DETERMINANTS OF CURRENT ACCOUNT DEFICIT AND ITS SUSTAINABILITY IN KENYA

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (PhD) IN ECONOMICS.

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Abstract

Large and persistent current account deficits are among the most serious problems of developing countries since they result in economic crises such as currency crises, burgeoning external debts and reduction in the level of international reserves. Kenya's current account deficit rose from 2.9 percent of GDP over 1964-73 to 6.9 percent over 1974-79 on account of the two oil shocks, widening trade balance and overvalued domestic currency. This prompted the country to rely increasingly on risky short term flows to balance the accounts. This has consistently created a financing gap. Hence, the need to find out the determinants and the sustainability of the current account deficit. The purpose of this study was to assess empirically the determinants of Kenya's current account deficit and its sustainability. The objectives of this study were to determine the univariate integration properties of variables; establish the determinants of the current account deficit; analyze its sustainability; and evaluate its dynamic interactions among various macroeconomic variables. Based on the absorption approach, the study established the persistence and determinants of the current account deficit; on the other hand, the Inter-temporal approach was vital in the assessment of the sustainability of the deficit. Time series research design was adopted. Due to the time series nature of the study, Multivariate Vector Autoregressive, Granger causality test together with Variance decomposition and impulse response functions were used to empirically establish the determinants and dynamics of the current account deficit. Sustainability of the current account deficit was investigated by use of the Johansen Maximum Likelihood Cointegration methodology. Augmented Dickey Fuller, Phillips & Perron Test, Dickey-Fuller Test with GLS Detrending and the Kwiatkowski, Phillips, Schmidt, and Shin Test were used to check for the integration properties of the variables. The results indicate that current account deficit, gross domestic product growth, inflation and foreign direct investment are *I(0)*. Degree of openness, terms of trade, external debt stock, foreign exchange, gross domestic savings, fiscal deficit, exports and imports are $I(1)$ .The results also indicate that exports and imports are cointegrated with the estimated coefficient of 0.21989 indicating that current account deficit is not sustainable in the long-run because of faster rise in the Kenyan imports relative to exports. The major determinants of the current balance are the degree of openness, terms of trade, oil price on the international market and inflation. The variance in the current account is better explained by its own shocks followed by shocks from degree of openness, fiscal deficit, terms of trade, external debt of stock, foreign direct investment, growth rate of gross domestic product, and inflation. From the findings the study recommends the Country to focus on current account targeting policies together with policies that encourage increasing and stabilizing gross domestic product in order to increase exports and its competitiveness and policies that reduce the burden of depending on oil from the world market.

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Background to the study

Global current account imbalances are one of the key macroeconomic imbalances that underlie the global financial crisis (Adams and Park, 2009). Large and persistent current account deficits are among the most serious problems of many developing countries since they result in economic crises like currency crises, burgeoning external debts and reduction in international reserves. The persistent growth of current account deficits in both developed and developing countries has raised questions about their potential excessiveness and concerns regarding the potential impact and disorderly correction that may result from these imbalances.

In the 1990s, current account deficit became a very popular subject for investigation for economists due to the frequent balance of payments crises that broke in various parts of the world. These took the form of currency crises accompanied by substantial capital outflows. In the late 1970s and early 1980s, there were few cases of currency crises especially in Latin America. Later in 1992, the European exchange rate mechanism (ERM) collapsed. In 1994, Mexican peso crisis and subsequent currency crises in the Latin America arouse, followed by a wave of currency crises of Asia in 1997 and 1998. It was Turkey at the beginning and in Argentina at the end of 2001 that witnessed the collapse of local currencies followed by free floating of the currencies. These series of crises in the last decade were so frequent that the existing models were inadequate in explaining them; hence, a significant collection of studies accumulated, giving way to different interpretations of the currency and current account crises.

Most financial crises have highlighted the role of large current account deficit in the run up to crisis episodes. Consequently, the concept of a sustainable (and excessive) current account deficit has become an important theoretical, political and economic issue. Corsetti *et al.* (1998) concluded that, on the whole, those countries hit hardest by currency crises were those running persistent current account deficit throughout the 1990s.This result is confirmed by Radelet and

Sachs (2000), Kamin *et al* (2001) and Edwards (2004).In his study Edwards shows that the probability of experiencing abrupt current account reversals is closely linked to the size of current account deficits. In an earlier study, however, Edwards (2001) supported the relevance of current account imbalances as there is strong evidence that large current account deficits should be a cause for concern of economic policy.

On the other hand, in most countries, the major constraint on the rate of growth of output is the balance of payments position because this sets limits to the growth of demand to which supply can adapt. Theoretically, the current account balances have a direct bearing on the balance of payments.

In Africa, given the macroeconomic fragility, a clear understanding of the factors that affect the current account balance appears to be a sensible strategy for effective policymaking. A stylized characterization of the Africa region includes deficits in the current account that have been very large in recent years, dismal rates of growth, strong reliance on foreign aid, low public and private savings, concentration of exports on single primary products, and large distortions in the economy. All of these characteristics emphasize the fact it is crucial to understand the determinants of current account balances in Africa, and in order to understand policy implications not only in terms of magnitude and direction but, given the many peculiarities of the region.

Kenya is one of the Africa's worst performing economies notwithstanding a pick up in economic growth. The economy is market based, with some state owned infrastructure enterprises and maintains a liberalized external trade system. Kenya's average growth has only been 4 percent, lower than Sub-Saharan Africa (excluding South Africa), which grew close to 5 percent and substantially lower than its East African neighbors Uganda, Tanzania, and Rwanda, which together grew at an average of 7.8 percent this is indicated in Table 1.1.

Table 1.1:GDP growth rates (%) 2008-2012 Kenya,SSA and EAC

	2008	2009	2010	2011	2012
Kenya	1.5	2.7	5.8	4.4	4.3
SSA (excluding South Africa)	6.2	4.0	6.4	6.5	6.1
Uganda	7.7	7.0	6.1	5.1	4.2
Tanzania	7.4	6.0	7.0	6.4	6.5
Rwanda	11.2	4.1	7.2	8.6	7.7

Source: World Bank (2012b)

As compared to other countries in SSA, as well as emerging and newly industrialized economies, Kenya's current account is significantly out of balance and needs urgent attention. Kenya's current account last recorded a surplus in 2004. Since then, the current account has deteriorated and has registered deficits, thoroughly undermining Kenya's path towards industrialization.

The impressive economic performance that Kenya experienced after independence in 1963 has not been sustained, with external and internal shocks creating macro imbalances. In the first decade after independence, Kenya's economy grew at impressive rates, with GDP expanding by 6.6 percent. A series of exogenous factors compounded by inadequate macroeconomic policy responses later reversed the impressive economic growth of the first decade.

Table 1.2: Balance of Payment Trend 1964-2000

Years	1964-1973	1974-1979	1980-1989	1990-1995	1996-2000
Current Account (%)					
Trade Balance/GDP	-4.5	-6.9	-8.3	-6.7	-7.3
Current Account Balance/GDP	-2.9	-6.9	-4.7	-1.7	-2.9
Capital Account (%)					
Long term/GDP	5.1	6.2	4.1	-0.7	-1.8
Short term/GDP	-0.5	1.2	0.8	2.7	5.1
Capital Account/GDP	4.6	7.4	4.9	2.0	3.3
Monetary Movements (%)					
IMF transactions/GDP	0.0	-0.2	0.7	0.9	-0.5
Reserves and other liabilities/GDP	-1.8	-0.8	-0.2	-1.3	-1.0
Monetary Movements/GDP	-1.8	-1.0	0.5	-0.5	-1.5

Source: GOK, 2002

Table 1.2 above provides a summary of balance of payments trends in Kenya 1964-200. The current account deficit rose from 2.9 percent of GDP over 1964-73 to 6.9 percent over 1974-79 on account of the two oil shocks, widening trade balance and overvalued domestic currency. Long term flows turned from a position of 5 percent of GDP over 1964-73 to a -1.8 percent of GDP over 1996-2000 prompting the country to rely increasingly on risky short term flows to balance the accounts. Monetary movements have been negative indicating a weak foreign exchange reserves position. This high level of Kenya's current account deficit remains a concern as any exogenous shocks in 2013 could heighten macroeconomic instability. The current account deficit stood at 10 percent in 2012, the same level as in 2011 despite monetary policy action (see table 1.3).

Table 1.3 : Kenyas' Macroeconomic Environment 2008-2012

	2008	2009	2010	2011	2012
Fiscal Framework (% of GDP)					
Budget Deficit (incl grants)	-4.3	-5.2	-5.1	-4.3	-4.5
Total Debt	45.6	47.5	49.9	48.5	47.2
External account (% of GDP)					
Exports (fob)	18.7	14.4	16.5	17.1	14.3
Imports (cif)	42.5	32.8	39.1	43.5	38.2
Balance of trade	-15.7	-12.4	-14.7	-18.9	-16.4
Current Account balance	-7.3	-5.3	-7.9	-9.8	-10.3
Inflation (average)	**16.2**	**10.5**	**4.1**	**14**	**12.3**
Exchange rate(KES/US$)	**69.2**	**77.4**	**79.2**	**88.8**	**85**

Source: World Bank (2012b)

According to World Bank, (2012a), Kenya is walking a tight rope with deficits at 13.1% of GDP, a record high amongst the highest external deficits in the world, with imports growing by 20% compared to export growth at 10%. Growth in imports was attributed to oil imports, which accounted for 27.6 percent of the total import bill in 2011, moving from US$ 2.7 billion (8.9 percent of GDP) in 2010 to US$ 4.1 billion (11.6 percent of GDP) in 2011. This was attributed to the rise in world crude prices by 33% and growth in the volume of consumption by 12% increase (from 3.2 to 3.6 million metric tons), which was due to the need to expand thermal power, as hydropower operated below potential. With factor incomes and transfers roughly constant, the deterioration in the trade balance was also apparent in the current account balance. The widening current account deficit pulled the overall balance into negative territory.

Kenya will need to manage a number of risks if it is to achieve baseline growth projections. Chief among these are possible fluctuations in the foreign exchange rate and other economic disturbances the current account deficit (World Bank 2012b). Thus what is not known the sources of the current account deficit, but also the size and time profile of the balancing adjustments. That makes long term sustainability of the current account deficit a bench mark of which authorities should be aware.

On the other hand, in spite of the relatively extensive body of theoretical literature on the subject, there are only a few country studies that analyze the effect of macroeconomic variables on the current account deficit and its sustainability. In line with these strong demands, the study was considered timely to empirically assess the determinants and sustainability of the external position and its dynamic interaction in Kenya.

1.2 Statement of the Problem

The current account balance is a very important macroeconomic indicator of the future behavior of the economy; ex post it shows the results of macroeconomic policy management efficiency. It is also a good source of information about the behavior and decisions of institutional sectors of domestic economy. The size of the current account balance has an important impact on exchange rate determination and external competitiveness of a particular economy under investigation. Among the key interest of macroeconomic policy decision makers is to establish the main determinants of the movement of the current account balance, and consequently, to create and perform adequate macroeconomic policy measures in order to achieve a sustainable level of current account balance.

Kenya's balance of payments is generally characterized by a persistent current account deficit. Compounded with the recent world economic slowdown, the significance of such perpetual current account deficit may pose a threat to long term economic growth, (GOK 2009). The persistence of current account deficit may have implications of an excess of investment demand over savings with the dangerous consequences of balance of payment crises, debt accumulation and the reduction in the level of international reserves.

According to Nyongesa (2007) and Nyongesa and Onyango (2009; 2012), while using both cointegration and Granger causality methodology it emerged that current account deficit was the cause of the budget deficit in Kenya. This implied that parsimoniously external deficit is very crucial to the current stability of the economy, ceteris paribus, thus the analysis of the trend, sustainability, determinants and dynamics of the deficit is important, as it could assist in predicting threats to macroeconomic sustainability. From the above background, the study therefore set out to fill the gap by assessing empirical the sustainability, determinants and dynamics of the current account deficit in the Kenyan perspective.

1.3 Objectives of the Study

The broad objective of this study was to assess empirically the determinants of Kenya's current account deficit and its sustainability.

Specifically, the objectives of the study were to;

i) Determine the univariate integration properties of the time series variables.
ii) Analyze the sustainability of the current account deficit in Kenya by adopting the intertemporal budget constraint approach.
iii) Establish the determinants of current account deficit in Kenya
iv) Evaluate the dynamic interactions among various macroeconomic variables and the current account deficit in Kenya.

1.4 Hypotheses of the Study

The study tested the following hypotheses;

i) For the integration Properties of the variables

$H_0: \delta = 0$ Unit root exists thus the variable is non stationary

$H_1: \delta < 0$ Unit root does not exist thus the variable is stationary.

ii) For Sustainability/Cointegration i.e. presence of Long run relationship

$H_0: r = 0$ No cointegration

$H_1: r > 0$ There is Cointegration of r equations

iii) For Determinants of the Current Account Deficits

$H_0: b_i = 0$ The independent variables is not a determinant of CA

$H_1: b_i \neq 0$ The independent variables is a determinant of CA

iv) For Causality and impulse response link between CA and other Macro variables

$H_0: \Phi_i = 0$ No causality and impulse response link between the variables

$H_1: \Phi_i \neq 0$ There is causality and impulse response link between the variables

1.5 Justification of the Study

Given that the increasing macroeconomic imbalances in Kenya have been attributed to the increasing current account imbalances, the study was considered important in establishing the determinants of current account deficit and its sustainability. An empirical assessment of the sustainability of the deficit and its determinants would also be of importance to the public and policy makers in trying to curb the macro economic imbalances and in detecting the short run and the long run effects of their actions in relation to the deficit. This would further enable the country to use the appropriate policy mix in trying to reduce the deficits in order to avoid the imbalances.

A better understanding of the factors underlying short and long term developments in the current account may assist policy makers in assessing whether policies aimed at attaining domestic economic objectives are compatible with a sustainable external position. Furthermore, being a member to a number of regional groupings that are moving towards monetary integration (such as the EAC), Kenya is expected to achieve certain agreed targets in key macroeconomic indicators to enable a smooth integration process, one of which is achieving low and/or sustainable current account position. Results from this study would therefore provide critical input into the formulation of a policy framework that would assist in reducing the current account deficits in line with the convergence criteria.

On the other hand, the study would be of importance to the academicians since it contributes to knowledge by empirically testing the economic theory that relates to the current account deficits in the developing world using the current econometric methodology thereby adding value to the existing theories.

1.6 Scope and limitations of the Study

This study was based on annual time series data of the variables in question for the period 1970-2011.Kenya started experiencing acute current account deficits in the 1970s. One of the limitations is that the Johansen approach does not allow for the possibility of a structural break in the cointegrating relation. The treatment of the variable OIL price on the world market as an exogenous variable makes it hard to check the impulse response and variance decomposition of OIL on the CA using VAR.

1.7 Theoretical Framework

Theoretically, there are three basic models applied to explain the determinants of current account balances. These models include the elasticity approach, the absorption/ saving investment balance approach and the intertemporal approach (Yang, 2010). The elasticity approach features the price elasticity of demand for imports and exports by allowing changes in the exchange rate. This approach is widely applied to evaluate the impact of currency and the role of exchange rate and trade flows on current account balances.

The absorption approach is also known as the saving investment and balance approach or macroeconomics oriented approach. This approach says that economies with current account deficit should import from other countries to cover its excess consumption and spending. It is predicted that the current account is in surplus when the absorption is smaller than income. On the other hand, it is in deficit when the absorption is larger than income.

The intertemporal approach is derived from the absorption approach. According to this approach, current account surplus is a condition where production exceeds spending, or exports exceed imports. Current account deficit happens when spending is larger than production or imports exceed exports. Under this condition, the economy is the borrower. In determining the current account sustainability, the study adopts the intertemporal approach.

The absorption approach provides more inclusive and potentially less misleading framework compared to elasticity approach in analyzing the current account dynamics, (Hung and Gamber, 2010). Under this approach, the current account is the difference between monetary values of domestic production and aggregate demand. Government expenditure has impacts on imports.

In finding the determinants of the current account deficit, the study adopts the absorption approach. In order to explain the absorption approach, the study uses the basic national income identity which shows the relationship between external and internal balances. The basic national income identity defines Income, Y_t as the sum of private and public consumption, C_t and G_t investment, I_t and net exports, $X_t - M_t$; that is

$$Y_t = C_t + I_t + G_t + X_t - M_t \tag{1.1}$$

Rearranging the variables in (1.1) we have,

$$X_t - M_t = Y_t - C_t - G_t - I_t = S_t - I_t \tag{1.2}$$

where $S_t = Y_t - C_t - G_t$ is the National Savings.

This means that the external account has to equal the difference of National Savings (defined as income less private and public consumption) and Investment.

By definition, $CA_t = X_t - M_t$, thus equation (1.2) becomes

$$X_t - M_t = S_t - I_t \tag{1.3}$$

Equation (1.3) can also be written as

$$CA_t = S_t - I_t \qquad (CA_t > 0 \Rightarrow Surplus;\ (CA_t < 0 \Rightarrow Deficit) \tag{1.4}$$

This relation implies that the current account balance is the difference between exports and imports of any country and is related to savings and investment in the economy. Rather than test if the components of internal balances (C, I and I and G) and external balances $(X_t - M_t)$ have impacts on current account balances, the study investigated the factors that can determine

the movements or balances of these components. The possible factors that determine the internal balances are inflation, productivity and foreign exchange, while the factors that determine the external balances can be terms of trade, oil prices and trade openness.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter provides a review of the literature on current account. Section 2.2 provides an exposition of the History, trend and development of current Account balance in Kenya. Section 2.3 and 2.4 deal with the empirical literature on determinants and sustainability of current account deficit and current account deficit literature in Kenya is dealt with in section 2.5.

2.2 History, Trends and Development of Current Account Balance in Kenya

Kenya's balance of payments position started showing strain in the early 1970's.With the first oil shock in 1973, the terms of trade worsened, a situation that persisted with the exception of the coffee boom period of 1976-1977.The boom led to a temporary recovery in the balance of payments position. The sharp fall in the prices in 1978 and the inability to reduce imports drastically owing to the existence of many projects that began in the boom period led to a sharp deterioration in the balance of payment situation (GOK 1989).

As the country was trying to cope with the changed circumstances, the second oil shock occurred in the period 1979-1980.The situation was exacerbated by the decline in coffee and tea prices as well as a fall in export volumes. The poor weather of the early 1980s and the global recession worsened the overall balance of payment position (*ibid*).

There was a notable improvement in the country's external trade and the balance of payment situation in 1983.Exports earnings rose significantly while value of imports rose only marginally. The overall trade deficit of K£ 276 million was therefore lower by K£ 55 million compared with 1982.These changes were chiefly dependent on favorable price movements for merchandise exports and on the restraint of imports. Invisible trade also improved. The resultant deficit on the current account fell to K£ 116 million which was smallest since 1977 (GOK, 1984).

