAB__KES(-1))	1.904354	-0.001053	-0.000153	-2894151.	1.11E-05	2.38E-06
	(0.97995)	(0.00091)	(0.00017)	(1477540)	(7.9E-06)	(5.2E-06)
	[1.94333]	[-1.15825]	[-0.88781]	[-1.95876]	[1.39620]	[0.46114]
D(CAB__KES(-2))	1.141573	-0.000383	-0.000109	-2217789.	6.61E-06	3.41E-06
	(0.73968)	(0.00069)	(0.00013)	(1115280)	(6.0E-06)	(3.9E-06)
	[1.54332]	[-0.55802]	[-0.83880]	[-1.98855]	[1.10618]	[0.87673]
D(GEX(-1))	1904.491	-0.098321	-0.126467	-2.01E+09	0.008519	0.003738
	(940.715)	(0.87255)	(0.16502)	(1.4E+09)	(0.00760)	(0.00495)
	[2.02452]	[-0.11268]	[-0.76639]	[-1.41447]	[1.12074]	[0.75572]
D(GEX(-2))	492.8232	-0.018450	0.028915	-1.08E+08	-0.001162	0.001535
	(330.610)	(0.30665)	(0.05799)	(5.0E+08)	(0.00267)	(0.00174)
	[1.49065]	[-0.06016]	[0.49858]	[-0.21730]	[-0.43482]	[0.88292]
D(GDP_US(-1))	-671.1687	-0.858347	0.369233	-1.03E+09	-0.003033	0.010039
	(1678.37)	(1.55676)	(0.29441)	(2.5E+09)	(0.01356)	(0.00882)
	[-0.39989]	[-0.55137]	[1.25414]	[-0.40849]	[-0.22366]	[1.13769]
D(GDP_US(-2))	-4386.401	1.065842	0.023386	5.00E+09	-0.013829	-0.010723
	(1777.84)	(1.64902)	(0.31186)	(2.7E+09)	(0.01437)	(0.00935)
	[-2.46726]	[0.64635]	[0.07499]	[1.86572]	[-0.96259]	[-1.14714]
D(GDP_KE(-1))	-9.84E-08	3.87E-10	-3.57E-11	0.295198	-1.40E-12	9.13E-14
	(2.0E-07)	(1.8E-10)	(3.5E-11)	(0.29921)	(1.6E-12)	(1.0E-12)
	[-0.49590]	[2.10515]	[-1.02600]	[0.98659]	[-0.87480]	[0.08747]
D(GDP_KE(-2))	-8.12E-07	1.27E-10	8.85E-12	0.818401	-1.11E-12	9.16E-13
	(3.7E-07)	(3.5E-10)	(6.5E-11)	(0.56160)	(3.0E-12)	(2.0E-12)
	[-2.17976]	[0.36710]	[0.13550]	[1.45726]	[-0.36988]	[0.46768]
D(RER(-1))	204281.2	-65.23398	-6.867618	-2.30E+11	0.239130	0.500195
	(86049.2)	(79.8142)	(15.0944)	(1.3E+11)	(0.69533)	(0.45241)
	[1.37401]	[-0.81732]	[-0.45498]	[-1.77192]	[0.34391]	[1.10562]
D(RER(-2))	-44399.57	-3.293340	-1.995594	-2.88E+08	-0.186506	0.072702
	(18363.0)	(26.3079)	(4.97532)	(4.3E+10)	(0.22919)	(0.14912)
	[-2.417882]	[-0.12518]	[-0.40110]	[-0.00674]	[-0.81376]	[0.48754]
D(OP(-1))	403702.6	-161.5044	-31.08680	-2.28E+11	0.736154	0.315691
	(114312.)	(106.029)	(20.0522)	(1.7E+11)	(0.92372)	(0.60101)

