RELATIONSHIP BETWEEN EXTERNAL DEBT SERVICING AND CURRENT ACCOUNT BALANCE IN KENYA

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DECLARATION

This project is my original work and has not been presented for a degree or any other award in any University.

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K102/31661/2015

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DEDICATION

I dedicate this project to my dear wife Florence Ndunge for her moral and spiritual support.

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ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
AfDB	African Development Bank
AIC	Akaike Information Criterion
ARDL	Autoregressive distributed Lag
BoP	Balance of payments
CAB	Current account balance
CAD	Current account deficit
CBK	Central Bank of Kenya
ELGS	Exports Led Growth Strategies
EPZ	Exports Processing Zones
HIPCs	Heavily Indebted Poor Countries
IDA	International Development Association
IMF	International Monetary Fund
ISS	Imports substitution strategy
KNBS	Kenya National bureau of statistics
OLS	Ordinary Least Squares
SIC	Schwarz Information Criterion

SSA	Sub-Sahara Africa
TOT	Terms of Trade
VAT	Value Added Tax
VAR	Vector Autoregressive
WB	World Bank

OPERATIONAL DEFINITION OF TERMS

Balance of payments: It is a summary statement that summarizes a country's transaction with the foreign countries (rest of the world). It comprises the capital account, financial account and the current account.

Current Account Balance: It is the sum of three components: the trade balance, unilateral transfers such as foreign aid and the factor income balance such as interest and dividends

Current Account Deficit: Current account deficit implies that country's export of goods and services is less than the value of goods and services imported.

External debt: This is the debt owed to external creditors. These creditors include: International Development Association (IDA), World Bank (WB), African Development Bank (AfDB), International Monetary Fund (IMF) and other international institutions.

External debt Servicing: This is the sum principal repayment, interest charged on the debt and any late payment fees. It can be paid in currency, services or goods.

Vector Auto regression: It is a forecasting technique in economics that does not distinguish between exogenous and endogenous. It treats all variables systematically without imposing any restriction to the system.

Debt overhang effect: It happens when there is some probability that in future, debt will be bigger than the country's reimbursement capacity where expected debt service cost will discourage further domestic and foreign investment

Debt Burden: when the cost of servicing external debt is too high due to large external debt portfolio.

Causality: When the future value of a variable can be predicted by past values of another variable

Liquidity constraints theory: This is putting limit on the amount an individual can borrow or alteration in the interest rate the borrower should pay therefore raising the cost of borrowing.

ABSTRACT

A constant current account imbalance in many developing nations has energized **i**mpressive enthusiasm among economists and policy makers trying to have a reasonable comprehension of the significance of current account balance. Kenya has experienced persistent current account imbalance that has remained underneath the threshold that economists would consider sustainable. At the point when a nation runs steady current account imbalance for a long period, it raises worries about its sustainability. The persevering current account imbalance has led to increase of liabilities to the rest of the world that are financed by the capital account surplus. These should be paid back in the long run. As a result Kenya has been using its borrowed foreign funds to finance this imbalance in the current account that yield no long-term productive gains and thus its ability to repay the debts is becoming questionable. Current account imbalances are becoming a concern of policy makers in many countries. Despite many studies done on current account balance, there is no consensus as regards the relationship between external debt servicing and the current account balance in Kenya. The main objective of this study was to analyse the relationship between external debt servicing and current account balance in Kenya. Understanding the precise nature of this relationship would aid policy makers with information that is vital for planning purposes, strategy formulation and proper economic management. The study was based on several theories explaining the current account balance and used annual time series data. The study utilized non experimental research design. Vector error correction model (VECM) was utilized because there was insufficient theory that connects these variables. The study found that external debt servicing granger causes current account balance in Kenya. The empirical findings showed that external debt service has significant negative effect on current account balance in the long run. The study recommends that there should be clear implementation of the medium term debt strategy. This will guard against vulnerability to external debt shocks and crowding out effect. Policies on external debt management should be carefully designed not to weaken macroeconomic fundamentals because they take long time before fizzing out.

CHAPTER ONE

INTRODUCTION

1.1 Background

Constant current account imbalances in many developing nations has energized extensive enthusiasm among economists and policy makers looking to have clear understanding of the significance of current account balance in macroeconomic issues. Many countries have run huge and constant current account imbalance which have been followed by economic slowdowns and severe financial crises (Kariuki, 2009). Current Account Balance (CAB) is one of the components of the Balance of Payments (BoP) in open economy (Mwangi, 2014). The other components are capital account and financial account.

1.1.1 Balance of Payments

Kenya's balance of payments which summarizes Kenya's transaction with the foreign countries decreased into a deficit of Ksh 6 billion in the year 2015 from Ksh 5.18 billion in 2014 (CBK, 2015). This was contributed by a drop in financial inflows and low number of tourists which wiped out gains of a lower import bill. This meant that Kenya had more outflows than the inflows (receipts). This negatively affected the shilling, which depreciated by 13 percent the same year. The deficit resulted from Ksh 8.4 billion increase in the capital account surplus that could not offset 37.5 percent decrease in the financial account surplus.