According to the economic survey reported by GOK (1985), there was considerable improvement in Kenya's external trade and balance of payment position in 1984 despite the problem of food imports due to the drought. The value of exports rose by 19% compared to the 1983 while that of imports rose by 21%.The overall trade deficit however increased by K£ 64 million mainly as a result of special food imports. The overall balance of payments in 1984 stood at K£ 39 million compared with K£ 69 million in 1983.The balance of payment position improved as a result of increased inflows of long term capital, grants and the IMF credit in addition to improved trade.

GOK (1986) reported that in 1985, the balance of payment deficit amounting to K£ 86 million was recorded. This was largely as a result of poor exports, liberal import policies and food imports early in the year. All of which led to the decline in the balance of trade and the growth of the current account deficit which rose from K£ 147 million in 1984 to K£ 169 million in 1985.

According to the GOK (1987), the large decline in petroleum prices that characterized most of 1986 and the high earnings from coffee exports during the year, aided the better performance of the economy, particularly the balance of payment. The improvement in the current account led to an overall balance of payment surplus of K£ 73 million during the year compared with a deficit of K£ 94 million and a small surplus of K£ 32 million recorded in 1985 and 1984 respectively. The better economic performance in 1986 is also reflected in high foreign exchange reserve holding.

According to GOK (1994), the worst overall balance of payments and the basic balance deficit were registered in 1992 to the tune of K£ 433 million and K£ 418 million respectively. This was attributed to the foreign exchange resulting from suspension of disbursement to Kenya in November 1991 by the IMF, World Bank and the bilateral donor community in general. The current account recorded a high deficit of K£ 295 million in 1991 to that of K£ 151 million in 1992.This was aided by the inflows in service and grants, in particular tourism, transport and inflows related to foreign exchange Bearer Certificates (ForexCs).

The major indicators of international trade and the balance of payment deficit showed a better performance in 1996 than the previous year (1995). The of payment deficit which had widened in 1995 narrowed down in 1996 by 13%.The overall balance of payment recorded an exceptionally high surplus. These developments were due to the increase in exports and capital inflows. The current account deficit narrowed to K£ 211.2 million in 1996 compared with K£ 1030.9 million in 1995 (GOK, 1997).

GOK (1998) reported that in 1997, the current account deficit deteriorated from K£ 211.2 million in 1996 to 1101.9 million, primarily reflecting the widening of the trade deficit by K£ 997.1 million. According to the GOK (1999), the balance of trade worsened in 1998 compared to the previous year owing to marginal growth in imports while exports almost stagnated. The overall balance of payments surplus which had been declining since 1996 further declined by 32.0% in 1998. The slackened growth of exports and imports volume reflected the slow growth of the economy. The deterioration of balance of payments was largely as a result of worsening current account deficit and the lapse of the IMF's Enhanced Structural Adjustment Facility (ESAF) in July 1997, which adversely affected both the bilateral and multilateral capital inflow due to eroded international confidence in Kenyan economy.

The international trade and balance of payment showed a mixed performance in 1999. The level of imports declined, albeit marginally. The current account therefore improved to record a surplus for the first time since 1994. The significant reduction of exports prices and the volume of various exports items mainly explained the sluggish performance of the export sector (GOK 2000).

GOK (2001) reported that in the year 2000, the performance of the international trade and the balance of payments was poor. The deficit widened further by 35% in 2000 compared to 9.4% in 1999. The current account deficit deteriorated to Ksh 18,145 million in 2000 from a deficit of Ksh 6,875 million in 1999 while capital and financial accounts registered a smaller surplus. The total exports covered only 54.3% of the imports bill in 2000 compared to 59.4% in 1999. There was a general rise in both imports volumes and prices which resulted in a much higher value of imports.

According to the GOK (2002) economic survey, the key indicators of international trade and balance of payments showed poor performance of external sector in 2001. There was a remarkable rise in imports while the domestic exports increased only marginally. This principally caused a drastic deterioration of the trade deficit when compared to the year 2000. These developments contributed to the widening of the current account balance to a deficit of Ksh 24,869 million in 2001 from a smaller deficit of Ksh 15,512 million in 2000.The deficit on current account was however fully offset by a surplus on capital and financial account causing the net international reserves of the country to increase to Ksh 13,072 million from Ksh 8,244 million in 2000.

The major pointers of international trade and balance of payments in 2002 showed an apparent divergent from the previous years. Imports fell significantly while exports grew substantially after a sluggish performance in recent years. As a consequence, the trade deficit narrowed for the first time since 1996.These developments caused the current account balance to recover from the deficit of Ksh 43,795 million in 2001 to a surplus of Ksh 4,724 million in 2002 (GOK 2003).

The key indicators of the international trade for 2003 showed a significant widening of trade deficit compared with the previous year when the deficit narrowed remarkably. Imports increased by a higher magnitude compared to exports leading to the deterioration of the trade deficit. The current account deficit, however recorded a surplus of Ksh 5,144 million in 2003 compared to the deficit of Ksh 13,950 million recorded in the previous year. These improvements in the current account were attributed to increase in tourism earnings and grants inflow from abroad (GOK 2004).

The trade balance widened from a deficit of Ksh 182,670 million in 2005 to Ksh 270,489 million in 2006.The substantial decline in the value of re-exports caused the value of total exports to go down compared to the value of imports which grew relatively faster in the period under review. This led to the deterioration of the exports/imports ratio from 58.8% in 2005 to 48.1% in 2006. The current account deficit widened to Ksh 37,900 million in 2006 from a deficit of Ksh 19,687 million in 2005. The visible trade deficit widened to stand at Ksh 235,512 million which mainly explains the deterioration in the current account (GOK, 2007).

GOK (2008), reported that an overall balance of payment improved from a surplus of K£ 44,446 million in 2006 to K£ 63,250 million in 2007 largely due to an increase in the foreign exchange reserves. The current account balance deteriorated further to a deficit of K£ 74,169 million in 2007 from a deficit of K£ 34,523 million the previous year. This was mainly due to the visible balance which widened to K£ 286,641 million.

GOK (2009) reported that the trade balance widened to a deficit of Ksh 425.7 billion from a deficit of Ksh 330.5 billion in 2007, a deterioration of 28.8 %. The value of domestic exports rose by 23.3% while imports grew relatively faster at the rate of 27.4%. The exports-imports ratios deteriorated from 45.4% in 2007 to 44.8% in 2008. The current account balance deteriorated to a deficit of Ksh 136,851 million in 2008 from a deficit of Ksh 69,638 million the previous year. As a percentage of GDP, the current account deficit excluding current transfers was 14.2% of GDP against the 7.0% projected in the first medium term plan of vision 2030.

In 2008, the balance of payment position declined on account of decreasing foreign direct inflows and the ever widening merchandise trade deficit. Net official reserves decreased by Ksh 33,161 million in 2008 compared to an increase of Ksh 63250 million in 2007. The depletion of reserves was occasioned by the growth in import bill and unmatched growth in exports of goods and services and net capital inflows (*ibid*).

Following the global crisis in 2008-2009 that hit all countries, in Kenya it was accompanied by reduced exports and a large imports bill (such as food and oil), the current account deficit widened, continuing an earlier trend. The current account deficit, for example, rose from $1.10 billion in 2007 to $2.12 billion in 2008.This was attributed mainly to the huge increase in the value of oil imports of $1.12 billion. The oil bill increased from $739 million in 2008Q2 to $1081 million in 2008Q3, but significantly declined to $540 million in 2008Q4 as a result of the fall in international oil prices. This increased imbalance in the context of reduced capital inflows caused a depreciation of the Kenya shilling as well as a running down of foreign exchange reserves (Mwega, 2010).

The current account deficit increased further from $1470 million in the year to August 2008 to $2388 in the year to August 2009 as a result of reduced current transfers (mainly remittances). The trade account remained fairly constant, with a decrease in merchandise imports as a result of the decrease in imports of oil (owing to the decrease in oil prices) and manufactured goods (*ibid*).

The available literature reviewed on the history, trend and development of the current account deficit in Kenya, it is apparent that the country's performance in international trade and balance of payment (sluggish export performance and escalating import growth) has been poor and caused a persistent current account deficit. This indicates a clear problem with Kenya's export competitiveness. From the literature, it has further emerged that the current account deficit has been caused by both external and internal factors these include international oil prices; imports and export value and volume, terms of trade and exchange rate. These factors enabled the study to undertake an empirical analysis of the determinants of current account deficit and its sustainability.

2.3 Empirical Literature on Determinants of Current Account Deficit

Several empirical studies have reviewed the determinants and consequences of current account adjustment. Milesi-Ferretti and Razin (2000) by adapting Eichengreen, Rose and Wyplosz' (1995) methodology from currency crises to current account adjustment, focused on low- and middle- income countries as their work was motivated by the Asian crisis of 1997- 98. The authors detect several adjustment episodes ("reversals") on the basis of a set of empirical criteria and find that slightly more than half of them are associated with an economic slowdown. Using a probit analysis, they find that adjustments are more likely in countries with large current account deficits, lower reserves, higher GDP per ca pita, worsening terms of trade, an increasing investment rate and floating exchange rate. Two external variables, namely OECD growth and the US interest rate, also turn out to be robust predictors of adjustment.

Khan and Knight (1983) investigate the evolution of the current account balances for 32 non-oil developing countries over the period 1973-1980 by using a pooled time series cross section data and adopting an Ordinary Least Square (OLS) estimation approach. Their results indicate that both internal factors (the increase in fiscal deficits and the appreciation in real effective exchange rates) and external factors (the deterioration in terms of trade, the decline of economic growth and the increase in foreign real interest rates) are important in explaining the deterioration of the current account of the countries under review.

Debelle and Faruqee (1996) using economic theories of saving and investment as a guide, examined the extent to which a common set of underlying determinants has been of historical relevance in explaining current account dynamics across countries over time. Using a panel of 21 industrial countries over 1971-93 and an expanded cross sectional data set that included 34 industrial and developing countries found that fiscal surplus, terms of trade and capital controls do not play a significant role on the long term (cross sectional) variation of the current account, while relative income, government debt and demographics do. Furthermore, a short-run examination of the determinants using both a partial adjustment model with fixed effects and an error correction model (to account for the possibilities of stationarity or non-stationarity of the ratio of net foreign assets to GDP, respectively) suggested that changes in fiscal policy, movements in terms of trade, the state of business cycle, and the real exchange rate affect the current account balance in the short run.

Calderon, Chong and Loayza (2002) attempt to extend the work of Debelle and Faruqee (1996) by applying more advanced econometric techniques to control for joint endogeneity and by distinguishing between within-economy and cross-economy effects. They used a panel data of 44 developing countries over the period 1966-1995 to examine the empirical links between current account deficits and a broad set of economic variables proposed in the literature. By adopting a reduced-form approach rather than holding a particular structural model, they found that current account deficits in developing countries are moderately persistent. Higher domestic output growth, increase in the terms of trade and the real exchange rate appreciation tend to worsen the current account deficit. On the other hand, increases in the public and private savings, higher growth rates in industrial countries and higher international interest rates have favourable impacts on the current account balance.

Gruber and Kamin (2007) assess some of the explanations that have been put forward for the global pattern of current account imbalances that have emerged in recent years, particularly the large U.S. current account deficit and the large surpluses of the developing Asian economies. Their work is based on the work of Chinn and Prasad (2003), using a panel data of 61 countries over the period 1982-2003 and including the standard current account determinants (per capita income, relative growth rates, fiscal balance, demographic factors and international trade openness). They find that the Asian surpluses can be better explained by a model that incorporates, in addition to standard determinants, the impact of financial crises on current accounts. However, their model fails to explain the large U.S. current account deficit when the model is augmented by measures of institutional quality.

Using Feasible Generalized Least Squares (FGLS) Least Squares Dummy Variable (LSDV), the Random Effects Method (REM) and Generalized Methods of Moments-Instrument Variables (GMM-IV) Aristovnik (2007), examines the short- and medium-term empirical link between current account balances and a broad set of [economic] variables proposed by theoretical and empirical literature. He focused on the Middle East and North Africa (MENA), an economically diverse region. A [dynamic] panel-regression technique is used to characterize the properties of current account variations across selected MENA economies in the 1971-2005 periods. The results indicate that higher [domestic and foreign] investment, government expenditure and foreign interest rates have a negative effect on the current account balance. On the other hand, a

more open economy, higher oil prices and domestic economic growth generate an improvement in the external balance, whereas the latter implies that the domestic growth rate is associated with a larger increase in domestic savings than investment. Finally, the results show a relatively high persistence of current accounts and reject the validity of the stages of development hypothesis as poorer countries in the region reveal a higher current account surplus [or lower deficit].

Arghyrou and Chortareas (2008) apply the Johansen and Juselius time series cointegration methodology in assessing the role of real exchange rates after controlling for the income catching-up process. For ten members of the euro area in 2008 (Austria, Belgium, Finland, France, Germany, Greece, Italy, the Netherlands, Portugal and Spain), they find that current account balances are determined by shifts in relative income as well as shifts in real exchange rates. The real exchange rate is found to be negatively related to the current account balance; domestic and foreign national income is negatively and positively, respectively, connected respectively to the current account balance. On the other hand, differences in the significance of the three variables namely real exchange rate, domestic and foreign national income exist. For one subset of the countries, domestic and foreign national incomes alone are significant enough as determinants in the long-run relationship. For the second subset, only real exchange rates are significant, whereas for the third subset all three variables are significant. Moreover, current account adjustment toward its equilibrium is gradual, with the disequilibrium term being the main determinant of short-run current account dynamics. For the majority of the members of the euro area, current account adjustment is a nonlinear process, with the speed of adjustment depending on the sign of the disequilibrium term.

Sekmen (2008) examines the interaction of current account deficits with other macroeconomic and demographic variables such as per capita GDP, inflation rate, government consumption, electric consumption, and fertility rate, domestic credit to private sector, industry value added, and life expectancy for Turkey, and population age 65 or above using specification methods on Least Squares Methods (OLS). The dependent variable is per capita GDP since it represents the well-being of a country.In the Turkish Congress they believed that huge current account deficit is a sign of an economic crisis in the near future. The priority of the study by Sekmen(2008) therefore was to test whether the CA deficit may deteriorate well-being of Turkey and which in turn cause economic crises or not.

Based on the saving-investment theory, Nkuna and Kwalingana (2009) use cointegration analysis to identify the long run and short-run determinants of Malawi's current account deficit using annual data from 1980 to 2006. Results suggest that openness, terms of trade, external debt accumulation, and current account liberalization fundamentally determined the current account deficit in Malawi. Furthermore, results reveal that these deficits have been, to a large extent, persistent.

Kayikçi (2011) examines the theoretical linkages between current account deficits and a broad set of economic variables in Turkey for the purpose of exploring the sustainability of these deficits. The choice of the set of explanatory variables are motivated by existing debates of these theories about the current account behavior assuming that there is a stable underlying structure that links the current account to these macroeconomic variables. Data for the last two decades indicate that high growth and investment rates are not only the main causes of current account deficits in Turkey, but also indicators of their sustainability. Turkey would continue to have current account deficits in the subsequent years and sustainability of these deficits has become increasingly difficult as long as it has high growth rates.

Despite the importance of the topic for individual country policy formulation, comprehensive empirical studies on the subject are quite limited, especially in the case of developing countries. Furthermore, determinants of the current account balance can vary from country to country, since countries have different characteristics, resources, economic structures, and economic policies according to their different needs. Nonetheless, the studies that have examined the determinants of the current account balances in developing countries using different methodologies have given different findings although they remain inconclusive. Further, most of the available empirical literature tends to focus on multi-country analyses. Thus, the specific characteristics of the economy being analyzed should be given more priority than standard econometric techniques in discovering the determinants of the current account balance for a country.

2.4 Empirical Literature on Sustainability of Current Account Deficit

The most discussed issue in the field of international finance in the world has been the sustainability of a country's current account disequilibrium. Economists have suggested different definitions for the sustainability of current account deficits (Matsubayashi, 2005). According to Crockett and Goldstein (1987), the sustainability of current account deficits is dependent on two factors. These factors are; a country's capacity to service its external debt and secondly, the country's coherency of saving-investment decisions with respect to other countries. An external position is defined as unsustainable if the country violates its intertemporal budget constraint (Ostry, 1997).This is one of the objectives of the current study.

A sustainable current account is a sign of sustainable external debts. Second, the sustainability of the current account supports the validity of modern intertemporal model of the current account. In this model, current account balance reflects the dynamic saving-investment decisions of rational economic agents and acts as a buffer to smooth consumption in the face of shocks.This essentially means that current account can be inclined to revert to its equilibrium path in the long run (Holmes, 2006).

The discussion focused mainly on the question of whether the US current account deficit that was forecast to reach $550 billion or 5% of GDP in 2003 was sustainable (Schwartz, 2003). This had been an issue of significant importance for policymakers and academic economists alike (Mann, 2002; Holman, 2001).In the case of Kenya the current account deficit has been above 5% of GDP.Consequently,this has been an issue for policy makers, as it is hard to tell if the deficit is sustainable or not. Thus, this study goes further to test empirically the sustainability of the deficit for Kenya.

Further, Milesi-Ferreti and Razan (1996) developed a framework of current account sustainability. They point out that persistent current account deficits of 5 per cent of GDP for 3 – 4 years do not necessarily mean that the deficit is sustainable. Their main argument is that the "sustainable" level of a current account deficit is the level consistent with solvency. This is the level at which the external debt to GDP level stabilizes. One of the major conclusions of the study by Milesi-Ferreti and Razan(1996) is that the current account deficit should "flash a red light" if the export sector is very small, external debt and debt service costs are too high, savings

are low and the financial sector is poorly regulated. Kenya has the same characteristics as illustrated by the two authors, however no empirical study has been done on the same.

Bodman (1997) examines the dynamic relationship between Australian imports and exports in both the short and long-run using recent cointegration and error correction techniques. The study analyses the direct implications over the specification and estimation of Australian import and export functions and resulting elasticity estimates. The author also addresses the issue of sustainability of persistent current account deficits in the Australian context and provides a test of whether Australia is satisfying its intertemporal [or present value] budget constraint (IBC).The results indicate that exports and imports are all integrated of order one I(1) and that exports and imports are cointegrated.This suggests a long-run equilibrium relationship between them despite apparent short-term divergences. It is shown that Australia meets both necessary and sufficient conditions to satisfy its present value budget constraint. The Australian current account deficit therefore is sustainable.This study uses the same methodology and variables to assess the empirically the sustainability of the current account deficit in Kenya.

Baharumshah, Lau and Fountas (2003) examine the sustainability of the current account imbalance for four ASEAN countries (Indonesia, Malaysia, the Philippines, and Thailand) over the 1961–1999 periods. They utilize the intertemporal budget constraint (IBC) model to explain the behavior of the current account in these countries. Their analysis is based on unit root and cointegration procedures including those allowing for a structural break to deal with the major shortcomings of previous studies. The empirical results indicate clearly that for all countries, except Malaysia, current account deficits were not on the long-run steady state in the pre-crisis (1961–1997) era. This leads to the conclusion that the current accounts of these countries were unsustainable and did not move towards external-account equilibrium. Moreover, the persistent current account deficits might serve as a leading indicator of financial crises. In contrast, we find strong co-movement between inflows and outflows in Indonesia, the Philippines and Thailand in the period including the post-crisis years, while Malaysia was on an unsustainable path. This is because macroeconomic performance of most of the ASEAN-4 countries has changed dramatically since the onset of the Asian crisis in mid-1997. The evidence suggests that action to prevent large appreciations should have been taken prior to the 1997 crisis.