	[-2.98918]	[1.32812]	[0.81324]	[1.70167]	[-1.44231]	[-0.79050]
D(CAB__KES(-1))	1.904354	-0.001053	-0.000153	-2894151.	1.11E-05	2.38E-06
	(0.97995)	(0.00091)	(0.00017)	(1477540)	(7.9E-06)	(5.2E-06)
	[1.94333]	[-1.15825]	[-0.88781]	[-1.95876]	[1.39620]	[0.46114]
D(CAB__KES(-2))	1.141573	-0.000383	-0.000109	-2217789.	6.61E-06	3.41E-06
	(0.73968)	(0.00069)	(0.00013)	(1115280)	(6.0E-06)	(3.9E-06)
	[1.54332]	[-0.55802]	[-0.83880]	[-1.98855]	[1.10618]	[0.87673]
D(GEX(-1))	1904.491	-0.098321	-0.126467	-2.01E+09	0.008519	0.003738
	(940.715)	(0.87255)	(0.16502)	(1.4E+09)	(0.00760)	(0.00495)
	[2.02452]	[-0.11268]	[-0.76639]	[-1.41447]	[1.12074]	[0.75572]
D(GEX(-2))	492.8232	-0.018450	0.028915	-1.08E+08	-0.001162	0.001535
	(330.610)	(0.30665)	(0.05799)	(5.0E+08)	(0.00267)	(0.00174)
	[1.49065]	[-0.06016]	[0.49858]	[-0.21730]	[-0.43482]	[0.88292]
D(GDP_US(-1))	-671.1687	-0.858347	0.369233	-1.03E+09	-0.003033	0.010039
	(1678.37)	(1.55676)	(0.29441)	(2.5E+09)	(0.01356)	(0.00882)
	[-0.39989]	[-0.55137]	[1.25414]	[-0.40849]	[-0.22366]	[1.13769]
D(GDP_US(-2))	-4386.401	1.065842	0.023386	5.00E+09	-0.013829	-0.010723
	(1777.84)	(1.64902)	(0.31186)	(2.7E+09)	(0.01437)	(0.00935)
	[-2.46726]	[0.64635]	[0.07499]	[1.86572]	[-0.96259]	[-1.14714]
D(GDP_KE(-1))	-9.84E-08	3.87E-10	-3.57E-11	0.295198	-1.40E-12	9.13E-14
	(2.0E-07)	(1.8E-10)	(3.5E-11)	(0.29921)	(1.6E-12)	(1.0E-12)
	[-0.49590]	[2.10515]	[-1.02600]	[0.98659]	[-0.87480]	[0.08747]
D(GDP_KE(-2))	-8.12E-07	1.27E-10	8.85E-12	0.818401	-1.11E-12	9.16E-13
	(3.7E-07)	(3.5E-10)	(6.5E-11)	(0.56160)	(3.0E-12)	(2.0E-12)
	[-2.17976]	[0.36710]	[0.13550]	[1.45726]	[-0.36988]	[0.46768]
D(RER(-1))	204281.2	-65.23398	-6.867618	-2.30E+11	0.239130	0.500195
	(86049.2)	(79.8142)	(15.0944)	(1.3E+11)	(0.69533)	(0.45241)
	[1.37401]	[-0.81732]	[-0.45498]	[-1.77192]	[0.34391]	[1.10562]
D(RER(-2))	-44399.57	-3.293340	-1.995594	-2.88E+08	-0.186506	0.072702
	(18363.0)	(26.3079)	(4.97532)	(4.3E+10)	(0.22919)	(0.14912)
	[-2.417882]	[-0.12518]	[-0.40110]	[-0.00674]	[-0.81376]	[0.48754]
D(OP(-1))	403702.6	-161.5044	-31.08680	-2.28E+11	0.736154	0.315691
	(114312.)	(106.029)	(20.0522)	(1.7E+11)	(0.92372)	(0.60101)