A deficit in the balance of payments occurs when a country exports fewer goods, services and capital than it imports. Since the exports are few and can't generate enough income to pay for the imports, the country must borrow from other

countries to pay for its imports. In the short-run a deficit in the balance of payment fuels the country's economic growth because the country can use part of the borrowed funds to finance government projects that generates income (IMF, 2009). In the long-run, the country becomes a net consumer of the world's economic output. Since the country is now consuming products of the other countries it will have to go into debt to pay for consumption. This means that the country will not be investing in future growth. If the deficit continues long enough, the country may sell its assets such as natural resources, land and commodities to pay the creditors. On the other hand a balance of payments surplus means the value of country imports is less than the value of its exports. A surplus in the balance of payments boosts economic growth in the short term because the country lends money to countries that buy its products.

Balance of payments comprises of three components namely: the financial account, the capital account and the current account. The capital account captures the financial transactions that don't affect economic output while the financial account captures the change in international ownership of assets. Current account balance (CAB) which is the main component captures the trade balance (net export), unilateral transfers such as foreign aid and the net factor income from abroad such as interest and dividends. CAB which also represents the difference between domestic saving and investment is a key economic indicator of how a country is performing externally (Giancarlo, 2002). Current account balance constitutes an integral measure of national saving and therefore it can be used as an indicator of a country's saving and spending behaviour (Mwangi, 2014). The information contained in current account balance is quite useful in projecting BoP, compilation and measurement of national

income. CAB plays a leading role and it is an important factor in policy formulation, analysis and decision-making processes in the increasingly interdependent world economy (Edwards, 2001).

Economic theory contends that whether current account imbalance is beneficial or detrimental to the economy depends on the factor that gave rise to it (Ghosh and Ramakrishnan, 2006). Generally, large persistent current account imbalance may signal ill-performance and vulnerability of the economy (Todaro and Smith, 2003). Persistent current account imbalance is also a key indicator of low national savings and investments, lack of international competitiveness and structural economic problem such as an undeveloped financial system. Furthermore, current account imbalance means a potential loss of output, increased unemployment and unbalanced economic growth (Nusrate, 2008; Ogwuru, 2008; Ghosh and Ramakrishnan, 2006).

In Kenya the import export gap grew by nearly 33 percent in the year 2002 due to the country importing machinery and other capital goods for infrastructure projects. This led to high current account deficit during the same year. Although the deficit was contributed by investment in transport projects, which will be paid off economically after their completion, there was high likelihood that this deficit was one of the main causes why the shillings depreciated during the same period (Mwenga, 2007).

Kenya Vision 2030, which goes for changing Kenya into a prosperous country by year 2030, identified key strategic areas keeping in mind the end goal to accomplish high monetary development, social improvement and great administration. So as to accomplish the vision, the strategies arranged will

influence the investment, national saving, and fiscal performance among other macroeconomic variables. These are some of the key factors that will influence the current account position. This is the fundamental motivation behind the current account balance research.

1.1.2 Trend of the Current Account Balance (CAB) in Kenya, 1980-2015

The current account balance in Kenya has been in deficit for the entire period under study. Although the deficit in the current account might be something good when it quantifies the investment finance gap that should to be filled up, it can also represent a dangerous and unsustainable imbalance between national investment and national savings and therefore lead to accumulation of external debt.

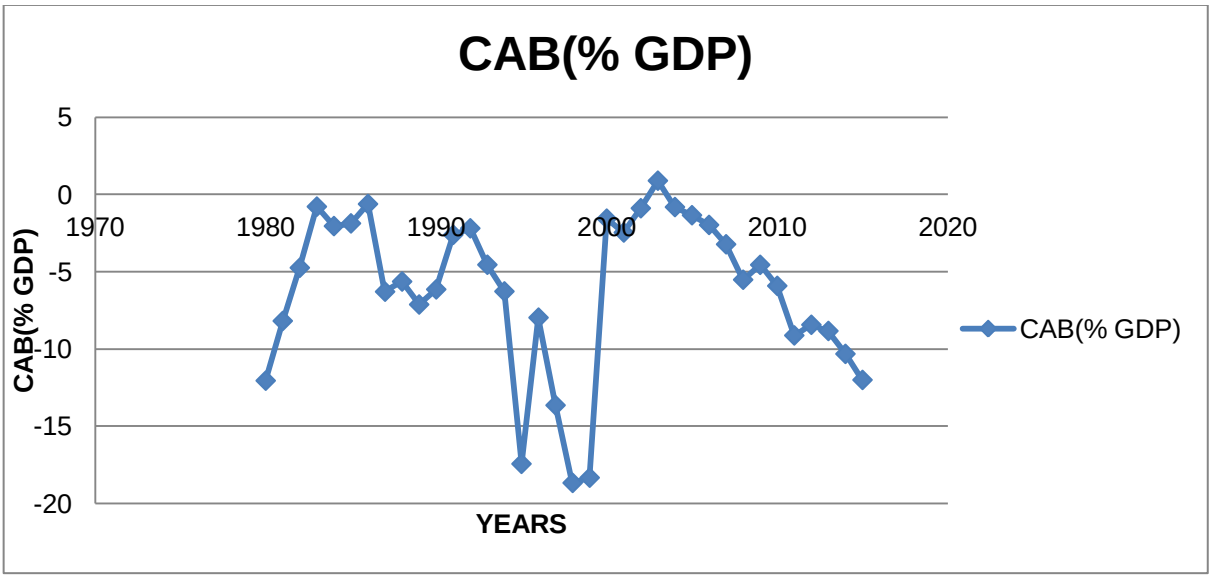


Figure 1.1 Trend of current account balance in Kenya, 1980 to 2015

Source: International Monetary Fund: World Economic Outlook Database, 2015

Figure 1.1 shows the trend of current account balance in Kenya for the period between 1980 and 2015. The figure reveals that current account balance in Kenya