Baharumshah, Lau, and Fountas (2004) further attempt to examine the issue of sustainability of current account imbalances in eight East Asia countries in the panel and can be broadly divided into the crisis-affected economies (Indonesia, Malaysia, the Philippines, South Korea, and Thailand) and the non-affected economies (Japan, Taiwan, and Singapore), using the latest developments in nonstationary panel data analysis. The methods of nonstationary time series panels provide a much more promising explanation than would an analysis based on pure time series or cross section data. The empirical results clearly indicate that the current account imbalances were not on the long-run steady state in the pre-crisis era (1970-1997). This leads to the conclusion that the current accounts of Asia-8 during this period were unstable and did not move towards external account equilibrium. However, strong co movements between exports and imports are found in the extended sample period that includes the post-crisis period (1970-2000). This result implies that large currency depreciations and the economic recovery have brought the Asia-8 economies back on a sustainable path. Current account imbalances may therefore be used as an indicator [or warning signal] in predicting future crises.

Muwanga-Zake and Katamba (2005) analyze the composition, magnitudes and trends of capital flows and current account deficit in Uganda over the 1994- 2004 period. The results reveal that the pattern of capital flows fluctuated over the period mainly on account of official flows, the basis on which the magnitude of Uganda's external debt stock grew substantially during the period. Private capital flows also increased steadily over the period, with the bulk being in the form of foreign direct investment that appeared to be more stable than other identified flows. In addition, these flows appeared to have provided some impetus for positive and significant growth in output. However, the current account deficit excluding grants proved to be consistently large. The size of the deficits seemed to suggest that it might continue to remain unsustainable in the medium term. This is because total imports tended to grow at a faster rate as compared to exports of goods, hence inducing a sustained widening of the current account gap that has translated into a form of chronic imbalance.

In a related study, Matsubayashi (2005) re-examines whether the huge external deficits in the United States for the last few decades are sustainable by using time series methods. Two distinct analytical differences from earlier works are considered. First, the private sector and government are separated to construct the current account identities used. Second, both the necessary and

sufficient conditions for the sustainability of external deficits are explicitly considered. Taking these modifications into consideration, the empirical results of Matsubayashi study do not necessarily reject the hypothesis that external deficits in the US are sustainable.

A study on Greece examined the main macroeconomic, financial and structural factors that shaped current account developments over the period from 1960 to 2007 and discusses these developments in relation to the issue of external sustainability. Concerns over Greece's external sustainability have emerged since 1999 when the current account deficit widened substantially and exhibited high persistence. The empirical model used, which theoretically rests on the intertemporal approach, treats the current account as the gap between domestic saving and investment. The authors examined the behavior of the current account in the long run and the short run using co-integration analysis and a variety of econometric tests to account for the effect of significant structural changes in the period under review. The findings indicate that a stable equilibrium current account model can be derived if the ratio of private sector financing to GDP, as a proxy for financial liberalization, is included in the specification. Policy options to restore the country's external sustainability are explored based on the estimated equilibrium model (Brissimis, Hondroyiannis, Papazoglou, Tsaveas and Vasardanit, 2010).

Sustainability indicators have been proposed, by which an acceptable level of current account deficit that the country can bear without endangering its solvency position. In this respect, some sustainability criteria have been developed and these are used as indicators for the crises. Studies have used the econometric techniques such as unit roots and cointegration analyses in order to evaluate the notion of sustainability. A common feature in existing literature is the finding of nonstationary current accounts using unit root tests such as Wu (2000) for Organization of Economic Cooperation Countries (OECD). Another approach is to examine the cointegration between exports and imports such as Leachman and Francis (2000) and Wu, Chenn and Lee (2001) for Group of Seven Countries, (G7). There are also some studies that apply both methods such as Baharumshah, Lau and Fountans (2003) and Ongan (2008).

The large current account deficit in Kenya raises the issue of whether it is sustainable. The financial crises of the 1990s (including those of East Asia) demonstrate that a large current account deficit may trigger a sharp hike in interest rates, a rapid depreciation of exchange rates and thereby disrupting the performance of the domestic economy for example the Mexican crisis

of 1994-95 was similarly preceded by a very large current account deficit. Therefore there is need to empirically determine the sustainability of Kenya's current deficit.

2.5 Literature on Current Account Deficit and other macroeconomic variables affecting the deficit in Kenya.

Most of the African countries, in the 1970s and early 1980s marked a watershed. Since that time, there has largely been crisis; in the expansion in external public debt with debt servicing difficulties rising sharply and stagnant or falling exchange rate earnings. It is noted that the root of the crisis lies both in the international and domestic spheres, (Duncan and Howell, 1992).

In Kenya, Bigstein and Ndung'u (1992), note that it was not until nearly ten years after independence in 1963 that the country first began to experience the budget deficit and current account deficit which in turn ran into the balance of payment difficulties. These balance of payment difficulties were owing to falling terms of trade and expansionary budgets.

Using an approach that highlights macroeconomic determinants of longer-term saving and investment balances, Chinn and Prasad (2003) investigated the medium-term determinants of current accounts for a sample of industrial and developing countries [including Kenya] using cross-section and panel regression techniques. They found that government budget balances and initial stocks of net foreign assets are positively correlated with current account balances. Their findings also indicated that, among developing countries, indicators of financial deepening and terms of trade are positively associated with current account surpluses [or smaller deficits], while measures of openness to international trade are associated with larger current account deficits.

Using the Generalized Instrumental Variable Estimation (GIVE) method and OLS, Özmen (2004) empirically investigates the effects of institutional and macroeconomic policy stance variables on current account deficits (CAD). Based on cross-section data for a broad number of developing and industrial countries, including Kenya, the results strongly suggested that better governance increases whilst the presence of original sin decreases the ability of an economy to sustain CAD. Exchange rate flexibility and openness appear to put a discipline on CAD. Consistent with the equity home bias and Feldstein-Horioka puzzle, CAD decreases with country

size. The net impacts of the financial deepening and monetary credibility on CAD are found to be insignificant.

Abmann (2007) analyzes the dynamic effect of macroeconomic crises as currency crises and the current account reversals on economic growth using the panel data from 1975-1997 for 67 countries including Kenya. The two specifications of the influence of both the crises are assessed. Within each specification, both types of crises have an effect on economic growth in the period of occurrence. While the effect of a currency crisis is significantly persistent over time, the effect of a reversal is not. Furthermore, significant heterogeneity prevails within the growth equation connected with the steady state level and growth dynamics captured via random coefficients. The estimation results suggest differences in the estimated costs of both types on economic growth.

Osakwe and Verick (2007) analyzes the determinants of both short and medium-term current account deficits in Africa, Kenya included. They find that countries are more likely to have a deficit exceeding five percent if the economy is small, less open and diverse, and is experiencing macroeconomic instability. Less democratic governments also have a higher probability of running a deficit. Overall, the main message is that though most African economies are characterized by current account deficits, only a few have real concerns regarding the sustainability of this imbalance. As long as these countries can finance their deficits via aid and debt accumulation, they face no immediate crisis. However, this allows the economies to continue with the status quo rather than addressing the structural causes of the deficit such as export supply constraints. This is due to poor infrastructure. African leaders and policymakers should therefore focus on removing such impediments thereby providing a boost to long-term growth and development prospects.

Chinn and Ito (2005) investigate the medium-term determinants of the current account using a model that controls for factors related to institutional development, with the goal of informing the recent debate over the existence and relevance of the "savings glut." The economic environmental factors that are considered are the degree of financial openness and the extent of legal development. They find that for industrial countries, the government budget balance is an important determinant of the current account balance whereby the budget balance coefficient is

0.21 in a specification controlling for institutional variables. The empirical findings are not consistent with the argument that the more developed financial markets are, the less saving a country undertakes. The relationship posited here is applicable only to countries with highly developed legal systems and open financial markets. For less developed countries including Kenya, and emerging market countries, they found the reverse correlation; greater financial development leads to higher savings. Furthermore, there was no evidence of "excess domestic saving" in the Asian emerging market countries. Rather, they seem to have suffered from depressed investment in the wake of the 1997 financial crises. They also find evidence that the more developed equity markets are, the more likely countries are to run current account deficits.

Nyongesa and Onyango (2009, 2012) provided an exhaustive characterization of the empirical long run equilibrium linkage and causality between the current account deficit and budget deficit for Kenya. Using the Vector Error Correction Model and adopting Johansen Maximum Likelihood Estimation Cointegration methodology and Granger causality their results indicated that there was a long run relationship between the two deficits. On the other hand, causality ran from current account deficit to Budget deficit. The econometric analysis suggests that managing current account deficit offers scope for improvement in the budget deficit in turn supporting the Current Accounting Targeting proposition.

Cheung, Furceri and Rusticelli (2010) assess the link between structural and cyclical factors and current account balances using a panel of 94 countries (industrial, emerging and developing countries including Kenya) from 1973-2008. They found that the medium term evolution of the global external imbalances can be related in large part to structural factors including cross country differences in demographics, fiscal deficits, oil dependency and intensity, stage of economic development, financial market development and institutional quality.

Liesenfeld, Guilherme and Jean-Francois (2010) use different nonlinear panel data specifications to investigate the causes and dynamics of current account reversals in low and middle-income countries. This includes Kenya with data from 1984-2001. They analyze four sources of serial persistence: a country-specific random effect reflecting time invariant differences in institutional, political or economic factors, serially correlated transitory error component capturing persistent country-specific shocks, dynamic common time-specific factor effects, designed to account for

potential spillover effects and global shocks to all countries, and a state dependence component to control for the effect of previous events of current account reversal and to capture slow adjustments in international trade flows. The results suggest that current account balance, terms of trade, foreign reserves and concessional debt are important determinants of current account reversal. Furthermore, they find strong evidence for serial dependence in the occurrence of reversals. While the likelihood criterion suggests that state dependence and serially correlated errors are essentially observationally equivalent, measures of predictive performance provide support for the hypothesis that the serial dependence is mainly due to serially correlated country-specific shocks related to local political or macroeconomic events.

From the empirical literature, evidence is still inconclusive as to the specific determinants of the current account balances in developing countries. This is apparent and can be seen from the conflicting results on the different variables. Most of the available empirical literature tends to focus on multi-country analysis/framework. To be more specific, the methodological approaches that have been adopted widely in the existing empirical literature have a major focus on cross section and panel/pool data analysis. The main limitation with this kind of estimation approach is that the corresponding results can only provide a generalized picture of the developing and industrial economies or both and could only be able to explain the behavior of current accounts in these economies thereby losing the country-specific characteristics. Although Kenya has been included in a number of panel studies, there is no study that has specifically examined the determinants of Kenya's current account deficits. This study tries to go beyond this generalization and empirically investigates the macro variables that may influence the behavior of the current account deficit and its sustainability in Kenya and assess its dynamics over time.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In order to achieve the objectives in line with the theoretical framework, this chapter provides the models and the methodology the study used. The study employed unit root test, cointegration test, Vector Autoregressive (VAR) while testing for the respective hypotheses.

3.2 Research Design

Research methodology in econometrics literature indicates that in order to test the hypotheses and meet the objectives that were advanced in chapter one of this study, a time series design was appropriate. In this regard, the methodology used in this study adopted the positivist paradigm to scientific inquiry. Creswell (1994) and Hussey and Hussey (1997) notes that positivism is founded on the belief that objective reality exists independent of what individuals perceive. That is, the positivist seeks facts or causes of social phenomena with little regard for the subjective states of individuals. It seeks to apply logical reasoning to research so that precision, objectivity and rigour replaces hunches, experience and intuition as a means of investigating research problem. Consequently, high regard is placed on identifying causal relationships among variables. This positivist view encompasses the following: - (i) The observation of real world phenomena or facts, (ii) the formulation of explanations for such phenomena or facts using deductive processes, (iii) the generation of predictions about real world phenomena using the previously formulated explanations and deductive processes, (iv) the attempted verification of these predictions through systematic, controlled experimentation or observation. A major tenet of the positivist paradigm is formulation and testing of hypotheses.

3.2.1 Model Specification for the determinants of current account deficit

On the basis of equation 1.2 and 1.4 from theoretical framework and the literature reviewed, the study identified a number of factors that potentially determine the country's current account position. The study came up with the following specific function:

$$CA_t = f(CA_{t-i}, TOT, FX, FD, FDI, EDS, INF, OIL, GDP, GDS, DOP) \quad (3.1)$$

where the dependent variable CA_t is the Current Account Balance to GDP ratio; CA_{t-i} is the Current Account Balance lagged ; TOT is the terms of trade; FX is foreign exchange rate (Ksh/USD), FDI is Foreign Direct Investment ratio to GDP; EDS is the country's external debt stock; FD is fiscal deficit (%); INF is Inflation (%), OIL is the oil price on the world market (in billion US$ per barrel), GDP is the annual growth of Gross Domestic Product [productivity] (%), GDS is Gross Domestic savings (%), and DOP is the indicator of degree openness to international trade.

3.2.2 Model Specification for current account sustainability

In order to test the sustainability of the current account deficit, the study adopted a model developed by Husted (1992) which was based on Hakkio and Rush's (1991) procedure which is in line with the theoretical framework of the study.

Current Account is used as an instrument of consumption against possible shocks to the economy. Consumption tilting arises due to the difference between world interest rate and domestic rate of time preference. It is noted that an open economy faces the following budget constraint for each period *t:*

$$C_t = Y_t + B_t^f - I_t - (1 + r_t)B_t^f \quad (3.3)$$

where C_t is public and private consumption in period *t*, Y_t is the production in period *t*. I_t is Investment in period *t* , r_t is one period world interest rate and B_t^f is international borrowing which could be positive or negative. From this model, uncertainty in time is taken care of by assuming the "Ponzi condition" .This condition states that countries are going concerns that is foreign lender will not allow domestic residents to die with unpaid debts, also domestic residents will not die with unused assets.

Since this budget constraint must be satisfied for all periods, forward iterating (3.3), the intertemporal budget constraint is given by;

$$B_t^f = \sum_{i=1}^{\infty} \mu_i [Y_{t+i} - C_{t+i} - I_{t+i}]_t + \lim_{i \to \infty} \mu_i B_t^f \tag{3.4}$$

where $\mu_i = \prod_{j=1}^{i} \left(\frac{1}{1+r_{t+j}} \right)$ is a product of the first i discount factors. Note that:

$$Y_t - C_t - I_t = X_t - M_t = TB_t \tag{3.5}$$

where TB denotes trade balance.

Therefore the economy's budget constraint can be expressed as

$$B_t^f = \sum_{i=1}^{\infty} \mu_i [TB_{t+i}]_t + \lim_{i \to \infty} \mu_i B_t^f \tag{3.6}$$

From equation (3.6), when i approaches infinity that is $i \to \infty$ the last term vanishes, and then current value of the foreign debt will equal the sum of present discounted value of future trade balances. If the current stock of foreign debt is bigger than the present value of future trade balances, then the country's debt is in a bubble hence the current account is not sustainable.

Following Hakkio and Rush (1991) and Husted (1992), we assumed a stationary world interest rate with mean r that is exogenous with respect to this economy's choices. Upon further manipulation, equation (3.6) can be re-written as:

$$M_t + B_t^f = X_t + \sum_{i=0}^{\infty} \frac{\Delta X_{t+1} - \Delta Z_{t+1}}{(1+r)^{i-1}} - \lim_{i \to \infty} \frac{B_{t+1}^f}{(1+r)^{i-1}} \tag{3.7}$$

where $Z_t = M_t + (r_t - r) B_{t-1}^f$. Now, subtracting X_t and then multiplying both sides of the equation by minus 1, we get:

$$CA_t = X_t - M_t - rB_t^f = \sum_{i=0}^{\infty} \frac{\Delta X_{t+1} - \Delta Z_{t+1}}{(1+r)^{i-1}} - \lim_{i \to \infty} \frac{B_{t+1}^f}{(1+r)^{i-1}} \tag{3.8}$$

Assuming that both the X and Z are both nonstationary process, each integrated of order 1 denoted by $I(1)$;

$$X_t = \alpha_1 + X_{t-1} + \varepsilon_{1t} \tag{3.9}$$

$$Z_t = \alpha_2 + Z_{t-1} + \varepsilon_{2t} \tag{3.10}$$

Where α_j are drift parameters (possibly equal to zero) and ε_{it} are stationary processes and uncorrelated. For this particular case, equation (3.8) becomes:

$$X_t = \alpha + M_t^* - \lim_{i \to \infty} \frac{B_{t+1}^f}{(1+r)^{i-1}} + \varepsilon_t \tag{3.11}$$

with $M_t^* = M_t - rB_{-1t}^f$ indicating imports of goods and services plus net interest payments, $\alpha = \frac{1+r}{r}(\alpha_1 - \alpha_2)$, and $\varepsilon_t = \sum_{i=0}^{\infty} \frac{(\varepsilon_{1t} - \varepsilon_{2t})}{(1+r)^{i-1}}$

Assuming that the second term in equation (3.11) vanishes, then (3.9) can be written as a simple regression relation

$$X_t = \alpha + \beta M_t^* + \varepsilon_t \tag{3.12}$$

where under the normal hypothesis that the economy is satisfying the intertemporal budget constraint, we expect the $\beta = 1$ and ε_t would be stationary. Thus if X_t and M_t^* are $I(1)$, then they are cointegrated.

The empirical results may allow establishing several conclusions concerning the sustainability of the intertemporal budget constraint;

i) When there is no cointegration the current account deficit is not sustainable and do not move towards external-account equilibrium.
ii) When there is cointegration with $\beta = 1$,the current account deficit is sustainable;
iii) When there is cointegration with $\beta > 1$,the economy's imports are growing faster than the economies exports, and the current account deficit may not be sustainable.

The condition $0 < \beta < 1$ is a sufficient condition for the budget constraint to be obeyed. However, when imports and exports are expressed as a percentage of gross domestic product or in per capita terms, it is necessary to have $\beta = 1$ in order for trajectory of debt to GDP ratio not to diverge in an infinite horizon.

3.3 Target Population

The target population consisted of all the macro economic variables that have a bearing on the current account deficit in Kenya.

3.4 Sample design and Sample size

The study used annual time series data set comprising of macroeconomic variables from the World Bank and Kenya National Bureau of Statistics. The series span the period 1970 to 2011. These was aimed at achieving comprehensive coverage and give much accurate results.

3.5 Data Sources and Analysis

The data for the study was obtained from the world Development Indicators, a publication of the World Bank, and statistical abstracts from the Kenya National Bureau of statistics (KNBS).

Due to the nature of the study that involved the adoption of the stationarity tests, cointegration and Vector Autoregressive model, the analysis was conducted using the Econometric Estimation software Eviews. The analysis also involved used descriptive statistics.

3.5.1 Integration properties (Unit root test)

A time series variable has the property of stationarity when it possesses a finite mean, variance and autocovariance function that are all independent of time. Analogously, a non-stationary series possesses a time dependent mean or autocovariance function. A stochastic time series is said to be integrated of order d if the series requires differencing d times in order to achieve stationarity (Engle and Granger 1987).