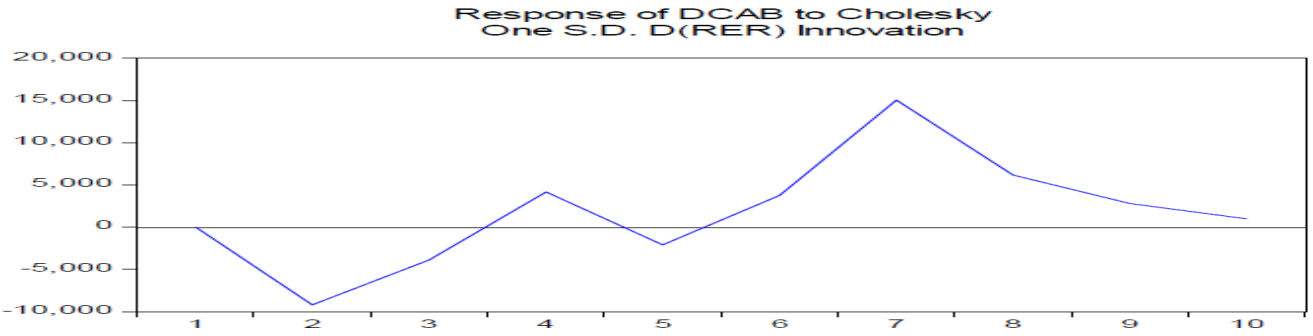
	[3.53158]	[-1.52320]	[-1.55030]	[-1.32248]	[0.79695]	[0.52527]
D(OP(-2))	291434.1	-108.2491	-15.92538	-2.41E+11	0.540104	0.794047
	(137561.)	(127.594)	(24.1304)	(2.1E+11)	(1.11158)	(0.72324)
	[2.11858]	[-0.84839]	[-0.65997]	[-1.16214]	[0.48589]	[1.09790]
C	1377.344	1.982388	2.266832	4.04E+09	-0.022377	-0.081136
	(8673.67)	(8.04519)	(1.52150)	(1.3E+10)	(0.07009)	(0.04560)
	[0.15880]	[0.24641]	[1.48987]	[0.30923]	[-0.31927]	[-1.77919]
R-squared	0.796198	0.919715	0.794945	0.696185	0.700309	0.494498
Adj. R-squared	0.558430	0.826048	0.555714	0.341735	0.350670	-0.095254
Sum sq. resids	1.81E+09	1553.090	55.54782	4.10E+21	0.117875	0.049900
S.E. equation	12265.19	11.37647	2.151508	1.85E+10	0.099111	0.064485
F-statistic	3.348629	9.819057	3.322922	1.964124	2.002950	0.838485
Log likelihood	-281.5558	-93.01556	-48.05034	-665.6618	35.04719	46.65181
Akaike AIC	21.96710	8.001153	4.670396	50.41939	-1.484977	-2.344579
Schwarz SC	22.68701	8.721062	5.390305	51.13930	-0.765067	-1.624669
Mean dependent	-4571.852	23.80978	1.386719	2.92E+10	-0.043737	0.000941
S.D. dependent	18457.56	27.27680	3.227838	2.28E+10	0.122995	0.061617
Determinant resid covariance (dof adj.)		1.24E+22				
Determinant resid covariance		9.58E+19				
Log likelihood		-850.9893				
Akaike information criterion		70.73995				
Schwarz criterion		75.73132				

Source: Author

Due to the model specified in 3.13, the results interpreted were limited to the first model (first column) with Current account balance (CAB) as the dependent variable. Generally, the VECM model shows that there were two co integrating relationship between CAB and government expenditure (GEX) and CAB and GDP. From the equation of interest (first column), both co integrating coefficient were negative and significant showing that model was validated and adjusted into long run equilibrium. The estimated results in table 4.3 (first column) have an adjusted R-squared of 55.84 per cent. This implies that approximately 56 per cent of the variation in change in current account balance is explained by the explanatory variables in the model. This implies that the model had predictive power and could explain the dynamics of current account.