was unstable between 1980 and 2015 with current account deficits dominating the scene. Patterns in current account deficit in Kenya have been increasing to the tune of 18.7 percent of GDP in 1998 as shown in figure 1.1. In the year 2012 the current account deficit stood at 13.1 percent of the gross domestic product. There is a concern that since 2003, the upward pattern in growth of the current account deficits has proceeded unabated.

The depicted instability could be attributed to several factors that include internal and external shocks. The deteriorating terms of trade for the country's exports and the world recession in the early 1980s, had adverse impacts on the economy (Republic of Kenya, 1982). In the period 2010/2015 the deficit increased to the tune of US$ 6.08 billion due to investments in infrastructure-related imports. This trend is a concern to economists and policy makers because the health of a nation's external balance is shown by the current account balance among other factors. The essential indicator of macroeconomic crisis is the current account imbalance in form of actual or anticipated current account deficit (Summer, 1996).

1.1.3 Current account balances of selected East African countries

For the period between 1980 and 2015 East African Countries have experienced persistent current account imbalance. From 2007 the upward pattern in growth of the current account imbalance has proceeded unabated. With this upward trend unsustainable current account balance can emerge very rapidly. This is especially the case if the government maintain fixed exchange rates. These deficits have contributed to unsustainable imbalance between investment and national savings which has led to accumulation of external debt. Thus, the importance of maintaining sustainable current account balance cannot be underestimated.

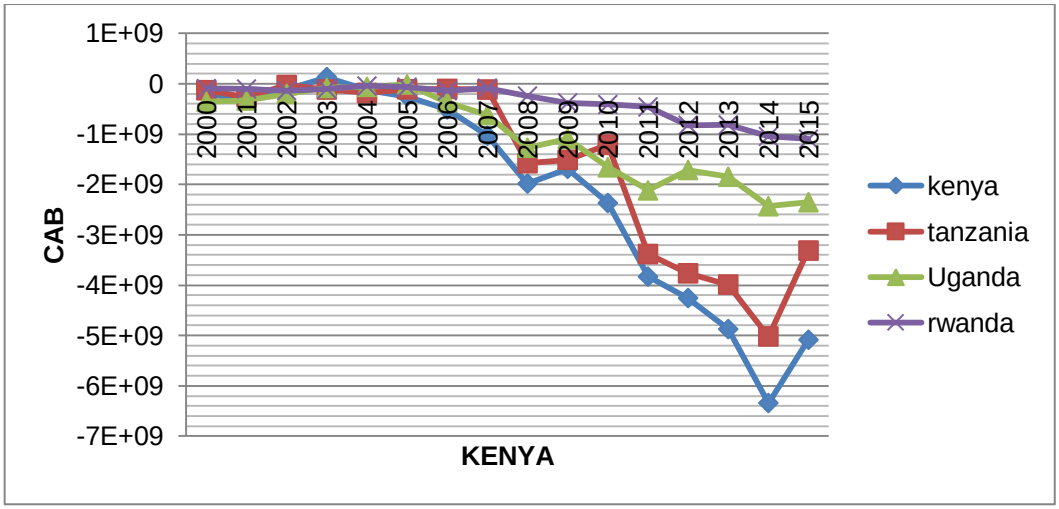


Figure 1.2 Current account balances of selected East African countries

Source: International Monetary Fund: World Economic Outlook Database, 2015

Figure 1.2 shows the trend of current account balances of different countries in East Africa. It is observed that Kenyan current account balance has been worse compared to other countries in East Africa. This unfavourable trade scenario has been exacerbated by the fact that Kenya's exports are dominated by few primary commodities, which have low price and income elasticities. Generally, Kenya is a net-importer. Various trade policies have been put in place to address this persistence current account deficit. Some of these policies are import substitution, liberalization of trade through Structural Adjustment Programmes (SAPs), exports led growth policies and current multilateral trade agreements. The import substitution strategies were aimed at industrialization through promotion of infant industries.

Administrative measures including licensing of importation, tariffs and price regulations were adopted in the 1980s. These policies failed to bear results as far as reducing the current account deficit was concerned (Were, 2007). In the 1980sKenya shifted from imports substitution strategy (ISS) and adopted exports led growth strategies (ELGS) under the structural reforms. This was caused by

pressure from the multi-lateral financial institutions to address deteriorating exports. As a result the current account deficit improved during the same period. The export promotions strategies put in place included the Export Processing Zones (EPZs) and the implementation of Export Trade Authority. As a result EPZs were subjected to a tax holiday for a period of ten years starting from that time and import duty exemptions on processing equipment for investments.