Thus the time series X_t is said to be integrated of order one, denoted $X_t \sim I(1)$, if its level series X_t is nonstationary but its first-differenced series ΔX_t is stationary, that is, $\Delta X_t \sim I(0)$. Note that by stationarity we mean covariance or weak stationarity, meaning the property that a time series variable possesses a finite mean, variance, and autocovariance function that are all independent of time. Analogously, a nonstationary series may possess a time dependent mean or autocovariance function.

Determining the order of integration of a time series variable involves testing for the number of autoregressive unit roots that the time series contains. For example, the first order autoregressive process.

$$X_t = \delta X_{t-1} + u_t \qquad u_t \sim IId(0, \sigma_u^2) \qquad (3.13)$$

where X_0 a fixed is initial value, δ is a parameter and u_t is a white noise. When $|\delta| < 1$ the series X_t is stationary since it possesses a constant finite mean and variance which are independent of time. In contrast, when $\delta = 1$, X_t is nonstationary since both its mean and variance are time dependent.

In order to test the order of integration of the macroeconomic series, the study employed a battery of stationarity tests including classical unit root tests namely the Augmented Dickey-Fuller (ADF) test and the Phillips Perron (PP) test.

3.5.1.1 Augmented Dickey-Fuller (ADF) test

While testing the unit root using the ADF test, the study used the following ordinary least square equations:

$$\Delta y_t = \delta y_{t-1} + \alpha_i \sum_{i=1}^{\rho} \Delta y_{t-i} + \varepsilon_t \tag{3.14a}$$

$$\Delta y_t = \beta_1 + \delta y_{t-1} + \alpha_i \sum_{i=1}^{\rho} \Delta y_{t-i} + \varepsilon_t \tag{3.14b}$$

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \alpha_i \sum_{i=1}^{\rho} \Delta y_{t-i} + \varepsilon_t \tag{3.14c}$$

For all the $\varepsilon_t \sim IId(0, \sigma_\varepsilon^2)$

The difference between the three regression equations 3.14a, 3.14b and 3.14c concerns the presence of the deterministic elements δ and α_i . The first is a pure random walk model, the second adds an intercept or drift term, and the third includes both a drift and linear time trend. In all cases, the null hypothesis is that the tested time series variable contains a unit root.

However, there is a question concerning whether it is most appropriate to estimate Equation 3.14a, 3.14b, or 3.14c unless the researcher knows the actual data-generating process. It might seem reasonable to test the hypothesis using the most general form of the models, namely Equation 3.14c.

3.5.1.2 Phillips Perron (PP) test

It has been proved, using Monte Carlo simulation that the power of the ADF test is very low. The ADF test is unable to discriminate clearly between nonstationary and stationary series with a higher degree of autocorrelation and is sensitive to breaks. To overcome this, the semi-parametric Phillips-Perron test which gives robust estimates when the series has serial correlation and time dependent heteroscedasticity was used to supplement the ADF test.

Phillips and Perron (1988) propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the nonaugmented DF

test equation (3.14c), and modifies the t-ratio of the α_i coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic. The PP test is based on the statistic:

$$\tilde{t}_\alpha = t_\alpha \left(\frac{\gamma_0}{f_0}\right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\tilde{\alpha}))}{2 f_0^{1/2} s} \tag{3.15}$$

where $\tilde{\alpha}$ is the estimate and t_α is the t-ratio of α_i, $se(\tilde{\alpha})$ is the coefficient standard error and s is the standard error of the test regression. In addition γ_0 is the consistent estimate the error variance in (3.16) [calculated as $(T-k)s^2/T$ where k is the number of regressors].The remaining term f_0 is an estimator of the residual spectrum at frequency zero.

The ADF and PP tests are asymptotically equivalent but may differ substantially in finite samples due to the different ways in which they correct for serial correlation in the test regression. The ADF and PP tests are therefore severely size distorted (reject I(1) null much too often when it is true) and the PP tests are more size distorted than the ADF tests. In general, the ADF and PP tests have very low power against I (0) alternatives that are close to being I(1). That is, unit root tests cannot distinguish highly persistent stationary processes from nonstationary processes very well. Also, the power of unit root tests diminish as deterministic terms are added to the test regressions. This implies that tests that include a constant and trend in the test regression have less power than tests that only include a constant in the test regression. For maximum power against very persistent alternatives, the recent tests proposed by Elliot, Rothenberg and Stock (1996) were used. The tests were confirmed by the KPSS test of Kwiatkowski *et al.* (1992).

3.5.1.2 Dickey-Fuller Test with GLS Detrending (DF-GLS)

ERS (1996) proposed a simple modification of the ADF tests in which the data are detrended so that explanatory variables are "taken out" of the data prior to running the test regression. ERS defined a quasi-difference of y_t that depends on the value a representing the specific point alternative against which we tested the null:

$$d(y_t \mid a) = \begin{cases} y_t & if \;\; t = 1 \\ y_t - a y_{t-1} & if \;\; t > 1 \end{cases} \tag{3.16}$$

Considering an OLS regression of the quasi-differenced data $d(y_t \mid a)$ on the quasi-differenced $d(x_t \mid a)$:

$$d(y_t \mid a) = d(x_t \mid a)\hat{\delta}(a) + \eta_t \tag{3.17}$$

where x_t contains either a constant, or a constant and trend, and let $\hat{\delta}(a)_t$ be the OLS estimates from this regression. ERS recommended the use of $a = \bar{a}$, where:

$$\bar{a} = \begin{cases} 1 - 7/T_t & if \quad x_t = \{1\} \\ 1 - 13.5/T & if \quad x_t = \{1, t\} \end{cases} \tag{3.18}$$

Defining the *GLS detrended data,* y_t^d using the estimates associated with the $\bar{a}$:

$$y_t^d = y_t - x_t'\hat{\delta}(\bar{a})$$

Then the DFGLS test involved estimating the standard ADF test equation, (3.14c), after substituting the GLS detrended y_t^d for the original y_t.

While the DFGLS -ratio follows a Dickey-Fuller distribution in the constant case, the asymptotic distribution differed when you include both a constant and trend.

3.5.1.3 The Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) Test

The KPSS (1992) test differs from the other unit root tests described here in that the series is assumed to be (trend-) stationary under the null hypothesis. The KPSS statistic is based on the residuals from the OLS regression of y_t on the exogenous variables x_t .

$$y_t = x_t'\delta + u_t \tag{3.19}$$

The LM statistic is defined as:

$$LM = \sum S(t)^2 / (T^2 fo) \tag{3.20}$$

where fo, is an estimator of the residual spectrum at frequency zero and where $S(t)$ a cumulative residual function is:

$$S(t) = \sum_{r=1}^{t} \hat{u}_r \tag{3.21}$$

based on the residuals $\hat{u}_t = y_t - x_t'\delta(0)$. We point out that the estimator of δ used in this calculation differs from the estimator δ used by GLS detrending since it is based on a regression involving the original data and not on the quasi-differenced data.

To specify the KPSS test, you must specify the set of exogenous regressors x_t and a method for estimating fo. The reported critical values for the LM test statistic are based upon the asymptotic results presented in KPSS

3.5.2 Cointegration Test

In order to test the sustainability of the current account deficit the study adopted Cointegration test of Johansen (1988) and Johansen and Juselius (1990) maximum likelihood estimator. According to the multivariate model of Johansen and Juselius (1990), the vector autoregressive (VAR) in equation (3.1) is estimated.

$$X_t = \Pi_1 X_{t-1} + \Pi_2 X_{t-2} + \ldots + \Pi_k X_k + \phi D_t + u_t \qquad (3.22)$$

where Π_t, ϕ are ($n \times n$) matrix of parameters, u_t is assumed to be independent and Gaussian distributed with mean zero and variance σ^2,thus $u_t \sim IId(0, \sigma_u^2)$.

The variable D_t contains deterministic terms such as constants and a linear trend and where X_t is (X_t, M_t) and an ($n \times 1$) vector consisting of exports and imports for the sustainability modeling integrated of $I(1)$. The long-run equilibrium is $\Pi X = 0$, where the long-run coefficient matrix Π is defined as

$$\Pi_i = I - \Pi_1 - \Pi_2 - \ldots - \Pi_k \qquad i = 1,2,\ldots k \qquad (3.23)$$

The long-run cointegrating matrix Π is an N x N matrix whose rank determines the number of cointegrating vectors, say r . If we define two matrices $\alpha(N \times p)$ and $\beta(N \times p)$ such that $\Pi = \alpha\beta^T$, the row of β consists r cointegrating vectors.

The study used both the maximum-eigenvalues method and trace tests statistics introduced by Johansen and Juselius (1990) in determining the number of cointegrating vectors.

3.5.3 Vector Autoregressive (VAR)

In order to analyze the determinants of current account deficit, the study used the multivariate data analysis in the context of vector autoregressive models (VAR).This model helps us to determine the interdependencies and dynamic relationships between variables by incorporating non-statistical a priori information.

In its basic form, a VAR consists of a set of K endogenous variables $y_t = (y_{1t},...,y_{kt},...,y_{Kt})$ for $k = 1,...K$ .The $VAR(p)$ -process is then defined as:

$$y_t = A_1 y_{t-1} + ... + A_p y_{t-p} + CD_t + u_t \qquad (3.24)$$

with A_i are $(K \times K)$ coefficient matrices for $i = 1,..., p$ and u_t is a K-dimensional process with $E(u_t) = 0$ and time invariant positive definite covariance matrix $E(u_t u_t^T) = \Sigma_u$ (white noise).The matrix C is the coefficient matrix of potentially deterministic regressors with dimension $(K \times M)$ and D_t is an $(M \times 1)$ column vector holding the appropriate deterministic regressors,such as a constant,trend,and dummy and /or seasonal dummy variables.

A vital characteristic of a $VAR(p)$ process is its stability. This means that it generates stationary time series with time invariant means, variances and covariance structure, given sufficient starting values. This can be checked by evaluating the characteristics polynomial:

$$\det(I_K - A_1 z - ... - A_p z^p) \neq 0 \text{ for } |z| \leq 1 \qquad (3.25)$$

If the solution of the above equation has a root for $|z| = 1$,then either some or all variables in the $VAR(p)$ process are integrated of order one i.e $I(1)$.

In practice, the stability of an empirical $VAR(p)$ process can be analyzed by considering the companion form and calculating the eigenvalues of the coefficients matrix (Lütkepohl, 2006). A $VAR(p)$-process can be written as a $VAR(1)$-process as

$$\xi_t = A\xi_{t-1} + v_t \tag{3.26}$$

with

$$\xi_t = \begin{bmatrix} y_t \\ \vdots \\ \vdots \\ y_{t-p+1} \end{bmatrix}, A = \begin{bmatrix} A_1 & A_2 & \cdots & A_{p-1} & A_p \\ I & 0 & \cdots & 0 & 0 \\ 0 & I & \vdots & 0 & 0 \\ \vdots & \vdots & \ddots & \vdots & \vdots \\ 0 & 0 & \cdots & I & 0 \end{bmatrix}, v_t = \begin{bmatrix} u_t \\ 0 \\ \vdots \\ 0 \end{bmatrix} \tag{3.27}$$

where the dimension of the stacked vectors ξ_t and v_t is $(Kp \times 1)$ and that of the matrix A is $(Kp \times Kp)$. If the moduli of the eigenvalues of A are less than one then the $VAR(p)$ is stable. For a given sample of the endogenous variables $y_1, \cdots y_T$ and sufficient presample values $y_{-p+1}, \cdots, y_0$, the coefficients of a $VAR(p)$- process can be estimated efficiently by least squares applied separately to each of the equations . If the error process u_t is normally distributed ,then this estimator is equal to the maximum likelihood estimator conditional on the initial values.

Once a $VAR(p)$ model has been estimated, the study has to check for diagnostic tests, such as testing for the absence of autocorrelation, heteroscedasticity or non-normality in the error process. The study further tested the Granger causality, impulse response functions and forecast error variance decomposition. The latter two are based upon the Wold moving average decomposition for stable $VAR(p)$-a process which is defined as:

$$y_t = \Phi_0 u_t + \Phi_1 u_{t-1} + \Phi_2 u_{t-2} + \cdots, \tag{3.28}$$

With $\Phi_0 = I_K$ and Φ_s can be computed recursively according to:

$$\Phi_s = \sum_{j=1}^{s} \Phi_{s-j} A_j \text{ for } s = 1,2,\cdots \tag{3.29}$$

whereby $A_j = 0$ for $j > p$

Finally, forecasts for horizons $h \geq 1$ of an empirical $VAR(p)$-process can be generated recursively according to:

$$y_{T+h|T} = A_1 y_{T+h-1|T} + \cdots + A_p y_{T+h-p|T} \tag{3.30}$$

where $y_{T+j|T} = y_{T+j}$ for $j \geq 0$. The forecast error covariance matrix is given as:

$$Cov\left(\begin{bmatrix} y_{T+1} - y_{T+1|h} \\ \vdots \\ y_{T+h} - y_{T+h\backslash T} \end{bmatrix}\right) = \begin{bmatrix} I & 0 & \cdots & 0 \\ \Phi_1 & 1 & & 0 \\ \vdots & & \ddots & 0 \\ \Phi_{h-1} & \Phi_{h-2} & \cdots & I \end{bmatrix} (\Sigma_u \otimes I_h) \begin{bmatrix} I & 0 & \cdots & 0 \\ \Phi_1 & 1 & & 0 \\ \vdots & & \ddots & 0 \\ \Phi_{h-1} & \Phi_{h-2} & \cdots & I \end{bmatrix}$$

and the matrices Φ_i are the empirical coefficient matrices of the Wold moving average representation of a stable $VAR(p)$-process as shown above. The operator $\otimes$ is the Kronecker product.

3.6 Data Presentation Techniques

The study used tables and line graphs in data presentation.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter provides study findings by representing an analysis of the descriptive statistics, time series properties (Unit root), correlation, Cointegration (Long run relationship) and Vector Autoregressive (VAR), Granger causality, variance decomposition and the impulse responses of Current account deficit with respect to other macroeconomic variables.

4.2 Descriptive statistics

To assess the distributional properties of the macro variables that have a direct bearing on Current Account balance, descriptive statistics are reported in Table 4.1. Current account deficits are a persistent feature of Kenyan economy. As shown in Table 4.1, the average current account balance (CA) has mostly remained in the negative territory for a large sample of Kenya's data. The mean of current account balance as a ratio to GDP is 5.6%.It can also be seen that CA has surpassed more than ten times the threshold set by Mann (1999) of 5%, this result would make one to say that the current account deficit is unsustainable. In terms of the specific components of the current account, imports (IM) have always exceeded exports (EX). From Table 4.1 and Figures 4.1 to 4.12, GDP growth is seen as being unstable. Degree of openness has been on the upward trend. However, the Foreign direct Investment has never gone beyond 2.7% of the GDP. Oil Prices have been on the upward trend from the year 2000 while the Kenyan currency has been weakening against the US dollar.

Table 4.1 Descriptive Statistics of the Macro-variables

Variables	Mean	Median	Maximum	Minimum	Std. Dev	Skewness	Kurtosis	Jarque-Bera	Prob
EX	27.1500	26.7050	38.9000	20.1700	4.1520	0.8120	3.6947	5.4600	0.0652
IM	32.9250	31.7400	45.8600	26.4000	4.3857	0.8303	3.3659	5.0603	0.0796
CA	-5.6287	-5.1345	0.8885	-18.6798	4.9803	-1.1040	3.7087	9.4105	0.0090
GDP	4.3561	4.1062	22.1739	-4.6554	4.4037	1.9313	9.0852	90.9126	0.0000
DOP	54.1752	54.1766	75.1311	35.8839	11.7656	0.0216	1.9222	2.0360	0.3613
OIL	47.0671	38.6050	104.4900	16.8000	23.5703	0.7468	2.5465	4.2643	0.1186
FD	-4.0443	-4.2750	0.0800	-8.9000	2.3581	-0.0135	2.2119	1.0883	0.5803
FDI	0.6112	0.4689	2.6767	0.0047	0.5699	2.1007	7.8951	72.8246	0.0000
EDS	52.5192	47.7507	131.8994	0.0000	24.8757	0.9504	4.3095	9.3243	0.0094
INF	12.6603	11.3798	45.9789	1.5543	8.4589	1.6635	7.1454	49.4430	0.0000
TOT	99.1645	93.2177	167.9000	70.1493	20.5843	1.2455	4.4564	14.5706	0.0007
FX	39.0782	26.0790	85.0681	5.5000	29.9734	0.2306	1.3005	5.4269	0.0663
GDS	15.0056	16.7351	27.0230	5.0902	6.0161	-0.0704	1.7614	2.7196	0.2567

Note: Sample 1970-2011; N=42, Prob-Probability

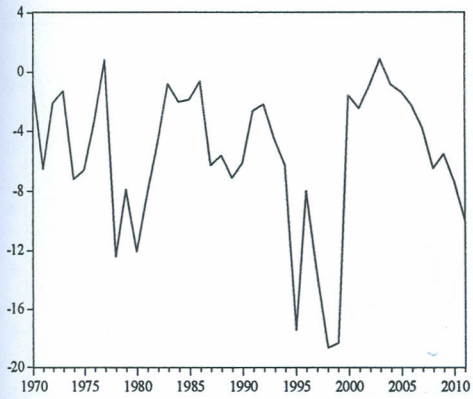

Figure 4.1 Time series Plot for CA (Level)

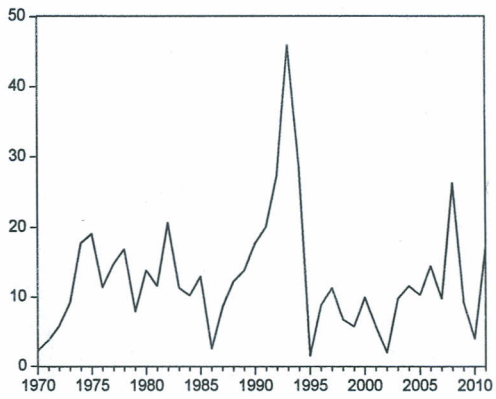

Figure 4.2 Time series plot for INF (Leve)

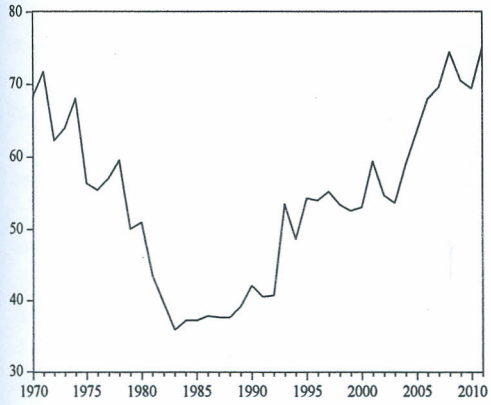

Figure 4.3 Time series Plot for DOP (Level)