Generally, the model shows that current value of current account balance is explained by its previous values, the lagged values of changes in real exchange rate and lagged values of domestic and foreign GDP. The coefficients of previous value of change in degree of openness of the economy and change in government expenditure of the economy were significant at 5 percent when lagged than once. According to Wooldridge (2000) interpreting time series coefficient may be misleading especially for short run model. To address the objective Impulse response function was used to check how shocks in real exchange rate affect changes in current account balance. Figure 4.3 shows the impulse response function results.

Figure 4.3: Impulse Response Function of Change in CAB to RER



Source: Author

Firstly, previous change in real exchange rate is insignificant but when lagged twice, the coefficient is negative and significant at 5 percent level and above. Therefore, this implies that changes in exchange rate influence import volume change with a lag. In addition, a negative sign implies that depreciation of real exchange rate worsens trade balance in short-run. This finding is in line with the theoretical expectation of the elasticity approach and is supported by IRF results. The impulse response function graph shows that a shock in RER leads to worsening of the current account balance as witnessed in the first two periods. Thereafter, the impact of an increased import bill due to depreciation leads to positive change in net exports thus leading to improvement of the current trade balance as witnessed from period two till period four.

The results presented in table 4.3 and impulse function graph support the assertion that depreciation of Kenya shilling first worsens and then improves. These results are consistent with the J-Curve hypothesis and therefore support the assertion that the Kenyan economy abide by Marshal Lerner Condition.

4.3.2. Testing Thirlwall Condition

The second objective sought to test whether import growth rate is consistent to long run growth. Import model modeled in 3.14 was estimated and the coefficient of natural log of income (elasticity of income) compared to the hypothesized value as provided by Thirlwall law in 3.15.

Long run Relationship

Perasan *et al.*, (2001) was used to test for the existence of a long run relationship. Wald Statistics was used to test whether log of import prices as a ratio of log of export price and log of GDP were jointly significant. Table 4.4 and 4.5 five shows the Perasan Model and shows the Wald test respectively.

Table 4.4: Model used for testing co integration

Method: Least Squares
Sample (adjusted): 1982 2009
Included observations: 28 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDPI(-1))	0.314768	0.196006	1.605909	0.1226
D(LNPM_LNPX(-1))	-0.459026	0.439358	-1.044766	0.3075
LNMI(-1)	-0.098834	0.092880	-1.064097	0.2988
LNGDPI(-1)	0.108507	0.044763	2.424021	0.0240
LNPM_LNPX)(-1)	0.604998	0.527799	1.146267	0.2640
C	0.154005	0.296675	0.519105	0.6089

R-squared	0.245627	Mean dependent var	0.059310
Adjusted R-squared	0.074179	S.D. dependent var	0.138121
S.E. of regression	0.132900	Akaike info criterion	-1.011035
Sum squared resid	0.388571	Schwarz criterion	-0.725563
Log likelihood	20.15449	Hannan-Quinn criter.	-0.923763
F-statistic	1.432661	Durbin-Watson stat	1.434715
Prob(F-statistic)	0.251837		

Source: Author

Given the results in table 4.4, null hypothesis that the lagged coefficients LNMI, LNGDPI and LNPM-LNPX are not different from zero, if the null hypothesis is rejected then there is no co integration. Table 4.5 shows the estimated F-Statistics:

Table 4.5: Wald Test

Test Statistic	Value	df	Probability
F-statistic	5.339013	(2, 22)	0.0129
Chi-square	10.67803	2	0.0048

The F-statistics of 5.3390 is above the critical bounds of [I(0): 3.793 and at I(1): 4.855] computed by Perasan *et al* (2001). This implies that the null hypothesis was rejected at 95 percent confidence level. Therefore, there exists a long run relationship among the variables in the model. Long run equation was estimated using ARDL, following standard practice AIC and SBC criteria indicated that the optimal number of lags is zero. Table 4.6 shows the results for long run import model.