1.1.4 External debt servicing and current account balance in Kenya

High cost of external debt has an implication on the social and economic sectors' investments and ultimately on the overall output of an economy. Like most Sub-Sahara Africa (SSA) countries, bigger percentage of Kenya's external debt comprises of debt basically from bilateral sources. The extent of concessional debt has been increasing since 1990s (Brien and Ryan, 1999). According to Ajayi (1991) debt crisis has evolved from a complex combination of factors. Some of the factors that have been causing debt crisis are external while others are the immediate consequence of economic policies pursued.

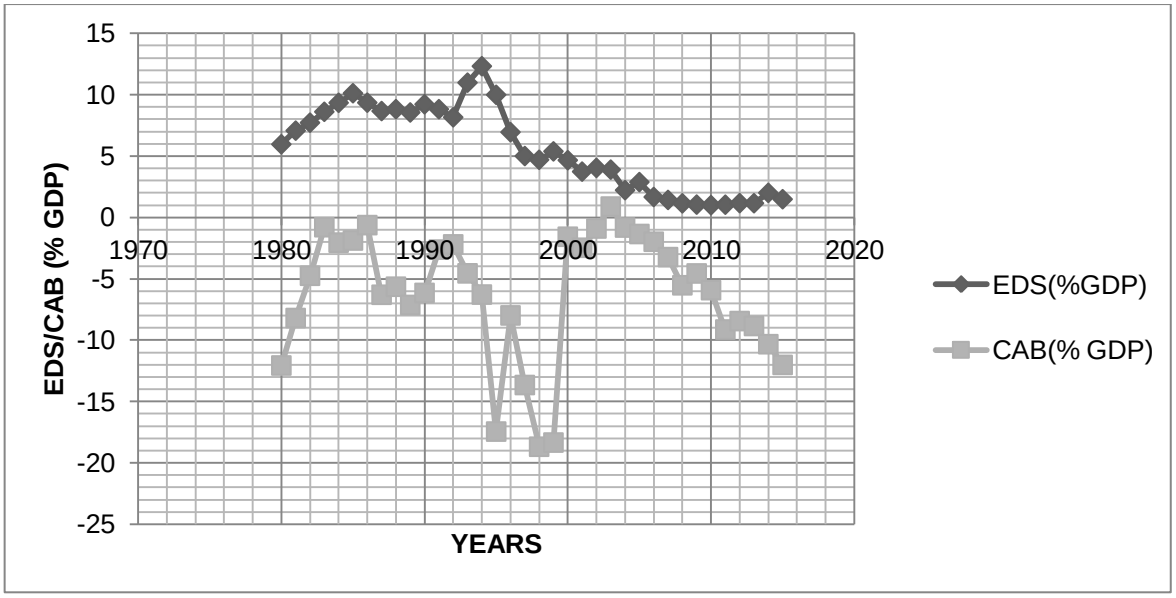


Figure 1.3 Trends of external debt servicing and current account balance as a percentage of GDP
Source of the basic data: International Monetary Fund (IMF): World Economic Outlook Database, 2015

Figure 1.3 shows that the external debt servicing and current account balance in Kenya have been fluctuating from 1980 to 2015. The highest external debt service in 1994 was followed by a huge current account deficit in 1995. Figure 1.3 reveals that a current account surplus in 2003 was followed by the lowest external debt service in 2004. A critical look at Kenya's fiscal scene reveals an expansionary fiscal phase indicated by an increase in the primary deficit. These fiscal developments have resulted to an increase in the share of debt service in total spending over the years. This is due to accumulating debt stock, which increases servicing amounts. For instance, external debt servicing rose from 8.1 percent to 12.3 percent of recurrent spending, equivalent to 4.2 percent of GDP between 1993 and 1994. In 2014/15, external debt servicing without factoring in debt redemption, amounted to Ksh 121.4 billion, representing 2.8 percent of the GDP. This means that external debt servicing was consuming a big share of

budgetary allocations. This increase in external debt service was attributed to both external and internal factors.

In the mid-1980s the world loan fees expanded pointedly as an outcome of anti-inflationary programmes in the industrialized nations (Republic of Kenya, 1982). In the meantime, the terms of trade weakened for the borrower world as raw material costs fell. Kenya's growth of exports earnings declined from 26 percent in 1980 to 13 percent in 1981. Due to debt write-offs and a decline in bilateral and private debt the growth of external debt in 1988 and 1989 declined. Further In 1989, Kenya was forgiven its external debt amounting to US$463 million.

The decline in the 1990s was attributed to the fact that there were no new external debt contracts due to aid embargos and negative net-repayments. The two-year 'help freeze' in official capital inflow in 1991 and 1992 brought about an expansion in Kenya's external instalment overdue debts (Magero, 2015). Further there was likewise substantial dependence on domestic borrowing in relation to external borrowing in the 1990s and a generally tight financial position was additionally seen during the period. Kenya serviced its external debts without rescheduling despite the magnitude of external debt. This is also confirmed by the fact that there was negligible or zero accumulation of arrears in 1970s and a better part of 1980s (Mutai et al., 2008)

In 1990s, the debt burden became so acute and Kenya rescheduled its external debt for the first time. The government began to accumulate arrears on official debts in the late 1990s with the curtailment of donor funding. External financial support started slackening in the 1990s despite the dramatic build-up in nominal aid flows during the same period. The level of external indebtedness has been

falling (Magero, 2015). Although Kenya may not have huge debt as compared to other heavily indebted poor countries (HIPCs), her present poor economic performance and inability to meet her debt obligations have serious implications on economic development. Other factors which led to high external debt included an overvalued exchange rate, import-substituting industrial strategy, and negative real interest rates which were characterized by overprotection. The more prominent pervasiveness of the import authorizing framework and regulations on business exercises made enormous opportunities for rent-seeking and for official discretion (Magero, 2015).