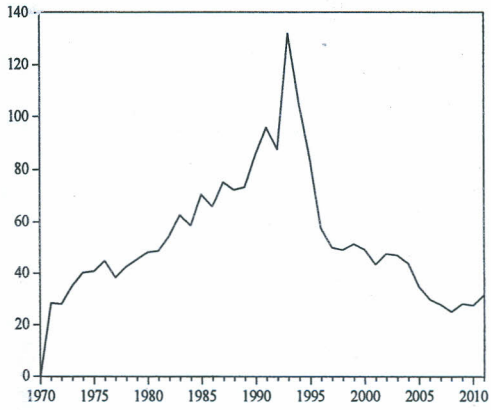

Figure 4.4 Time series Plot for EDS (Level)

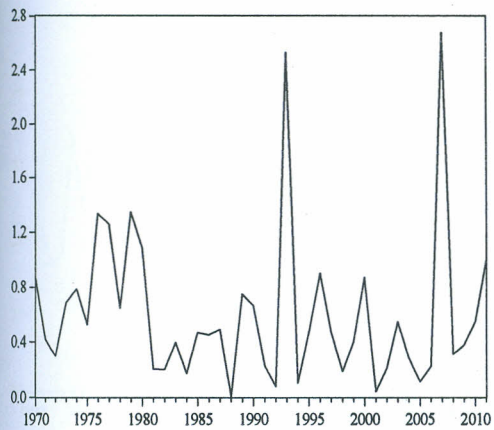

Figure 4.5 Time series plot for FDI (level)

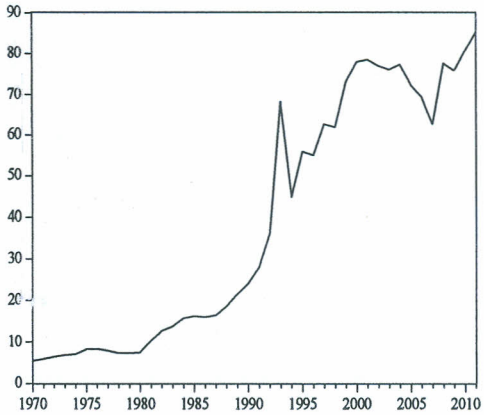

Figure 4.6 Time series plot for FX (level)

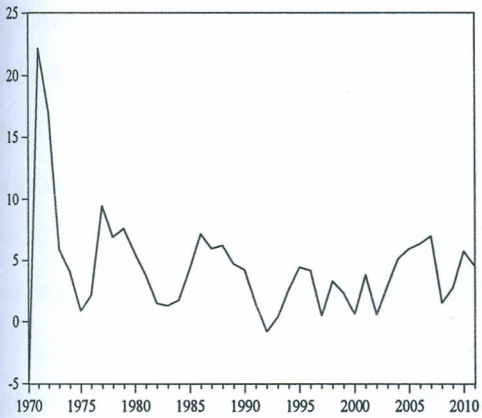

Figure 4.7 Time series Plot for GDP (Level)

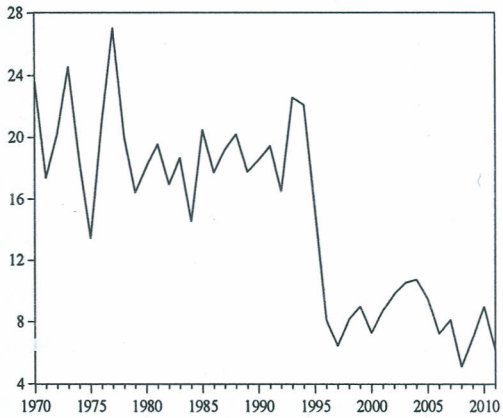

Figure 4.8 Time series plot for GDS (Level)

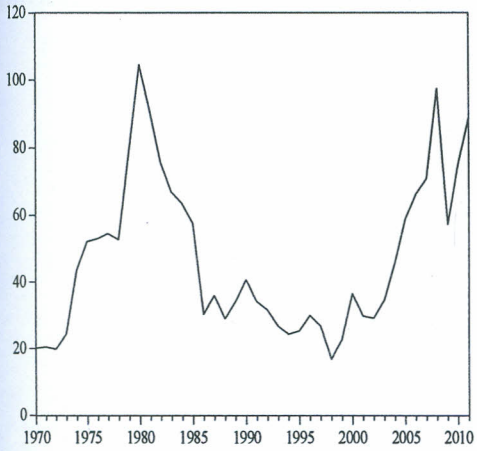

Figure 4.9 Time series Plot for OIL (Level)

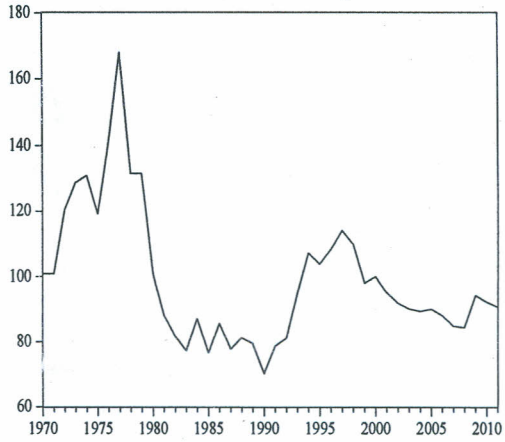

Figure 4.10 Time series Plot for TOT (Level)

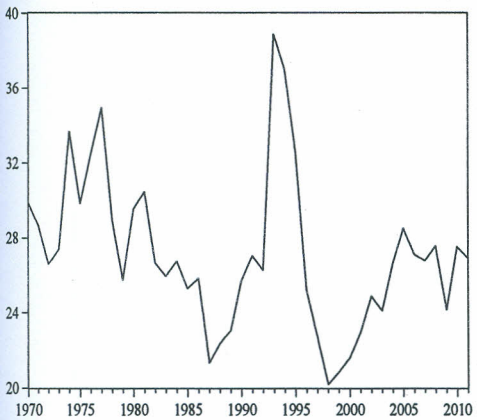

Figure 4.11 Time series plot for EX (Level)

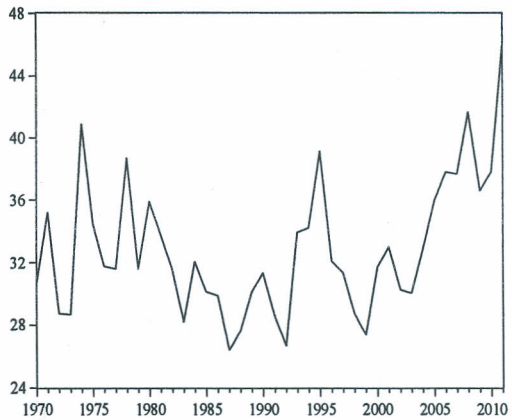

Figure 4.12 Time series Plot for IM (level)

4.3 Correlation between Current Account and other macroeconomic variables

Table 4.2 presents simple correlation coefficients relating Kenya's current account to the other macro variables. The sample Period is from 1973 to 2011. The current account is strong negatively correlated with productivity growth (GDP) [r = -0.615] and Foreign exchange (FX) [r = -0.811] at 5% level of significance. The correlation between current account and degree of openness (DOP), external debt stock (EDS), imports (IM) and terms of trade (TOT) are r = -0.073, r = -0.076, r = -0.234 and r = – 0.121 respectively at 5% level of significance indicating a negative but weak relationship. Finally, current account is strong and positively correlated with oil price on the international market (OIL) with a value of r = 0.703 at 5% level of significance. The correlation between current account and inflation is r = -0.078 and FDI is r = 0.017 but not significant at 5% level of significance.

Table 4.2: Correlation Matrix

	CA	GDP	DOP	OIL	FDI	EDS	FD	INF	TOT	EX	IM	GDS
GDP	-0.615**											
	(0.027)											
DOP	-0.073**	0.230										
	(0.046)	(0.143)										
OIL	0.703**	-0.044	0.128									
	(0.037)	(0.782)	(0.420)									
FDI	0.017	0.011	0.231	0.159								
	(0.916)	(0.944)	(0.141)	(0.313)								
EDS	-0.076**	-0.227	-0.678**	-0.296	0.049							
	(0.033)	(0.148)	(0.000)	(0.057)	(0.757)							
FD	-0.180	0.099	0.523**	-0.308**	-0.140	-0.376**						
	(0.254)	(0.534)	(0.000)	(0.047)	(0.375	(0.014)						
INF	0.067**	-0.291	-0.111	0.155	0.261	0.560**	-0.266					
	(0.004)	(0.062)	(0.485)	(0.328)	(0.095)	(0.000)	(0.088)					
TOT	-0.121**	0.225	0.349**	-0.101	0.266	-0.296	0.142	-0.069				
	(0.006)	(0.153)	(0.023)	(0.523)	(0.088)	(0.057)	(0.371)	(0.666)				
EX	0.121	0.023	0.207	0.131	0.372**	0.204	-0.050	0.502**	0.405**			
	(0.445)	(0.885)	(0.188)	(0.410)	(0.015)	(0.195)	(0.751)	(0.001)	(0.008)			
IM	-0.234**	0.099	0.679**	0.527**	0.225	-0.323**	0.122	0.166	0.113	0.410**		
	(0.013)	(0.534)	(0.000)	(0.000)	(0.151)	(0.037)	(0.442)	(0.292)	(0.477)	(0.007)		
GDS	0.241	0.149	-0.399**	-0.185	0.136	0.340**	-0.415**	0.217	0.286	0.511**	-0.357**	
	(0.124)	(0.347)	(0.009)	(0.241)	(0.389)	(0.028)	(0.006)	(0.168)	(0.067)	(0.001)	(0.020)	
FX	-0.811**	-0.258	0.400**	-0.012	-0.012	-0.046	0.368**	0.020	-0.292	-0.242	0.312**	-0.809**
	(0.038)	(0.099)	(0.009)	(0.939)	(0.942)	(0.773)	(0.017)	(0.901)	(0.061)	(0.123)	(0.044)	(0.000)

NOTE.-The first statistic in each pair is the Spearman rank correlation coefficient. The numbers in parenthesis ( ) are the probability that the absolute value of the observed correlation will occur for null hypothesis of zero correlation. The values with ** are significant at 5%.

4.4 Integrated properties of variables

The first task before testing for cointegration and Vector Autoregressive between variables is to determine the order of integration of all the series. The study employed a battery of stationarity tests including classical unit root tests (first generation tests) namely the Augmented Dickey-Fuller (ADF) test and the Phillips Perron (PP) test. Since these tests cannot distinguish between unit root and near unit root stationary processes, the study also used other stationarity (second generation) tests, these included the Dickey-Fuller Generalized Least Square (DF GLS) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test of Kwiatkowski *et al.* (1992).

The results for ADF and PP test for different models and lag lengths (determined automatically by SIC) with Null hypothesis that the series has a unit root are presented in Table 4.3. The test results indicate that CA, GDP,INF and FDI are integrated of order zero denoted by $I(0)$; and DOP,OIL,FD,EDS,TOT,EX,IM,GDS and FX are integrated of order one [$I(1)$].

To confirm the results of unit root, the study tested the stationarity of the variables by use of DF-GLS and KPSS tests for different models and lag length. The results are indicated in Table 4.4 below. The tests gave the same results as the classical test except for TOT which is was found to be $I(0)$ and not $I(1)$ as had been previously indicated by the ADF and PP tests.

Table 4.3: Unit Root Tests

Variables	Augmented Dickey Fuller (ADF) Test		Phillips Perron (PP) Test		Inference
	Intercept	Intercept with Trend	Intercept	Intercept with Trend	
		Level			
CA	-3.6682** (0.0084)	-3.6274** (0.0397)	-3.6682** (0.0084)	-3.6274** (0.0397)	*I(0)*
GDP	-5.0926**(0.0001)	-5.6792**(0.0002)	-5.0926**(0.0001)	-5.6792** (0.0002)	*I(0)*
DOP	-0.9481 (0.7625)	-1.4761 (0.8217)	-1.0369 (0.7310)	-1.4761 (0.8217)	
Oil	-1.5528 (0.4972)	-1.5646 (0.7896)	-1.5523 (0.4974)	-1.5722 (0.7867)	
FD	-3.1305 (0.0520)	-3.3020 (0.0802)	-3.0819 (0.0558)	-3.1598 (0.1067)	
FDI	-7.0123** (0.0000)	-6.9275** (0.0000)	-7.0619** (0.0000)	-6.9737** (0.0000)	*I(0)*
EDS	-2.2516 (0.1921)	-2.2210 (0.4658)	-2.3185 (0.1712)	-2.2125 (0.4703)	
INF	-3.8988** (0.0045)	-3.8478** (0.0238)	-3.8988** (0.0045)	-3.8478** (0.0238)	*I(0)*
TOT	-2.0840 (0.2519)	-2.2171 (0.4673)	-1.9951 (0.2878)	-2.3399 (0.4041)	
EX	-2.8712 (0.0575)	-2.9474 (0.1591)	-2.9757 (0.0457)	-2.9473(0.1591)	
IM	-2.9218 (0.0515)	-3.2158 (0.0955)	-2.7746 (0.0708)	-3.0991 (0.1200)	
GDS	-2.0343 (0.2716)	-3.6756 (0.0355)	-1.8931 (0.3322)	-3.5891 (0.0432)	
FX	-0.0402 (0.9490)	-2.6887 (0.2463)	-0.1518 (0.9365)	-2.4955 (0.3286)	
		First Difference			
ΔCA	-8.1917** 0.0000)	-8.0808**(0.0000)	-8.7363** (0.0000)	-8.5963**(0.0000)	
ΔGDP	-11.4134** 0.0000)	-11.5045**(0.0000)	-11.4134** (0.0000)	-11.1592**(0.0000)	
ΔDOP	-7.3325** 0.0000)	-8.6416**(0.0000)	-7.2612** (0.0000)	-8.8675**(0.0000)	*I(1)*
ΔOIL	-6.4119** 0.0000)	-6.3369**(0.0000)	-6.4119**(0.0000)	-6.3369**(0.0000)	*I(1)*
ΔFD	-9.3063**(0.0000)	-9.1206**(0.0000)	-9.3063**(0.0000)	-9.1206**(0.0000)	*I(1)*
ΔFDI	-7.2395** (0.0000)	-7.1281** (0.0000)	-26.6416**(0.0001)	-26.8160**(0.0000)	
ΔEDS	-6.9489** (0.0000)	-7.1055** (0.0000)	-6.9489**(0.0000)	-7.0619**(0.0000)	*I(1)*
ΔINF	-6.6862** (0.0000)	-6.6091** (0.0000)	-8.3322** (0.0000)	-8.1852** (0.0000)	
ΔTOT	-6.3895**(0.0000)	-6.3091**(0.0000)	-6.3899**(0.0000)	-6.3119**(0.0000)	*I(1)*
ΔEX	-6.3615**(0.0000)	-6.2781** (0.0000)	-6.3846**(0.0000)	-6.2939**(0.0000)	*I(1)*
ΔIM	-8.4250**(0.0000)	-8.4836** (0.0000)	-11.4576**(0.0000)	-20.0177**(0.0000)	*I(1)*
ΔGDS	-6.9846**(0.0000)	-6.8972**(0.0000)	-12.3282**(0.0000)	-14.0491**(0.0000)	*I(1)*
ΔFX	-9.3954**(0.0000)	-9.3380**(0.0000)	-9.3954**(0.0000)	-9.3380**(0.0000)	*I(1)*

Notes: The Null hypothesis is that the series has a unit root. The rejection of the null hypothesis for the DF and PP test is based on the Mackinnon critical values.** indicate the rejection of the null hypothesis of Unit root at 5% level of significance. The parenthesized values are the probability of rejection while Δ denotes the first difference, Δ

Table 4.4: Stationarity Tests

Variables	Elliott-Rothenberg-Stock DF-GLS test		Kwiatkowiski-Phillips-Schmidt-Shin Test		Inference at 5% sig. level
	Intercept	Intercept with Trend	Intercept	Intercept with Trend	
		Level			
CA	-3.3837**	-3.6020**	0.0789**	0.0616**	*I(0)*
GDP	-3.3453**	-4.3238**	0.3085**	0.1331**	*I(0)*
DOP	-0.9274	-1.1504	0.2512	0.1967	
OIL	-1.2386	-1.6285	0.1109	0.1130	
FD	-1.5885	-1.9789	0.2341	0.1410	
FDI	-6.7216**	-7.0527**	0.0805**	0.0629**	*I(0)*
EDS	-1.3403	-1.5791	0.1917	0.1916	
INF	-3.5306**	-3.6900**	0.0815**	0.0821**	*I(0)*
TOT	-2.1141	-2.3016	0.2666	0.1047	*I(0)*
EX	-2.7645	-3.0283	0.2196	0.0521	
IM	-2.9885	-3.3802	0.2928	0.1717	
GDS	-1.5378	-3.7678	0.6884	0.1246	
FX	0.5840	-1.6881	0.7561	0.1129	
		First Difference			
ΔCA	-6.5089	-7.7535	0.1112	0.1107	
ΔGDP	-0.9345	-2.5771	0.2482	0.1485	
ΔDOP	-6.4500**	-8.0038**	0.5750**	0.0711**	*I(1)*
ΔOIL	-6.4947**	-6.4734**	0.1384**	0.1256**	*I(1)*
ΔFD	-9.2576**	-9.1556**	0.1339**	0.1297**	*I(1)*
ΔFDI	-7.8488	-5.9600	0.4775	0.4233	
ΔEDS	-1.8593**	-6.0945**	0.3815**	0.0595**	*I(1)*
ΔINF	-6.9740	-6.4776	0.1053	0.1053	
ΔTOT	-6.4731	-6.4771	0.0701	0.0720	
ΔEX	-6.3144**	-6.4236**	0.0440**	0.0391**	*I(1)*
ΔIM	-6.3300**	-7.9909**	0.5000**	0.4878**	*I(1)*
ΔGDS	-4.9064**	-6.2856**	0.3554**	0.3578**	*I(1)*
ΔFX	-9.4721**	-9.5743**	0.1398**	0.1028**	*I(1)*

For KPSS: Null Hypothesis is that the series is stationary. ** indicate the acceptance of the null hypothesis of stationarity at 5%level of significance. The asymptotic critical values are tabulated in KPSS table.

Note: In this case we compare the test statistic value with the critical value on desired significance level. If the test statistic is higher than the critical value, we reject the null hypothesis and when test statistic is lower than the critical value, we cannot reject the null hypothesis.

4.4.1 Discussion of the integrated properties (stationarity and Unit root) results

The existence of stationarity to the current account as percentage of GDP is a sufficient condition for the long-run intertemporal budget constraint (LRBC) to hold, (Trehan and Walsh 1991, Taylor 2002). This has vital economic policy implications. Firstly, the results indicate that the CA is mean reverting, it is temporary in nature and that policy reforms are useful in addressing or containing the adverse changes in the deficit. Secondly, current account stationarity implies that external debt is finite and sustainable (Trehan and Walsh, 1991). To confirm these results, the study ran cointegration test between exports and imports as a ratio of GDP for the same sample period in the next section.