Table 4.6: Estimates for Long Run Import Model

Dependent Variable: LNMI
Method: Least Squares
Sample: 1980 2009
Included observations: 30
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPM_LNPX	-1.319762	1.123338	-1.174857	0.2503
LNGDPI	0.396718	0.101536	3.907177	0.0006
C	3.079620	0.238241	12.92650	0.0000

R-squared	0.766283	Mean dependent var	4.519398
Adjusted R-squared	0.748970	S.D. dependent var	0.591604
S.E. of regression	0.296410	Akaike info criterion	0.500497
Sum squared resid	2.372198	Schwarz criterion	0.640616
Log likelihood	-4.507449	Hannan-Quinn criter.	0.545322
F-statistic	44.26211	Durbin-Watson stat	0.270697
Prob(F-statistic)	0.000000		

Source: Author

Diagnostic tests of 0.27 reveals that the model suffers from autocorrelation, in this regard, Newey-West estimator was used to correct for autocorrelation. Secondly, diagnostic tests shows that the model is reliable as 76 percent of variations in log of imports are explained by explanatory variables. The results show that log in import as a ratio of export prices was insignificant at 5 percent level. These results may support the assertion that the composition of imports into the Kenyan economy is price inelastic. On the other hand, natural log of GDP which captures income elasticity of imports was highly significant at 1 percent level. This means that increase in GDP by one percent increases import volume by approximately 0.40 percent. Therefore, imports are highly elastic to income.

Short run Model

Given that the variables in the import model are co integrated supports estimation of the error correction model. ARDL model approach to error correction model was used for estimation. Table 4.7 shows the results for the error correction model.

Table: 4.7: Error Correction Model: Import Model

Dependent Variable: D(LNMI)
Method: Least Squares
Sample (adjusted): 1982 2009
Included observations: 28 after adjustments
HAC standard errors & covariance (Bartlett kernel, Newey-West fixed
bandwidth = 4.0000)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ECM(-1)	-0.355617	0.061598	-5.773217	0.0000
D(LNMI(-1))	0.511155	0.196473	2.601658	0.0160
LNPM_LNPX	0.157000	0.263275	0.596337	0.5568
D(LNGDPI(-1))	0.517204	0.176811	2.925175	0.0076
C	-0.025997	0.028193	-0.922107	0.3660

R-squared	0.465032	Mean dependent var	0.059310
Adjusted R-squared	0.371994	S.D. dependent var	0.138121
S.E. of regression	0.109457	Akaike info criterion	-1.426143
Sum squared resid	0.275558	Schwarz criterion	-1.188249
Log likelihood	24.96600	Hannan-Quinn criter.	-1.353416
F-statistic	4.998301	Durbin-Watson stat	2.214126
Prob(F-statistic)	0.004769		

Source: Author

Firstly, diagnostics show that the error correction model explains approximately 37 percent of variations in differenced log of imports. The F-Statistics of 4.99 was statistically significant at 1 percent significant showing that the explanatory variables jointly explain the dependent variables. The results of the short run shows that the error correction term (-0.356) is negative and highly significant. This shows that approximately 35 percent of errors are corrected within the first year. The model also shows that the lagged value of difference in log of imports and lagged value of GDP were significant at 5 percent significance level. However, the log of ratio of import prices to export prices was insignificant at 5 percent significance level. These results are consistent with the long run model which shows that relative prices are insignificant estimators of import growth.

To address the second objective, the long run model, as provided in table 4.6 was used for analysis. Thirlwall hypothesized that the estimate of elasticity consistent with long run or balanced growth is estimated by the average volume of export as a ratio of GDP which is equal to 0.264. One sample test is used to compare the estimated income elasticity of imports (0.397) to the hypothesized long run rate of 0.264. The null hypothesis states that there is no difference in import growth rate consistent with the long run growth and actual import growth rate. Table 4.8 shows the test for Thirlwall's hypothesis.