1.2 Statement of the problem

Current account balance in Kenya has remained beneath what economists would consider feasible. When the current account balance of a country remains in deficit for an extended period, it raises concerns about the sustainability of this deficit (Summer, 1996). As a rule of thumb, current account balance below-5 percent of GDP is alarming especially if funded by short-term debt or foreign reserves (Kenen, 1995). In 2014, the current account balance in Kenya stood at -8.5 percent of GDP and -10.3 percent in 2015. Current account balance in Kenya is below the world average current account balance which stood at -3.5 percent of the GDP by the year 2015. Kenya has not just operated with current account balance surpassing -5 percent for the greater part of the years in her history, but the current account deficits have likewise shown some volatility.

The persistent current account imbalance has led to building up of liabilities to the rest of the world that are financed by flows in the capital account. Inevitably, these should be paid back. As a result Kenya has been using its borrowed foreign funds to finance these deficits that yield no long-term productive gains and thus

its ability to repay the debts is becoming questionable (Mutuku, 2016). This is on the grounds that solvency requires that the nation be willing and able to produce adequate current account surpluses to reimburse what it has borrowed to finance the current account deficits.

The bulk of empirical studies have focused on the relationship between current account balance and key macroeconomics variables in various countries yielding different results. For instance Mbanga and Sikod (2008) found a unidirectional causality between external debt servicing and current account balance. However, Kayikci (2011) revealed existence of bidirectional causality between current account balance and external debt servicing. Blanchard and Francesco (2002) found that an increase in external debt servicing will have a positive impact on current account balance but Hermann and Jochem (2005) revealed that external debt servicing affected current account balance negatively. The review of these empirical studies has shown that it is inadequate to generalize the link between external debt servicing and current account balance. Studies such as Mutuku (2016); Mwangi (2014) and Kariuki (2009) yields mixed results about the factors that impact the movement of current account balance in Kenya.

Most of the studies utilized econometric tools that were inadequate in accounting for the complexity of relationships between macroeconomic variables. This was because of the inadequacy of economic theory in the determination of the right model specification. This study took care of causality consequences using dynamic modelling that aim at examining impulse responses to establish the empirical impact of external debt servicing on current account balance in Kenya. Understanding the precise nature of this relationship is crucial for planning purposes and strategy formulation.

1.3 Research Questions

The study provided answers to the following questions:

(i) What is the nature of causality between external debt servicing and current account balance in Kenya?

(ii) What is the long run relationship between external debt servicing and current account balance in Kenya?

1.4 Objectives of the Study

The general objective of the study was to investigate the relationship between external debt servicing and current account balance in Kenya.

The specific objectives of the study were:

(i) To determine the nature of causality between external debt servicing and current account balance in Kenya.

(ii) To determine the long run relationship between external debt servicing and current account balance in Kenya.

1.5 Significance and Scope of the Study

Around the world, the business and the economic condition are generally influenced by the internal and external shocks. Because of this, there is need to analyse the country specific macro-economic variables like current account balance. The real inspiration of this study was based on the fact that persistent current account deficits of the country have been a concern to economists in the Kenyan economy. This study is of particular significance to monetary policy authority when formulating external debt policy. The study is of benefit to the national treasury since it informs how external debt servicing affects the current account balance when preparing national policies. This study was constrained to

the period 1980 to 2015. The period was considered to be long enough to capture the relationship between the external debt servicing and current account balance.

1.6 Organization of the study

This project is exhibited in five chapters. The foregoing chapter introduced the study and its objectives. It has additionally given background information of the current account balance and external debt service. Chapter two involves a review of both theoretical and empirical literatures that are relevant to the study. Chapter three gives the methodology that was adopted; it includes the research design, theoretical framework, model specification, description of variables, the type of data that was utilized and the method of data analysis. The study findings are reported in chapter four. Lastly chapter five presents the summary, discussion of the results, policy implication and also gives the areas for further research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter presents relevant theoretical and empirical literature which forms the grounding for investigating the relationship between external debt servicing and current account balance. Finally the overview of the literature and research gaps is discussed.

2.2 Theoretical Literature

In this section, a review of major theoretical arguments regarding current account balance is done.

2.2.1 Elasticity approach

One of the most important neoclassical theories that are applied in analysis of current account balance (CAB) is the elasticity approach developed by Thirlwall in 1986. The theory holds that current account balance disequilibria are caused by lack of competition in the international market. According to this theory current account depends on income elasticities and price of goods. According to this theory CAB can be defined as:

$CAB = X.P - eP_{f.}M$ ……………………………………………………………2.1

Where:

X is the exports

P is the domestic price

P_f is the foreign price

M is imports and

e is the exchange rate.