Existence of stationarity to the terms of trade implies that the shocks of the TOT to the current account are of a temporary nature and are significant in the short-run only. These transitory shocks would have caused more damage to the current account if they were of a permanent nature. These results are consistent with past theoretical and empirical work showing that terms of trade shocks are of a temporary nature in developing countries (Cashin and Dermott, 1998). The terms of trade effect is in line with Harberger-Laursen-Metzler and only has income effect. The existence of unit root in the Degree of openness variables suggest that its shock to current account are of a permanent nature and are significant in the long run. The existence of stationarity at levels in GDP is a show that the GDP is oscillating up and down thus the economy is struggling to maintain its stability and grow steadily. The existence of unit roots or Integrated of order one denoted by *I(1)* in the other macro variables' time series is expected, as the economic theory suggests unit root in the levels of these variables.

4.5 Sustainability of the current account deficit in Kenya

In determining sustainability of current account deficit, the study adopted an intertemporal budget approach. This involved estimating the cointegration analysis of exports and imports variables for Kenya for the period in question by the guidance of model 3.12. The study has adopted the Johansen multivariate cointegration procedure. The analysis technique has advantages over the other methods because it does not suffer from a normalization problem and is robust to departures from normality (Gonzalo, 1994).It also supports the superior properties in

relation to other techniques. The optimality of the Johansen estimation has been shown by Phillips (1991) in terms of symmetry, unbiasedness and efficiency property.

The determination of the number of cointegrating vectors is based on the use of two test statistics, namely, the trace test and the maximum eigenvalue test.The results are reported in Tables 4.5 and 4.6.

Table 4.5 : Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.348376	17.95428	15.49471	0.0209
At most 1	0.094962	3.392480	3.841466	0.0655

Trace test indicate 1 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 4.6: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigen value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.348376	14.56180	14.26460	0.0449
At most 1	0.094962	3.392480	3.841466	0.0655

Max-eigenvalue test indicate 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The comparison of test statistics with the critical values provides evidence for cointegration or long run relationship between exports and imports for Kenya in the sampled period. Johansen cointegration analysis requires the determination of appropriate lag length with an unrestricted VAR model. The log likelihood object provides a general, open-ended tool for estimating a broad class of specifications by maximizing likelihood function with respect to parameters. In relation to log likelihood, the study used the AIC lag specification criterion. The coefficients of the cointegrating vector are given in Table 4.7.

Table 4.7 : Normalized Cointegrating Coefficients and Adjustment Coefficients

	EX	IM
Normalized cointegration coefficient	1.0000	-0.21989
		(0.37266)
	D(EX)	D(IM)
Adjustment Coefficient	-0.8999	-0.66755
	(0.34551)	(0.28953)

Log likelihood -151.5932, standard error in parentheses, Lags interval (in first differences): 1-7,

While the existence of a cointegration relationship between imports and exports is a necessary condition to sustain the foreign deficit, it is not an adequate condition. Along with the existence of a cointegration relationship between imports and exports, the slope coefficients obtained from the equations derived from these series should also be equal to 1 to put forth clearly that the foreign deficit is sustainable. Failure to fulfill the second condition (sufficient condition) in the case of Kenya requires that the sustainability of foreign deficit must be considered with doubt. The results indicate that the cointegration coefficient is 0.21989.

4.5.1 Discussion of the Co integration (sustainability of the current account deficit) results

This section discusses the cointegration results between exports and imports as a test for sustainability following the framework defined in Milessi-Ferretti and Razin (1996) and Taylor (2002).Chortareas et al., 2004 notes that for a time series perspective to be employed researchers have to investigate the long-run relationship between exports and imports.

The findings indicated a cointegration relation between EX and IM with a cointegration coefficient of 0.21989 which is not close to unity. The null hypotheses of $\beta = 1$ is rejected, while the hypothesis of $\beta=0$ is not rejected. The empirical results imply that the current account is not on the sustainable path (weak form of sustainability), we can conclude that CA of Kenya may not be sustainable in the long-run because of faster rise in the Kenyan imports relative to the exports. The findings of the study are consistent with a study by Peker (2009) who analyzed the sustainability of current account deficit in Turkey. He found out that current account deficit can be sustained at a low level, though a long term relation between export and import series exists. The co-integration co-efficient was 0.8926. On the same wave length Dalgin and Gupta (2012) finds that long term sustainability of the Turkey's current account is "very questionable" but concludes there is no immediate risk assuming Turkey can maintain its current growth.

4.6 Determinants of current account deficit in Kenya

In order to establish the determinants of the current account in Kenya, the study estimated the VAR, together with Granger Causality Test.

4.6.1 Vector Autoregressive Model

This is an econometric model used to capture the evolution and the interdependencies between multiple time series, generalizing the univariate AR models. All the variables in VAR are treated symmetrically by including, for each variable, an equation explaining its evolution based on its own lags and the lags of all other variables in the model. Based on this feature, Christopher Sims advocates the use of VAR models as a theory-free method to estimate economic relationships, thus being an alternative to the "incredible identification restrictions" in structural models.

4.6.1.1 Specification (Lag order selection) and Estimation

VAR analysis depends critically on the lag order selection, since different lag orders can significantly affect the substantive interpretation of the estimates when those differences are large enough. Mukras (2012) notes that one practical problem in the estimation of VAR models relates to the number of variables to be included in the model and the maximum lag length to be applied. Therefore, selecting the right lag order for each VAR is the first important step in this empirical study. The common strategy in empirical studies is to select the lag order by some pre-specified criterion and to condition on this estimate in constructing the VAR estimates. There are four most commonly used lag order selection criteria in the literature, which are the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SIC), the Hannan-Quinn Criterion (HQC) and the general-to-specific sequential Likelihood Ratio test (LR).

These measures are defined as

$$AIC(p) = \log\det(\tilde{\Sigma}_u(p)) + \frac{2}{T}pK^2 \tag{4.1a}$$

$$HQ(p) = \log\det(\tilde{\Sigma}_u(p)) + \frac{2\log(\log T)}{T}pK^2 \tag{4.1b}$$

$$SC(p) = \log\det(\tilde{\Sigma}_u(p)) + \frac{\log(T)}{T}pK^2 \tag{4.1c}$$

$$FPE(p) = \left(\frac{T+p^*}{T-p^*}\right)^K \log\det(\tilde{\Sigma}_u(p)) \tag{4.1d}$$

with $\tilde{\Sigma}_u(p) = T^{-1}\sum_{t=1}^{T}\hat{u}_t\hat{u}_t'$ and p^* is the total number of parameters in each equation and p assigns the lag order. In each case, the lag order p is chosen to minimize the value of the criterion over a range of alternative lag orders p given by $\{p : 1 \le p \le p^*\}$. Table 4.8 below displays the information criterion for the lags. From the results, all the information criteria suggest that the optimal lag length is 2. The optimum lag is marked with an asterisk.

Table 4.8 :VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1258.168	NA	1.74e+14	64.00840	64.93728	64.34425
1	-901.0858	482.0609	1.70e+09	52.20429	58.24204	54.38735
2	-642.5030	206.8663*	10404402*	45.32515*	56.47175*	49.35541*

* indicate lag order selected by the criterion; LR: Sequential moditied LR test statistic (each test at 5% level); FPE: Final prediction error; AIC: Akaike information criterion; SC: Schwarz information criterion; HQ: Hannan-Quinn information criterion. Endogenous variables: CA DOP EDS FD FDI FX GDP GDS INF TOT; Exogenous variables: C OIL

In this model, the framework is described by a 10-dimensional VAR (2) in levels as the data generating process. From equation 3.1 and 3.24, then;

$$y_t = (CA, DOP, TOT, FD, FX, FDI, EDS, INF, GDP, GDS) \tag{4.2}$$

All the variables are treated as endogenous variables except OIL (oil price on the world market) which is an exogenous variable. This is because the variable is determined mostly by the OPEC countries that affect the supply of oil, thereby influencing its price. The VAR models are presented in Table 4.9 below. Model 1 is the model of interest with CA being the dependent variable. The results indicate that the independent variables account for 0.9363 of the variations in the dependent variable CA.

Table 4.9: Vector Auto regression Estimates

Model	1	2	3	4	5	6	7	8	9	10
	CA	DOP	EDS	FD	FDI	FX	GDP	GDS	INF	TOT
CA(-1)	0.7890**	0.1834	-0.0227	-0.0743	0.0211	-0.4515	0.0392	0.2973	-0.1531	0.9456
	(0.2776)	(0.2547)	(0.7905)	(0.1119)	(0.0382)	(0.5314)	(0.1649)	(0.2017)	(0.5121)	(0.6691)
CA(-2)	-0.1099	0.0686	0.1697	0.1116	0.02333	0.1213	0.1926	0.1641	0.2232	0.1392
	(0.2341)	(0.2147)	(0.6665)	(0.0944)	(0.0322)	(0.4481)	(0.1391)	(0.1701)	(0.4318)	(0.5641)
DOP(-1)	0.1144**	0.5327	-0.5264	0.0852	0.0100	-0.3761	-0.0645	-0.1986	0.1257	0.6650
	(0.0125)	(0.2866)	(0.8898)	(0.1260)	(0.0430)	(0.5982)	(0.1856)	(0.2271)	(0.5764)	(0.7531)
DOP(-2)	-0.0317	0.3177	0.2795	-0.1137	0.0169	0.6561	-0.0813	0.1778	0.5371	0.7340
	(0.2552)	(0.2341)	(0.7267)	(0.1029)	(0.0351)	(0.4885)	(0.1516)	(0.1854)	(0.4707)	(0.6150)
EDS(-1)	-0.0298	-0.3263	0.3288	-0.0241	-0.0261	-0.4550	0.0475	0.1260	-0.1889	-0.3024
	(0.1740)	(0.1596)	(0.4955)	(0.0702)	(0.0239)	(0.3331)	(0.1034)	(0.1264)	(0.3210)	(0.4194)
EDS(-2)	-0.0417**	0.2844	0.3058	0.0231	0.0393	0.4474	-0.0720	-0.0070	0.4313	0.4705
	(0.0121)	(0.1120)	(0.3476)	(0.0492)	(0.0168)	(0.2337)	(0.0725)	(0.0887)	(0.2252)	(0.2942)
FD(-1)	0.6725	0.4052	-1.1406	0.2458	0.0934	-0.2688	0.3282	0.02211	0.6782	1.8814
	(0.5378)	(0.4933)	(1.5313)	(0.2168)	(0.0740)	(1.0294)	(0.3195)	(0.3908)	(0.9920)	(1.2961)
FD(-2)	0.2616	0.4123	-1.0254	0.0780	0.0091	0.8753	0.3989	0.0463	-0.2737	-0.0522
	(0.6095)	(0.5591)	(1.7356)	(0.2457)	(0.0838)	(1.1667)	(0.3621)	(0.4429)	(1.1243)	(1.4690)
FDI(-1)	-1.0439	1.1981	-2.6932	0.7845	-0.4342	1.6949	-0.7208	-1.3923	2.3124	2.7692
	(2.1847)	(2.0039)	(6.2204)	(0.8806)	(0.3004)	(4.1816)	(1.2978)	(1.5874)	(4.0297)	(5.2649)
FDI(-2)	-1.4531	-2.6603	-5.2032	-0.5155	-0.7254	-1.7376	0.5748	-0.4266	-5.7972	-4.9230
	(1.7811)	(1.6337)	(5.0714)	(0.7180)	(0.2449)	(3.4092)	(1.0581)	(1.2942)	(3.2853)	(4.2924)
FX(-1)	0.2008	0.1510	0.1318	-0.0819	0.0100	0.7284	-0.0021	-0.0076	0.2030	0.1692
	(0.1632)	(0.1497)	(0.4646)	(0.0658)	(0.0224)	(0.3123)	(0.0969)	(0.1186)	(0.3010)	(0.3932)
FX(-2)	-0.2513	-0.0698	-0.2889	0.0931	-0.0305	0.1586	-0.0009	-0.1985	-0.3498	-0.7586
	(0.1584)	(0.1453)	(0.4510)	(0.0638)	(0.0218)	(0.3032)	(0.0941)	(0.1151)	(0.2921)	(0.3817)
GDP(-1)	-0.3528	0.0642	0.5984	0.1409	0.0294	-0.3933	0.4095	0.3668	-0.5580	-0.8074
	(0.3428)	(0.3144)	(0.9759)	(0.1382)	(0.0471)	(0.6561	(0.2036)	(0.2491)	(0.6322)	(0.8260)
GDP(-2)	-0.1210	-0.0764	-0.0066	-0.0177	-0.0266	-0.5403	-0.2057	-0.0402	-0.4196	-0.7489
	(0.2174)	(0.1994)	(0.6191)	(0.0876)	(0.0299)	(0.4162)	(0.1292)	(0.1580)	(0.4010)	(0.5240)
GDS(-1)	0.4275	0.6541	-0.6557	-0.0788	0.0028	0.5476	0.0269	-0.0473	0.9029	0.8519
	(0.4187)	(0.3841)	(1.1923)	(0.1688)	(0.0576)	(0.8015	(0.2488)	(0.3043)	(0.7724)	(1.0091)
GDS(-2)	-0.0331	-0.2214	-0.1779	-0.1111	-0.0637	-0.1168	-0.0183	-0.5167	-0.2130	-1.5428
	(0.3827)	(0.3510)	(1.0895)	(0.1543)	(0.0526)	(0.7324)	(0.2273)	(0.2780)	(0.7058)	(0.9222)
INF(-1)	-0.1671**	0.1575	0.7809	0.0794	0.0402	0.2033	-0.0472	0.1206	0.3854	-0.0755
	(0.0682)	(0.1543)	(0.4789)	(0.0678)	(0.0231)	(0.3219)	(0.0999)	(0.1222)	(0.3102)	(0.4053)
INF(-2)	0.1069	-0.0305	-0.0828	0.0284	0.0029	-0.2348	0.0577	0.0486	-0.6510	0.3268
	(0.1776)	(0.1629)	(0.5056)	(0.0716)	(0.0244)	(0.3399)	(0.1055)	(0.1290)	(0.3275)	(0.4279)
TOT(-1)	-0.2774**	-0.0131	-0.0585	-0.0164	-0.0082	-0.2115	0.0450	0.04544	-0.0457	0.0681
	(0.1065)	(0.0977)	(0.3033)	(0.0429)	(0.0147)	(0.2039)	(0.0633)	(0.0774)	(0.1965)	(0.2568)
TOT(-2)	0.1821	-0.0416	0.0109	0.0501	0.0175	-0.0181	-0.0014	0.0378	-0.1589	0.5338
	(0.1042)	(0.0956)	(0.2967)	(0.0420)	(0.0143)	(0.1994)	(0.0619)	(0.0757)	(0.1922)	(0.2511)
C	11.9716	9.5404	46.4598	-2.2297	-0.3596	15.8286	11.0569	18.0419	-15.2911	23.9072
	(14.0245)	(12.864)	(39.9318)	(5.6532)	(1.9284)	(26.8439)	(8.3312)	(10.1901)	(25.8686)	(33.7982)
OIL	0.0253**	0.0149	-0.1051	-0.0362	0.0077	-0.0340	0.0194	-0.0084	0.1498	-0.3541
	(0.0110)	(0.0587)	(0.1822)	(0.0258)	(0.0088)	(0.1225)	(0.0380)	(0.0465)	(0.1180)	(0.1542)

Cont.

Summary of the statistics of the VAR models

	CA	DOP	EDS	FD	FDI	FX	GDP	GDS	INF	TOT
R-squared	0.9363	0.9501	0.8870	0.7493	0.5635	0.9676	0.7271	0.8851	0.6205	0.8980
Adj. R-squared	0.7581	0.8918	0.7551	0.4568	0.0543	0.9298	0.4086	0.7511	0.1779	0.7789
Sum sq. resids	305.1155	256.7024	2473.592	49.5766	5.7688	1117.844	107.6711	161.0821	1038.0910	1772.0570
S.E. equation	4.1171	3.7764	11.7227	1.6596	0.5661	7.8805	2.4458	2.9915	7.5942	9.9221
F-statistic	1.9318	16.3118	6.7259	2.5618	1.1066	25.5983	2.28320	6.6043	1.4018	7.5431
Log likelihood	-97.3937	-93.9383	-139.2485	-61.0503	-18.0293	-123.3631	-76.5616	-84.6182	-121.8827	-132.5779
Akaike AIC	5.9697	5.7969	8.0624	4.1525	2.0015	7.26816	4.9281	5.3309	7.1941	7.7289
Schwarz SC	6.8986	6.7258	8.9913	5.0814	2.9303	8.1970	5.8570	6.2598	8.1230	8.6578
Mean dependent	-5.7255	53.3826	54.4354	-4.234	0.6098	40.7446	4.1360	14.7327	13.1441	99.0827
S.D. dependent	5.0454	11.4823	23.6879	2.2518	0.5821	29.7433	3.1804	5.9962	8.3754	21.1021

Notes: Standard errors in ( ), Oil variables has been treated as an exogenous variable, all other variables have been treated as endogenous variables, All figures are in 4 decimal places.** are significant.

4.6.1.2 Diagnostic test and Model Checking

Unrestricted VAR models usually involve a substantial number of parameters which in turn results in rather imprecise estimators. It is therefore desirable to impose restrictions that reduce the dimensionality of the parameter space. Such restrictions may be based on economic theory or other non sample information and on statistical procedures.

Once a VAR has been estimated, it is of pivotal interest to see whether the model is stable and the residuals obey the model's assumptions. In order to confirm the validity and stability of our estimates, post-estimations tests were carried out for the models. The tests and their results are discussed in the following subsections.

4.6.1.2.1 Stability Test

As earlier stated in chapter three, one important characteristic of $VAR(p)$ –process is its stability. This means that VAR generates stationary time series with time-invariant means, variances and covariance structure. The study evaluated the reverse roots of characteristic polynomial by conducting VAR stability condition Check test as in equation 3.25 in chapter three. The results in Table 4.10 indicate that the moduli of the eigenvalues are less than one. Figure 4.13 confirms the results that no root lies outside the unit circle, therefore VAR satisfies the stability condition.

Table 4.10: VAR Stability Condition Check

Root	Modulus
0.952200 + 0.036361i	0.952894
0.952200 - 0.036361i	0.952894
0.844485 + 0.298686i	0.895750
0.844485 - 0.298686i	0.895750
-0.064903 + 0.834665i	0.837185
-0.064903 - 0.834665i	0.837185
-0.509607 + 0.590025i	0.779633
-0.509607 - 0.590025i	0.779633
0.225488 - 0.631767i	0.670801
0.225488 + 0.631767i	0.670801
0.048730 - 0.623513i	0.625414
0.048730 + 0.623513i	0.625414
-0.382105 + 0.312464i	0.493597
-0.382105 - 0.312464i	0.493597
0.265107 + 0.395232i	0.475909
0.265107 - 0.395232i	0.475909
-0.468208	0.468208
0.428568 + 0.173125i	0.462215
0.428568 - 0.173125i	0.462215
-0.141454	0.141454

VAR satisfies the stability condition; No root lies outside the unit circle.