Table 4.8: Test for Thirlwall's Hypothesis

Variable Name	Mean	Std. Err
EX/GDP (Import growth rate consistent with long run growth)	$\dot{\pi} = 0.264$	0.0474
Actual Import Rate (Estimated in table 4.3)	$\hat{\pi} = 0.397$	0.1015
$H_0 : \hat{\pi} - \dot{\pi} = 0$		
$H_A : \hat{\pi} - \dot{\pi} > 0$		
T-Statistics		**6.8816**
P|T|>|t|		**0.0000**

Source: Author

Table 4.8 shows that the t-test is 6.8816 with a P-value of 0.000. Given that probability value is less than 1 percent significance level, we reject the null hypothesis and conclude that the actual import growth rate is higher than the rate consistence with long run growth. Therefore, it is concluded that the import growth rate is relatively higher than the desired level. This implies that balance of payment problems may hinder long run growth.

Summary, Conclusion and Recommendations

5.1. Summary

This study explored the effects of real exchange rate long run growth in Kenya. The objectives adopted aimed at establishing the effect of real exchange rate on current account balance in Kenya and secondly, to investigate whether the import growth rate is consistent with the desired level of growth in the long run.

The study was pinned on neo classical elasticity approach and balance of payment constraint model. Two models were estimated. The first model tested the Marshal Lerner condition while the later model tested Thirlwall hypothesis. Annual time series data from 1980 to 2011 was used for the investigation. The findings revealed that GDP and Real exchange rate are major determinants of current account balance changes. The findings further proved that Marshal-Lerner Condition was applicable in the Kenyan economy. However, it was discovered that the Thirlwall hypothesis was not supported by the data, it emerged that the import growth rate in Kenya was significantly higher than the threshold as asserted by Thirlwall hypothesis.

5.2. Conclusion

The main findings revealed that import is sensitive to changes in prices of imports and exports. Secondly, estimated level of import elasticity of income is very high. Responsiveness to import prices and high level of import growth rate is an indicator of high demand for imports and consequently relatively lower demand for exports in Kenya. In light of these findings, the following recommendations were made:

5.3. Recommendations

Firstly, high level of import demand is an indication of overreliance on imports in the country. Therefore, the Kenyan government through its ministry of industrialization should introduce policies that will promote local production of quality goods and services to reduce demand for imported goods.

Secondly, given that Marshal-Lerner-Conditions holds, the central bank of Kenya should introduce measures to enforce the stability of Kenya shilling and create a conducive atmosphere for investment and growth. A stable currency may reduce volatility of import volume and thus help in solving the balance of payment issue.

Lastly, various arms of government should introduce policies that promote export led growth. Increase in export relative to imports will ensure promote rapid growth in demand and supply of goods and services across borders without deteriorating the economy's balance of payment position.

5.4 Limitations of the Study

The major limitation encountered in the duration of this study was unavailability of data. Unavailability of data led to use of annual data from 1980 to 2011 as opposed to the proposed quarterly data from 1970 to 2012.

Abbreviations and Acronyms

ARDL Autoregressive Distributed lag Model
BOP Balance of Payment
CAB Current Account Balance
DF Dickey Fuller
ECM Error Correction Model
GDP Gross Domestic Product
OLS Ordinary Least squares
IMF International Monetary Fund
KIPPRA Kenya Institute for Public Policy Research and Analysis
RER Real Exchange Rate
SDR Special Drawing Rights
USA United States of America
USD United States Dollar
VAR Vector Auto regression
VECM Vector Error Correction Model

Operational Definition of Terms

Appreciation: It refers to a rise in value of a country's currency relative to that of other currencies.

Depreciation: It is a rise reduction in value of a country's currency relative to that of other currencies.

Degree of Openness: It's a term used to capture the level of free trade in an economy it refers to the degree to which an economy trades with other economies.

Exchange rate: The value of foreign country's currency in terms of the home country's currency.

Marshal-Lerner-Condition: The Marshall-Lerner condition states that the sum of the elasticities' of demand for a country's exports and of its demand for imports has to be greater than unity for a devaluation to have a positive effect on a country's Balance of Payment.

Trade balance: It refers to the current account balance which entails the difference between the value of exports and imports.

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