The exchange rate is expressed as the ratio of domestic price and foreign price as shown in equation 2.2 below:

$e = P/P_f$……2.2

Equation 2.2 shows that the value of exchange rate (e) increases as the value of domestic price (P) increases and it decreases with decrease in foreign price (P_f).

With the assumption of given prices, equation 2.1 can be rewritten as:

$CAB = X - eM$……..2.3

Differentiating equation 2.3 with respect to exchange rate (e) the following equation is obtained:

$$\frac{dCAB}{de} = \frac{dX}{de} - \left(e\frac{dM}{de} + M\frac{de}{de}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.4$$

Dividing equation 2.4 through by M the following equation is obtained:

$$\frac{dCAB}{de}.\frac{1}{M} = \frac{dX}{de}.\frac{1}{M} - \left(\frac{e}{M}\frac{dM}{de} + 1\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.5$$

But export and import elasticities can be defined as follows:

$$n_m = \frac{dM}{de}\frac{e}{M} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.6$$

$$n_X = \frac{dX}{de}\frac{e}{X} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.7$$

Where n_M and n_X are import and export elasticities respectively

Inserting equation 2.6 in to equation 2.5 it yields the following equation:

$$\frac{dCAB}{de}\frac{1}{M} = \frac{dX}{de}\frac{1}{M} - (n_m + 1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.8$$

Assuming that the current account is in balance and therefore X = eM, then:

M = X/e……..…….2.9

Inserting equation 2.9 in to equation 2.8 and rewriting the resultant equation yields the following equation:

$$\frac{dCAB}{de}\frac{1}{M} = \frac{dX}{de}\frac{e}{X} + n_m - 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.10$$

Inserting equation 2.7 into equation 2.10 and rewriting the resultant expression the following equation is obtained:

$$\frac{dCAB}{de} = M(n_X + n_m - 1) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.11$$

But since CAB should improve with devaluation, then it follows that:

$$\frac{dCAB}{de} > 0 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.12$$

If equation 2.12 holds then

$$n_X + n_M > 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2.13$$

Equation 2.13 satisfies the Marshall-Lerner (ML) condition, which states that for currency depreciation to improve the current account balance the sum of price elasticities of exports and imports must be greater than unity (Mudida, 2012).

The primary shortcoming of elasticity approach is that, it depends on exchange rate changes and assumes constant prices for both foreign and domestic products

so that a variation in nominal exchange rate causes a proportionate change in real exchange rate (Giancarlo, 2002).

2.2.2 Debt overhang theory

The debt overhang theory first discussed by Myers in 1977 depends on the fact that if debt will surpass the nation's repayment ability with some likelihood in the future, then the expected debt service is likely to be increasing as the country's output level increases. In this manner a portion of returns from investing in the domestic economy will be taxed away to pay the existing creditors and this will discourage new foreign investors (Claessens, Detragiache and Kanbur, 1996). The borrower country will therefore use only partially of any increase in output and exports since a good portion of that increase will be used to service the existing external debt. This creates a problem because if a country has a new investment project which may generate positive net present value, the country will not invest due to an existing debt position hence the country's level of investment will start decreasing.

The presence of this stock of external debt changes the incentive of either the creditor or the debtor. External debt relief may therefore benefit either of them. The creditor could have an incentive to keep on lending in order to avoid a loss thinking that the debtor will improve its economic conditions and will be in a position to repay the debt in the near future. On the other hand the debtor has disincentive to invest because of the assumption that all the gains will be taxed away to pay the lender. This theory implies that a decrease in the amount of external debt will lead to increase in domestic investment and a reduction in

government spending. According to intertemporal approach of the current account balance (CAB):

CAB = (S-I) + (T-G) ----------2.14

Where:

S is domestic saving

I is investment

T is taxes and,

G is the Government spending.

From equation 2.14 it is clear that increase in the level of investment will worsen the current account balance while reduction in government spending will improve the current account balance (Elbadawi et al., 1996). Referring to this theory Lensink and white (1999) argued that external debt may be beneficial or detrimental to economic growth. According to Lensink and White there is a threshold at which more external debt is detrimental to economic growth. External debt affects the economy positively until a certain point but beyond this point the effect becomes negative (Lensink and white, 1999).

2.2.3 Liquidity constraint hypothesis

A liquidity constraint hypothesis was developed by Valerie in 1995.Liquidity constraint is putting limit on the amount an individual can borrow. It can also mean an arbitrary alteration in the interest rate the borrower should pay therefore raising the cost of borrowing. If the cost of borrowing is too high then individuals and institutions will be prevented from borrowing over time. The requirement to

service debt reduces funds available for investment and growth ("Crowding out" effect). Reduction in the debt service will therefore lead to an increase in current investment and thus worsen current account balance (Cohen, 1993). The need to service large amount of external debts can affect economic performance due to lack of access to international financial markets (Claessens et al., 1996).