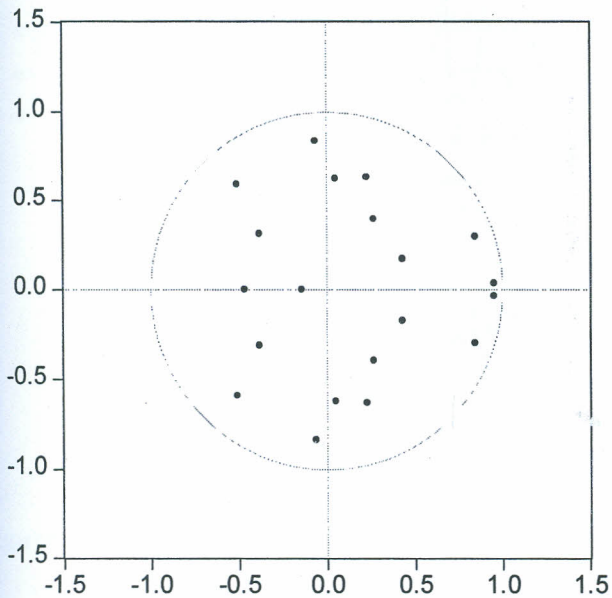

Figure 4.13: Inverse Roots of AR Characteristic Polynomial

4.6.1.2.2 Normality Test

Although normality is not a necessary condition for the validity of many of the statistical procedures related to VAR models, deviations from the normality assumption may indicate that model improvements are possible. However, normal distribution of errors is very important especially when we want to make interpretation according to the estimated econometrical equation. To test for the normality of the VAR models, the study plotted the residuals for the ten (10) models. The objective is to determine whether the residuals are stationary or not and figure 4.14 shows that the residuals are indeed stationary. The stationarity of the residuals therefore implies that the estimated parameters are valid.

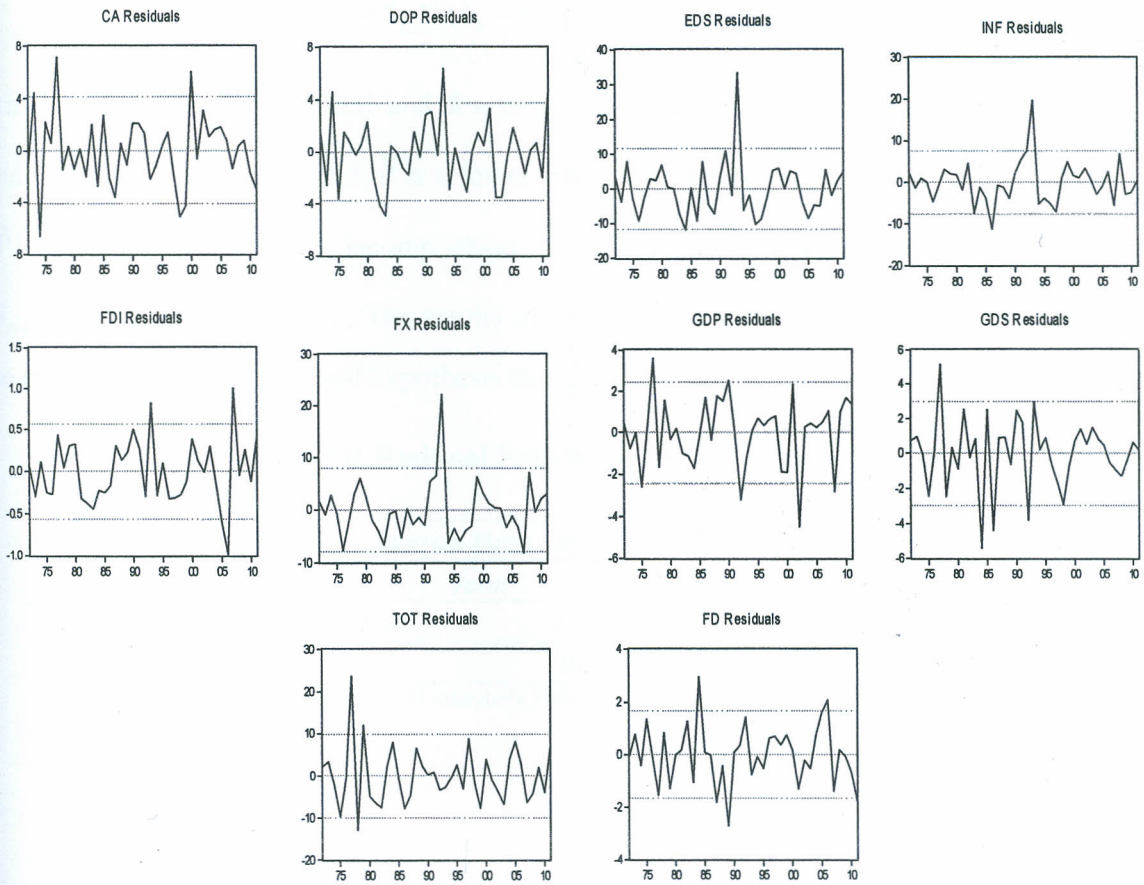

Figure 4.14 Residuals for VAR

To confirm the above results, a Jarque-Bera test for normality was conducted on the residuals of the VAR models. A multivariate version of this test was conducted using the residuals that are standardized by a Cholesky decomposition of the variance-covariance matrix for the centered residuals. The test statistics for the multivariate case is defined as;

$$JB_{mv} = s_3^2 + s_4^2 \tag{4.3}$$

Whereby s_3^2 and s_4^2 are computed according to;

$$s_3^2 = Tb_1^T b_1 / 6 \tag{4.4a}$$

$$s_4^2 = T(b_2 - 3_K)^T (b_2 - 3_k) / 24 \tag{4.4b}$$

with b_1 and b_2 being the third and fourth non central moment vectors of the standardized residuals $\hat{u}_t^s = \widetilde{P}^{-}(\hat{u}_t - \overline{\hat{u}}_t)$ and $\widetilde{P}$ is a lower triangular matrix with positive diagonal such that $\widetilde{P}\widetilde{P}^T = \widetilde{\Sigma}_u$, i.e. the cholesky decomposition of the residual covariance matrix. The test statistic JB_{mv} is distributed as $\chi^2(2K)$. The results of the Jarque-Bera test are presented in Table 4.11. The results fail to reject the null hypothesis that the errors in our models are normally distributed.

Table 4.11 VAR Residual Normality Test

Jarque-Bera test		
Joint		
Chi-Square	d.f	Prob.
86.71488	20	0.078

Orthogonalization: Cholesky (Lutkepohl); Null Hypothesis: residuals are multivariate normal

4.6.1.2.3 Serial Correlation Test

For testing the lack of serial correlation in the residual of the $VAR(2)$, a portmanteau test and the Breusch-Godfrey LM test were conducted. The portmanteau statistics is defined as

$$Q_h^* = T\sum_{j=1}^{h} tr(\hat{C}_j^{'}\hat{C}_0^{-1}\hat{C}_j\hat{C}_0^{-1}) \tag{4.5}$$

with $\hat{C}_i = \frac{1}{T}\sum_{t=i+1}^{T}\hat{u}_t\hat{u}_{t-i}^{'}$. The test statistics has an approximate $\chi^2(K^2h - n^*)$ distribution and n^* is the number of coefficients excluding deterministic terms of $VAR(p)$ model. The limiting distribution is only valid for h tending to infinity at a suitable rate with growing sample size. On the other hand, Breusch-Godfrey LM-statistics is based upon the following auxiliary regressions:

$$\hat{u}_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + CD_t + B_1\hat{u}_{t-1} + \cdots + B_h\hat{u}_{t-h} + \varepsilon_t \tag{4.6}$$

The Null hypothesis is $H_0 : B_1 = \cdots = B_h = 0$, and correspondingly the alternative hypothesis is of the form $H_1 : \exists B_i \neq 0$ for $i = 1,2,\cdots,h$. The test statistics is defined as:

$$LM_h = T(K - tr(\tilde{\Sigma}_R^{-1}\tilde{\Sigma}_e)) \tag{4.7}$$

where $\tilde{\Sigma}_R$ and $\tilde{\Sigma}_e$ assign the residual covariance matrix of the restricted and unrestricted models respectively. The test statistics LM_h is distributed as $\chi^2(hK^2)$

The presence of serial correlation in the models was tested by use of the Lagrange-Multiplier (LM) test and Portmanteau Tests for Autocorrelations. From the outcome we fail to reject the null hypothesis of no presence of autocorrelation in the models (see Table 4.12 and 4.13).

Table 4.12 VAR Residual Portmanteau Tests for Autocorrelations

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	98.67730	NA*	101.2075	NA*	NA*
2	192.5461	NA*	200.0167	NA*	NA*
3	307.0673	0.2124	323.8235	0.3436	100
4	396.5213	0.0931	423.2168	0.4781	200
5	504.8270	0.3561	546.9948	0.2217	300
6	596.8211	0.4531	655.2231	0.6175	400
7	699.4912	0.6712	779.6717	0.2476	500
8	805.4983	0.2341	912.1805	0.7143	600
9	893.8720	0.4103	1026.211	0.3490	700
10	992.2637	0.2456	1157.400	0.6175	800

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution
Null Hypothesis: no residual autocorrelations up to lag h

Table 4.13: VAR Residual Serial Correlation LM Tests

Lags	LM-Stat	Prob
1	415.787	0.064
2	383.342	0.981
3	NA	NA
4	414.213	0.091
5	385.574	0.770
6	369.326	0.758
7	NA	NA
8	NA	NA
9	376.808	0.672
10	405.292	0.991

Probs from chi-square with 100 df.
Null Hypothesis: no serial correlation at lag order h

4.6.1.2.4 Heteroskedasticity Test

The LM test for heteroskedasticity also shows that the null hypothesis of no heteroskedasticity is not rejected in the 10 models. Table 4.14 presents the results.

Table 4.14 VAR heteroskedasticity test with cross terms

VAR residual heteroskedasticy Test: Include cross terms		
	Joint	
Chi-Square	d.f	Prob.
99.8287	20	0.095

4.6.1.2.5 Lag Exclusion Wald Test

One can easily test the null hypothesis about (non)significance of particular lag in the model. For each lag the Wald statistic together with a p-value for the joint significance is reported – separately for each equation and jointly for the whole model (in the last column). In our case all lags are significant, as outlined in table 4.15.

Table 4.15 VAR Lag Exclusion Wald Test

	CA	DOP	EDS	FD	FDI	FX	GDP	GDS	INF	TOT	Joint
Lag 1	16.0964	25.6716	11.7695	10.0716	13.1086	14.2777	14.8704	14.8913	12.5101	14.7134	323.6720
	[0.0969]	[0.0042]	[0.3008]	[0.4342]	[0.2177]	[0.1607]	[0.1369]	[0.1361]	[0.2524]	[0.1429]	[0.0000]
Lag 2	12.3172	18.22293	2.5097	14.5644	13.8979	12.9893	14.2055	12.7027	12.7654	10.0548	388.6016
	[0.2644]	[0.0513]	[0.9907]	[0.1488]	[0.1777]	[0.2243]	[0.1638]	[0.2408]	[0.2371]	[0.4357]	[0.0000]
df	10	10	10	10	10	10	10	10	10	10	100

Chi-squared test statistics for lag exclusion: Numbers in [ ] are p-values

4.6.3 Interpretation and Discussion of VAR estimates

After testing the stability and validity of the VAR model, it is vital to discuss estimates of model 1, which has CA as a dependent variable. Considering the VAR estimates, the study finds substantial persistence in the current account deficit. The coefficient on the lagged current account is 0.7890 and significantly different from zero. This result is line with the findings of the literature, such as Chinn and Prasad (2003). It captures the partial adjustment of the current account and can be rationalized by habit formation in the behaviour of private agents. As the current account represents net saving decisions and is thus complementary to consumption decisions, the current account inherits the sluggishness of consumption changes which are due to habit formation. As a result the current account does not fully respond to changes in fundamentals instantaneously.

Countries that are more open to international trade can be expected to have larger export sectors enabling them to service external debt more easily and sustaining a higher level of current account deficit. In the current study the findings indicate a positive (0.1144) and significant relationship between the degree of openness and current account deficit. Thus this indicates that openness, can make adjustment to CA to a sudden stop and less painful (Calvo *et al.*, 2003 and Edwards, 2004).However Calderon *et al.* (2002),notes that the net effect of openness on CAD appears to be ambiguous.

The results indicate that external debt stock has a significant effect on the CA with a coefficient of -0.0417. These results are consistent with Kwalingana and Nkuna (2009) who examine the short run and long run determinants of current account deficit in Malawi over a period of 1980 to 2006. Their results indicate that the trade openness, terms of trade and external debt are the factors that determine current account deficit in Malawi.

In theory, the exchange rate have an impact on the current account, however the finding from this study reveals that the exchange rate is not a significant factor in determining the current account deficit. While these results are contradicts studies of Chinn and Ito (2006), Lee and Chinn (2006), Arghyrou and Chortareas (2008), and Arratibel, Furceri, Martin, and Zdzienicka (2011), they are consistent with studies of Cheung, Chinn, and E. Fujii,(2009), Devkota, S.C (2004) and Hermann (2009).In his study, while examining Nepal's economics Hermann (2009) proves that the exchange rate devaluation may not be necessary a way to improve the trade

balance. The fiscal tools such as increase the efficiency of tax administration and establishing the import substitution type of industries can help to reduce imports.

The GDP growth can be perceived as an indicator of internal macroeconomic performance reflecting macroeconomic policy stance and could hence be used to investigate consistency between internal and external policies. The higher a country's GDP growth rate, the greater the current account imbalance it can sustain without increasing its external debt to GDP ratio. Economic growth then becomes an important variable in assessing the external position of a country's economy (Adedeji, 2001; Chinn and Prasad, 2000; 2003).The results in our study indicate that the GDP growth is not significant. This confirms the earlier results of GDP being stationary at levels and thus not stable.

TOT is introduced as a proxy of external non-policy factors that affect the current account balance. An adverse transitory term of trade shock can induce either deterioration or improvement in the current account balance. The Harberger-Laursen-Metzler (1950) model suggests that it deteriorates because deterioration in the terms of trade will decrease real income and savings. The coefficient of TOT at lag of 1 is -0.2774 and significant. The change in terms of trade lagged one year is one of the most important factors affecting the current account balance in the short-run. The negative sign means that TOT has an adverse impact on the current account balance, but after a time lag due to some rigidity in the economy. Developing economies tend to suffer even in the presence of favorable TOT. Pinto (1987), Murphy (1983), Gelb (1988), Robinson and Ragnar (2005) and others emphasize that the windfall gains from an improvement in TOT can be squandered on white elephant projects in developing countries.

This study uses inflation as a proxy for monetary policy credibility. A credible monetary policy framework promotes stable inflation; reduces the volatility of exchange rate, reduces the degree of exchange rate misalignment thereby, addressing adverse changes in current account balance. Credible monetary frameworks reduce the tendency of aggregate demand to deviate substantially from the level consistent with inflation target. It therefore follows that inflation can act as a discipline device on CA by responding appropriately to aggregate demand shocks. The a priori expectation between INF and CA is ambiguous. It can be positive or negative since it can result

in higher domestic and foreign investment and savings through reducing the level of uncertainty and inefficiency in resource management (Ozman, 2004). In this study, the coefficient of INF was found to be -0.1671 and considered significant.

Since Kenya is an Oil importing economy, the variable OIL was included in the model as a determinant of CA. Higher oil prices does not improve the current account balance of oil importing economies, (International Monetary Fund, 2006). The coefficient of OIL is -0.0253 and significant. This shows that OIL prices have had a significant negative impact on the Kenyan Current account deficit. This result are consistent with studies of Gruber and Kamin, (2007) and Barnes, Lawson and Radziwill, (2010), who reported that oil price have impact on the current account.

4.6.3 Granger causality

The basic principle of Granger causality analysis is to test whether past values of macro variables help to explain current values of current account deficit. The causality tests were performed in a vector autoregression (VAR) model. The results are reported in table 4.16 below.

The reported F-statistics are the Wald statistics for the joint null hypothesis. The study estimated the VAR [2,2] since this is satisfies the stability condition and has the appropriate/optimal lag order as indicated in section 4.6.1.

Table 4.16: Granger Causality Test

Sn.	Null Hypothesis:	Obs	F-Statistic	Prob.	Conclusion	Inference
1.	DOP does not Granger Cause CA	40	0.14763	0.8633	*Do not Reject H_0*	
	CA does not Granger Cause DOP		4.21519	0.0229	*Reject H_0*	*DOP → CA*
2.	EDS does not Granger Cause CA	40	3.28279	0.0494	*Reject H_0*	*CA → EDS*
	CA does not Granger Cause EDS		0.49500	0.6138	*Do not Reject H_0*	
3.	FD does not Granger Cause CA	40	0.00824	0.9918	*Do not Reject H_0*	
	CA does not Granger Cause FD		3.39675	0.0449	*Reject H_0*	*FD → CA*
4.	FDI does not Granger Cause CA	40	3.62601	0.0371	*Reject H_0*	*CA → FDI*
	CA does not Granger Cause FDI		0.31741	0.7301	*Do not Reject H_0*	
5.	FX does not Granger Cause CA	40	1.83086	0.1753	*Do not Reject H_0*	*No causality*
	CA does not Granger Cause FX		1.46831	0.2442	*Do not Reject H_0*	
6.	GDP does not Granger Cause CA	40	0.00552	0.9945	*Do not Reject H_0*	
	CA does not Granger Cause GDP		1.88217	0.0167	*Reject H_0*	*GDP → CA*
7.	GDS does not Granger Cause CA	40	0.14209	0.8680	*Do not Reject H_0*	*No causality*
	CA does not Granger Cause GDS		0.74715	0.4811	*Do not Reject H_0*	
8.	INF does not Granger Cause CA	40	1.29429	0.2869	*Do not Reject H_0*	*No causality*
	CA does not Granger Cause INF		0.29898	0.7435	*Do not Reject H_0*	
9.	OIL does not Granger Cause CA	40	0.08725	0.9166	*Do not Reject H_0*	
	CA does not Granger Cause OIL		0.28051	0.0471	*Reject H_0*	*OIL → CA*
10.	TOT does not Granger Cause CA	40	0.23344	0.7930	*Do not Reject H_0*	
	CA does not Granger Cause TOT		4.80552	0.0143	*Reject H_0*	*TOT → CA*

Notes: Lags: 2; the sign → indicates the direction of causality; Test at 5% significance level.

4.6.4 Discussion of the Granger causality results

The empirical results portrayed in table 4.16 ,suggest that the Null hypothesis that CA does not Granger cause DOP is rejected at 5% significance level, therefore it appears that there DOP causes CA.From the statistics the null hypothesis of EDS does not Granger cause CA is rejected at 5% level of significance thus indicating that CA is a cause of EDS,this confirms the economic theory that EDS is as a result of CA. The relation between EDS and CA indicate that Kenya's current account deficit has largely been financed by external borrowings, resulting in the substantial level of external debt and international accumulation.

The findings also indicate that the null hypothesis that CA does not Granger cause FD is rejected, thus FD causes CA, this finding is inconsistent with the findings of Nyongesa and Onyango, (2009,2012).This might be because of the increase in the number of observation in the current study. The results also indicate that CA granger causes FDI. The findings also indicate that granger causality runs one way from each of the variables GDP, OIL and TOT to CA individually. On the other hand from the results we fail to reject the null hypothesis, thus there is no bivariate causality between each of the variables FX, GDS, INF and CA.