2.2.4 Balance of Payment Constraint Model

Balance of Payment constraint model formulated in 1986 by Thirlwall adopted a Keynesian view of aggregate demand and output but fundamentally incorporates the neoclassical elasticity approach in its formulation. This model otherwise known as Thirlwall Law has gained a lot of popularity. According to this theory, export is the only components of national output that provides foreign reserves which consequently allows the growth of other demand components in an open economy (Bahmani and Ratha, 2004). BoP constraint model explains that if an economy's rate of imports exceeds the rate of exports then current account deteriorates which in turn impedes economic growth.

BoP constraint model holds that faster income growth relative to export growth may only cause balance of payment disequilibrium because it increases demand for imports relative to export thus worsening the current account position. According to this model increase in external debt will increase the demand for imports which will worsen the current account.

BoP constraint model conjectures that current account equilibrium can only be maintained by export led growth. According to this theory the relationship between export and growth is circular and cumulative to the extent that export led

growth increases productivity which further increases competitiveness and revenue growth from exports (Bahmani and Ratha, 2004).

2.2.5 The Absorption Approach

The absorption approach was developed by Murshed (1997). According to this theory the difference between domestic output and spending (absorption) represents the current account balance. If income is greater than absorption there would be a trade surplus and vice versa. The theory emphasizes on changes in real domestic income and therefore it is referred to as real-income theory of the balance of payments (Kosimbei, 2002). The theory assumes that prices remain constant. It is based on Keynesian national income framework which is given as:

$$Y = C+I+G+X-M \quad \text{----------2.15}$$

Where:

C is Consumption

I is Investment

G is Government expenditure and

Y is Output.

Absorption (A) which is also known as aggregate spending is given as:

$$A = C+I+G \quad \text{----------2.16}$$

Substituting the absorption equation 2.16 into equation 2.15 and rewriting the resultant equation yields the following equation:

$$X - M = Y-A \quad \text{----------2.17}$$

Current account balance (CAB) is defined as a sum of three components: the net export, net current transfers and the net income from abroad.

CAB = X-M +NI+ CT ----------2.18

Where:

X and M are Exports and imports respectively.

NI and CT are net income from abroad and net current transfers respectively.

Net incomes from abroad (NI) and net current transfers (CT) are assumed to be very small and negligible for the case of Kenya (Njoroge, 2014), hence they can be dropped from equation 2.18 yielding the following equation:

CAB = X-M ----------2.19

Substituting the current account balance equation 2.19 into equation 2.17 and rewriting the resultant expression yields:

CAB = Y –C–I–G ----------2.20

From equation 2.20 it is clear that factors that affect consumption, investment and government expenditure will indirectly affect current account balance.

2.3 Empirical Literature

Several studies have explored the connection between current account balance and other macroeconomic variables. Were (2001) analysed the impact of external debt on the economy of Kenya by use of ordinary least square regression technique. Time series data for the period between 1970 and 1995 was used in the study for the following variables: Stock of Kenya external debt, GDP, private investment and the debt service. The study found that foreign debt did not

directly affect the economic growth but it influences economic growth through the accumulated external debts as a proportion of GDP and the past debt accumulation as a proportion of the debt service. The empirical outcomes demonstrated the existence of negative relationship between external debt and economic growth in Kenya. Further the negative relationship between private investment and external debt also known as the crowding out effect was confirmed. This confirmed the existence of debt overhang problem in Kenya since debt service caused crowding out effect. However, this study did not show how this crowding out effect affected the current account balance.

Blanchard and Francesco (2002) documented the ways through which financial integration can affect the position of current account balance using autoregressive distributed lag (ARDL) model. With increasing financial integration the cost of borrowing is expected to decrease. The developing countries with lower level of capital, high growth prospects and higher marginal productivity will increase their external borrowing to finance domestic investment. This will affect their current account balance negatively. The study established the relationship between various macroeconomic variables and current account deficit in Sub-Saharan Countries. The study revealed that there was a positive significant coefficient of 0.1067 between external debt and current account balance which implies that an increase in external debt by one unit will increase the current account balance by 0.1067 units. However, the study employed panel data for various Sub-Saharan nations and therefore the results cannot be used to address the specific issues in Kenya.

Chinn and Prasad (2003) carried out an empirical analysis on the effectiveness of various macroeconomic variables on current account in different country

grouping. The study applied panel regression techniques in analysing the data for different country grouping. The study revealed that current account balance of non-oil developing countries is affected by both external and internal factors. The study indicated that external debt servicing and current account balance were negatively related. The findings of the study revealed that, a unit increase in external debt servicing led to 2.523 percent decline in current account balance. This implied that accumulation of external debt worsens the current account position. Further the study revealed that external debt affected current account balance through high interest payments. The study also showed that 2.15 percent of fluctuations to current account were caused by the rate of inflation. The study used panel data for various countries and suggested that an empirical analysis should be done in each country to determine the effectiveness of current account determinants.

Hermann and Jochem (2005) analysed the effect of selected macroeconomic variables on current account balance in central and east European Union using Feasible Generalized Least Squares estimation technique. The study used quarterly panel data framework. The study revealed a negative relationship between current account balance and external debt services. According to Hermann and Jochem (2005) increasing external debt servicing by one percent declines the current account balance by 1.026 units. Further the study revealed that an increase in investment, rate of inflation and real effective exchange rate worsened the current account balance. Real per capita income, fiscal balance and financial deepening affected the current account positively. The limitation of this study was that it did not test for cointegration between the variables, information which could have enabled one to comment on the nature of the relationships.