4.7 Dynamic interactions among various macroeconomic variables and the current account deficit in Kenya

In VAR methodology, the estimated coefficient values in these models do not constitute the strength of these models. The better use of VAR models are made through granger causality, variance decompositions and impulse response functions. Since our aim was to specify the variables which contribute to the current account balance, using these analysis was more gainful. What VAR does is to invert the system and then innovations are generated after decomposition, which have direct economic interpretations.

In order to understand the dynamics of responses, both the impulse response functions (IRFs) and variance decomposition (VD) are used in a vector autoregressive (VAR) framework. While the impulse response functions track the responsiveness of the regressands in the VAR to shocks to each of the other variables, the variance decompositions provide information on the proportion of the movements in the dependent variables accounted for by their own shocks vis-à-vis the shocks to other factors.

4.7.1 Variance Decomposition

Variance decomposition shows the contribution of each shock to the variance of *n*-period-ahead forecast error of the variable. In other words, variance decomposition typically shows the proportion of the forecast error variance of a variable which can be attributed to its own shocks and the innovations of the other variables.

The results of variance decompositions for current account are reported in Table 4.17. It is observed that CA is completely explained (100 percent) by its innovations in the first period, but its explanatory power declines over time. CA is explained by the innovations of DOP in the portion of approximately 16%, and by the innovations of EDS, FD, TOT in the portion of approximate mean of 7%, 10%, 8% for each series respectively. CA is explained by the innovation of FDI, GDP, and INF in the portion of approximately 2% for each of the series. On the other hand, FX and GDS have a weak significant influence of less than 1% over the ten period time.

Table 4.17: Variance Decomposition of Current Account

Period	S.E.	CA	DOP	EDS	FD	FDI	FX	GDP	GDS	INF	TOT
1	4.117142	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	5.829651	71.17550	1.146412	4.698215	8.887086	1.058768	0.044816	2.197937	0.050771	1.131638	9.608860
3	6.450273	60.82858	9.275100	5.034874	10.42974	2.290581	0.316623	2.119401	0.087633	0.957520	8.659948
4	6.504628	59.93424	9.834195	5.010373	10.39405	2.585770	0.347459	2.140689	0.111180	1.124993	8.517057
5	6.820530	54.56951	13.45820	7.003395	10.56376	2.733456	0.340723	2.328858	0.102545	1.031502	7.868049
6	7.040869	51.23335	15.20890	8.929382	9.973574	2.601541	0.379170	2.282319	0.117139	0.974721	8.299899
7	7.182818	49.22860	16.16189	9.272391	9.871839	3.523346	0.368344	2.275770	0.138165	1.119302	8.040359
8	7.271752	48.04007	16.63318	10.30096	9.667831	3.524720	0.426371	2.222330	0.139029	1.120963	7.924546
9	7.317018	47.45316	16.51968	10.66761	9.556839	3.486610	0.496314	2.196951	0.183243	1.112077	8.327512
10	7.334078	47.23908	16.45261	10.82478	9.543164	3.567547	0.494206	2.202557	0.198805	1.125942	8.351307

Cholesky Ordering: CA CPI DOP EDS FDI FX GDP GDS TOT

From Table 4.17, since CA is largely determined by its own values, there is an indication that there is persistence in the current account deficit which also explains the structural conditions of the Kenyan economy. Through the variance decomposition, there is a noticeable very weak contribution of the GDP shock on CA. This contribution is approximately about 2% both in the short and long term since the economic growth does not last long. Finally, considering the importance of the degree of openness in the Kenyan economy, it would be interesting to highlight how the external shocks impact on the CA. This contribution is approximately about 16% in the long term and less than 10% in the short term.

4.7.2 Impulse Response

These impulses are derived using a recursive VAR model, in which Cholesky one-standard deviation shocks are applied and the response is estimated over a period of ten years, following the initial occurrence of the shocks. The impulse response function of VAR is to analyze dynamic effects of the system when the model received the impulse. In our 10 dimensional - $VAR(2)$ model, the study worked out the response between these variables. Results of the impulse response analysis are presented in figure 4.15, which illustrates the response of current account deficit to one standard deviation innovation in each of the macro variables and also the response macro variables to one standard deviation innovation in Current account.

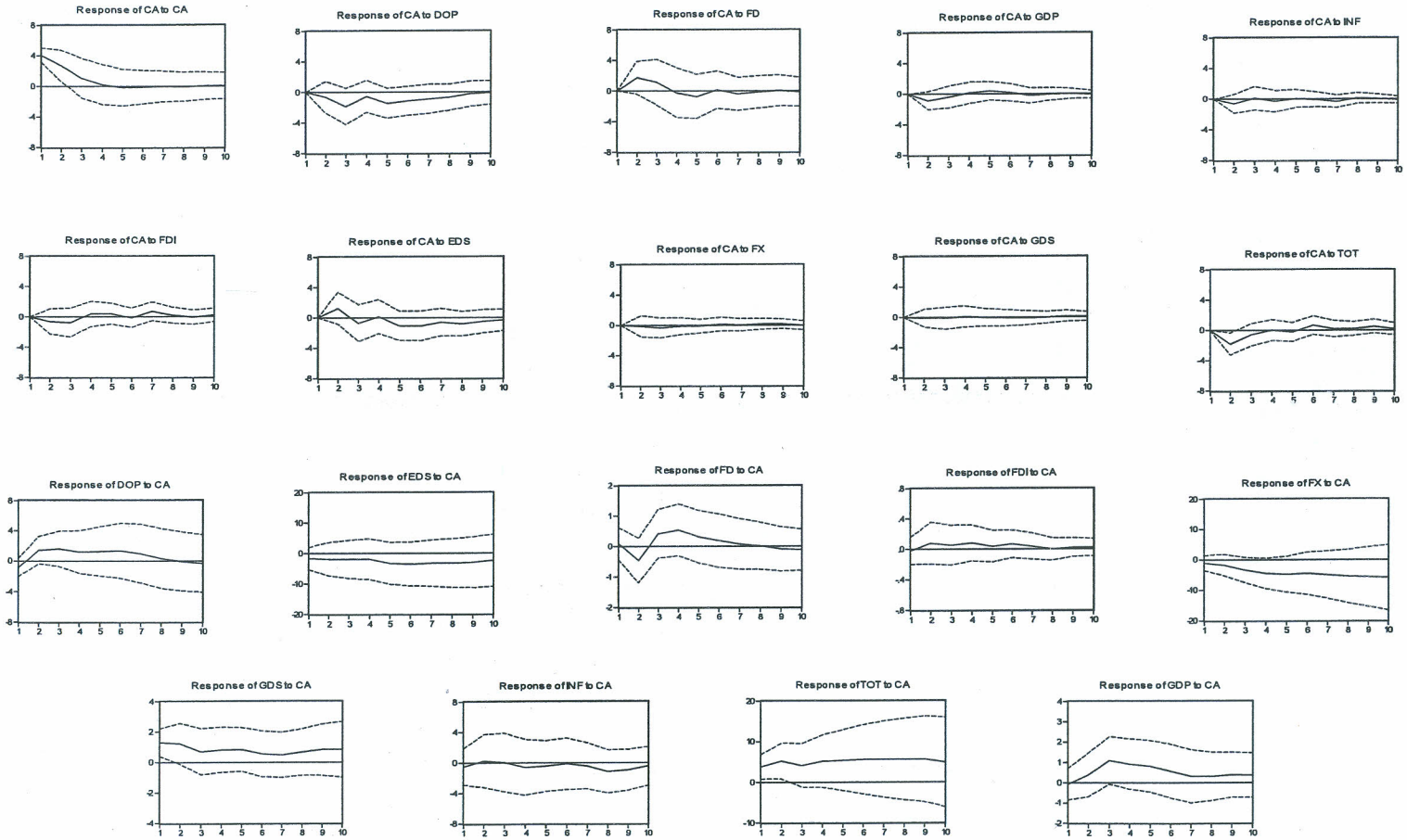

Figure 4.15: Response Cholesky One S.D Innovations $\pm 2SE$

4.7.2.1 Interpretation and Discussion of Impulse Response results

Response of CA to CA; Panel 1 of Figure 4.15 shows the response of CA due to one standard deviation of unanticipated positive shock to itself—a gradual decline in Kenya's CA. The dashed line becomes parallel to equilibrium after the fourth year. This shows that the positive shock to CA is transmitted completely to CA itself. There is a continuous decline in CA. Asymptotically, it will converge to equilibrium in the long run, which verifies the stability of the model.

Response of CA to DOP; In Panel 2, Initially CA was at zero, then the deficit starts (going down) it reaches its lowest at the third year and reduces again in the fourth year and remains negative in response to the exogenous shock to DOP, and then converges with equilibrium in the ninth year .

Response of CA to FD; Panel 3 Initially, CA starts rising in response to the exogenous shock of FD. It remains positive until the third year, and then goes to negative a little bit comes to zero in the sixth year and converges with equilibrium in the eighth year.

Response of CA to GDP and INF: Panel 4 and 5, show the dynamic response of CA to one standard deviation of shock to GDP and INF respectively. The CA goes negative and later converges to equilibrium.

Response of CA to FDI; In panel 6, it can be observed that the responses of CA to FDI is in an oscillation way and converges at equilibrium in year eight.

Response of CA to EDS; In panel 7, it can be observed that the responses of CA to EDS is in an oscillation way in the first years up to the 5th year and deviates further from equilibrium in subsequent years and remains negative to the end.

Response of CA to FX and GDS; In panel 8 and 9, it can be observed that there is very little or even no first response (at the 1st lag) of CA to the shocks of FX and GDS series.

Response of CA to TOT; From panel 10, it can be seen that the CA moves to negative and returns to zero in the fourth year and moves to positive and oscillates above the zero mark up to the end

of the period under study. This result is not consistent with Otto's (2003) and Tayyaba and Saira (2012) study, where the current account's response to positive TOT shocks is not significant.This is because TOT is considered a key driver of fluctuations in real income and the current account in developing countries (Khan & Knight, 1983).

The study also sought to investigate the response of the other macro variables (DOP, EDS, FD, FDI, FX, GDS, INF, TOT and GDP) to a shock on CA. The results are shown from panel 11-19. The results indicate there is a great impact on the series. The time paths resulting from the response coefficients do not generally converge to zero. This implies that a positive shock from the current account deficit brings about an immediate significant impact on the macro economic variables in question. This reveals that Kenya's CA balance showed a negligible transitory shock to the macro variables in the economy.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This last chapter contains the key findings presented in the thesis. First, there is a summary of the main findings of the study, secondly based on the findings, the emerging issues with an in-depth view of policy implications are discussed and lastly suggestions for further research are outlined.

5.2 Summary of Findings

This study has examined the determinants and sustainability of Kenya's current account deficit between 1970 and 2011 using the Johansen-Julius maximum likelihood cointegration approach, Vector Autoregressive model, Granger causality, and impulse response function and variance decomposition technique. The study provides additional insight into the determinants of CA at the country level given the strong dominance of cross country studies in the literature.

It has emerged that current account deficits are a persistent feature of the Kenyan economy and the average current account balance (CA) has mostly remained in negative territory for a large sample of Kenya's data. Imports (IM) have always exceeded exports (EX). The results also indicate that GDP growth has not been stable. The degree of openness has been on an upward trend. However the Foreign direct Investment has never gone beyond 2.7% of the GDP while oil prices have been on the upward trend from the year 2000. Meanwhile the Kenyan currency has been weakening against the US dollar.

In assessing the correlation coefficients relating current account with the other macro variables, results reveal that the current account is strongly negative correlated with productivity growth (GDP) with -0.615 and Foreign exchange (FX) [-0.811] at 5% level of significance. The correlation relationships between current account and degree of openness (DOP), external debt stock (EDS), imports (IM) and terms of trade (TOT) are -0.073, -0.076, -0.234 and – 0.121 respectively at 5% level of significance indicating a negative but weak relationship. The findings also indicate current account being positively correlated with oil price on the international

market (OIL) with a value of 0.703 at 5% level of significance. The correlation between current account and inflation is -0.078 and FDI is 0.017 but not significant at 5% level of significance.

Concerning the time series properties , the results for stationarity and unit root indicate that CA, GDP,INF,TOT and FDI are stationary at levels that is integrated of order zero [$I(0)$],on the other hand DOP, OIL, FD, EDS, TOT, EX, IM,GDS and FX are integrated of order one [$I(1)$].

On sustainability of the CA, the findings indicated that there is a long run relationship between imports and export with the estimated value of coefficient being 0.21989 contrary to the sufficient condition that slope coefficients obtained should also be equal to 1, thus the sustainability of foreign deficit must be considered with doubt that is the CA may not be sustainable in the long-run.

Concerning the determinants of current account deficit; Granger causality test indicate that, causality runs one way individually from DOP, FD, GDP, OIL and TOT to CA. Thus, these variables are determinants of CA. On the other hand CA causes EDS and FDI thus these are as a result of the current account deficit. The findings also indicate that there is no causality between individual variables FX, GDS, INF on CA. The findings from VAR estimates indicate that Current Account is determined by its own past values, Degree of Openness of the economy, External Debt stock, Inflation, Oil price and Terms of Trade.

On the dynamic interactions among various macroeconomic variables and the current account deficit in Kenya, the results from the variance decomposition and impulse indicate that CA is completely explained by its on innovations, but its explanatory power declines over time.CA is explained by the innovations of DOP in the portion of approximately 16%, and by the innovations of EDS, FD, TOT in the portion of approximately mean of 7%, 10%, 8% for each series respectively. CA is explained by the innovation of FDI, GDP, and INF in the portion of approximately 2% for each of the series. On the other hand FX and GDS have a weak significant influence of less than 1% over the ten period times. This result confirms the previous findings from the determinants of the CA.

5.3 Policy Implications

The findings of this study have some important implications for policymakers in Kenya and developing countries of the same level and characteristics or stage of development. The findings indicate that current account deficits are a persistent feature of the Kenyan economy; on the other hand, the existence of stationarity to the current account as a percentage of GDP is a sufficient condition for the long-run intertemporal budget constraint (LRBC) to hold. This has vital economic policy implications. The results indicate that the CA is mean reverting, it is temporary in nature and that policy reforms are useful in addressing or containing the adverse changes in the deficit, secondly, current account stationarity implies that external debt is finite and sustainable.

The policy implication of the findings of existence of Cointegration relationship between imports and exports with the estimated value of cointegration coefficient being 0.21989 indicate that current account balance of Kenya may not be sustainable in the long-run because of faster rise in the Kenyan imports relative to the exports. The finding of the violation of the sufficient condition for sustainability implies that, a large and persistent current account deficit may trigger a financial crisis in the long run. In other words, the current account path may be used as an indicator to predict financial crises. Therefore, the policy implication arising from this analysis is that Kenya should implement policy measures to correct their unsustainable external imbalances in the long run.

There is need to apply the appropriate macroeconomic policy mix in the short run to mitigate the cyclical and short-term shocks. However, to ensure that there is external stability in the long run, policies regarding structural improvement, such as export competitiveness enhancement, second stage import substitution and research and development, should be addressed.

The key policy implication of the findings about the determinants of the current account deficit is that given the oil variables having an effect on Current account, prudent management of energy resources must be pursued in order to substitute oil. This will help reduce the volatility often associated with oil prices on the world market. There is need to focus on the terms of trade in order to have a positive impact on the current account balance. On the other hand, inflation

should be contained to levels that are productive without affecting the economic growth and current account deficit.

5.4 Conclusions

Based on the empirical analysis and findings, the following conclusions were made in respect of the objectives of the study. From the findings the study concludes that Current account is sustainable in the short run and not in the long run and that the current account is persistent.

From the findings the study concludes that the major determinants of Current account are the Terms of trade, Degree of openness, oil prices on the world market, Fiscal deficit, Gross Domestic Product. External debt and foreign direct investment are as a result of current account deficit.

From the findings on the dynamic interactions among various macroeconomic variables and the current account deficit in Kenya,the study concludes that current account is explained by its own innovations, but its explanatory power declines over time. On the other hand current account is explained by the innovations of Degree of openness in the portion of approximately 16%, and by the innovations of External debt stock, Fiscal deficit, Terms of trade in the portion of approximately mean of 7%, 10%, 8% for each series respectively. CA is explained by the innovation of FDI, GDP, and INF in the portion of approximately 2% for each of the series. On the other hand, FX and GDS have a weak significant influence of less than 1%.

5.5 Recommendations

From the findings and policy implications, there is need for the economy or the country to focus on the appropriate policy mix that has a direct impact on the current account in order to reduce its persistence which can lead to significant economic costs in terms of severe adjustment processes, difficulties in funding external debts or even a default.

From the findings, GDP growth is stationary at levels and its effect is not significant to the current account. Theoretically, GDP growth is an indicator of internal macroeconomic performance that reflects macroeconomic policy stance and thus the higher a country's GDP growth rate, the greater the current account imbalance it can sustain without increasing its

external debt to GDP ratio. There is therefore need to provide an enabling environment for the sustained growth and stability of GDP in order to have a significant effect on the exports and ultimately have an impact on the current account deficit.

The findings further show that there is need to stimulate and support improvement in export competitiveness and investment in research and development which should be promoted in order to ensure that exports exceed imports.

On the other hand, there is need to encourage the use of other sources of energy to substitute oil. The government should provide an enabling environment and also invest in the extraction of the commercially viable oil and coal in the country. These would change the country from being an oil importing to oil exporting economy hence reduce the negative external effect of the oil price on the current account and the economy at large.

5.6 Contribution of the study

The study makes several vital contributions to both the theory and practice of macroeconomics. It is particularly a significant response to calls by researchers for studies focusing on macro econometrics and international finance. Specific contributions are outlined in the following sections.

5.6.1 Contribution of the study to economic theory.

The study would be of importance to the academicians since it contributes to knowledge by empirically testing the economic theory that relates to the current account deficits in the developing world specifically Sub Saharan Africa and in particular in the East African Community by using the current advanced econometric methodology thereby adding value to the existing theories. The study is among the first in-depth country analysis for Kenya using the concepts of persistence, sustainability and determinants. Previous studies focused on industrial and emerging economies. The features of the Kenyan economy were used to characterize the source of any asymmetries.

5.6.2 Contribution of the study to policy maker.

An empirical assessment of the sustainability of the deficit and its determinants are of importance to the public and policy makers in trying to curb the macro economic imbalances and in detecting dynamic and the long run effects of their actions in relation to the deficit. This would further enable the country to use the appropriate policy mix in trying to reduce the deficit in order to avoid the imbalances.

On the other hand a better understanding of the factors long term developments in the current account may assist policy makers in assessing whether policies aimed at attaining domestic economic objectives are compatible with a sustainable external position. Results from this study would therefore provide critical input into the formulation of a policy framework that would assist in reducing the current account deficits in line with the convergence criteria.

5.7 Suggestions for Further Research

The results indicate possible directions for further research. First, since the results may be sensitive to structural breaks. Secondly there is need for a study that assumes non linear dynamic interaction between current account deficit and the macro variables of interest.

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