Mbanga and Sikod (2008) analysed the impact of debt and its interest repayment on macroeconomic variables in Greece. Using vector autoregressive (VAR) the study pointed out that the external debt servicing and the rate of inflation greatly affected the current account developments during 1995-2006 in Greece. Further the study established a negative relationship between budget deficits and current account balance. The main assumption of the study was that stationary current account series ensured the long-run relationship and therefore the study assumed that the current account balance could also have unit roots (non-stationary). The study used Markov-switching –Augmented dickey fuller econometric framework and pointed that reduced debt burden and low rate of inflation increases the degree of current account balance persistence.

Mutai et al. (2008) studied the effects of external debt servicing on economic growth in Kenya using secondary data for the period between 1996 and 2007. The study used generalized method of moment's regression model. The variables used in the study included the lagged values of GDP, broad money supply, ratio of government expenditure to GDP, secondary school enrolment, ratio of debt to GDP and the private sector credit. The study confirmed the existences of crowding out effect where by the private investment were crowded out by the external debt due to high interest repayments. Crowding out of private and public investment led to a decrease in government spending and national income which worsen the current account balance.

Kariuki (2009) investigated determinants of current account balance in Kenya using intertemporal approach. The study used annual time series data for the period between 1970 and 2008. By use of multivariate analytical framework and OLS the study revealed that current account balance in Kenya was mostly

influenced by terms of trade. The results revealed that if terms of trade increased by 1 per cent current account balance increased by 0.11 percent holding other factors constant. Further the study pointed out that the relationship between real exchange rate and current account balance was positive. The other factors which affected the current account balance negatively included the foreign direct investments and external shocks. However the study ignored many factors that influence the current account balance movements. The study suggested that taking care of causality consequences, a similar study should be carried out using dynamic modelling that aims at examining impulse responses

Morsy (2009) investigated the relationship between current account balance and currency crisis in oil exporting countries using Intertemporal Approach. The study revealed that external debt among other factors influenced the position of the current account balance. The study used panel data for different oil exporting countries. Unit root test revealed that current account balance was a stationary series in the period and therefore co integration methods were not appropriate. The study therefore applied generalized methods of moments (GMM) which controls for endogeneity and corrects for the bias. The choice of this method was supported by the fact that the dependent variable was lagged and could affect estimation. The study established a negative relationship between external debt burden and current account balance since 1 percent increase in external debt burden will lower the current account balance by 0.35 percent.

Kayikci (2011) studied the effectiveness of current account balance determinants in Turkey using vector auto regression. Annual time series data for the following variables was used: current account balance, private investment to GDP ratio, openness, oil prices, real exchange rate and saving to GDP ratio and external debt

service. The results established bidirectional causality between current account balance and external debt service. This confirmed the hypothesis that the values of current account balance can also be used to predict the values of external debt service. It was established that 40 percent of variations in current account balance were caused by innovations in current account balance (past) and 26 percent of the variations were caused by external debt service. Variations in Current account balance were also highly influenced by the innovations in investment to GDP ratio and real exchange rate.

Mwangi (2014) utilized quasi experimental research design to empirically investigate current account determinants in Kenya using secondary data for the period between 1970 and 2010. The study applied the vector auto regression (VAR) model and established that current account balance was positively related to: gross domestic product, financial deepening, savings and real exchange rate. Current account was negatively influenced by investment, rate of inflation and balance of trade. It was established that Kenya being a unique economy, the issue of current account is very tricky. The exchange rate was established that highest impact on the current account amounting to 17.97 percent in long run. The results show that investments and savings have mild effect on the current account balance in Kenya. This is attributed to the fact that the savings and investments are affected by other macro-economic variables.

Magero (2015) examined the impact of total debt servicing on macroeconomic performance in Kenya using Vector autoregressive model. The study found that debt servicing has a significant effect on macroeconomic performance. This is due to the estimated effects on the macroeconomic fundamentals. Debt servicing crowded out private investment with no existence of debt overhang. Further

innovations in total debt servicing would persist in the economy for over ten years to shrivel. However the focus of this study was limited to effect of total debt service on few selected macroeconomic variables which included gross domestic product (GDP), private investment (PI) and real exchange rate (RER). The study ignored other macroeconomic variables and proposed further investigation on the relationship between debt servicing and all other macroeconomic variables.

Mutuku (2016) applied the vector error correction model (VECM) to analyse current account determinants in Kenya. Current account balance, GDP growth rate, dependency ratio, trade openness, net foreign asset, national income, oil prices and real exchange rate were used as the variables in the model. The study established that gross domestic product and trade openness had the greatest positive impact on current account on the first year. Net foreign asset, fiscal balance, oil prices, real exchange rate, dependency ratio and output level had negative effect on current account balance. The results on long run co-integrating model reveal that financial deepening in Kenya has no effect on the current account balance at 5 percent, 10 percent and 1percentlevel of significance. Since the study was limited to selected macroeconomic and demographic factors on current account balance, it suggested that a country specific study on the dynamic effect of monetary and fiscal policy shocks on balance of payment components would be useful in informing policy in this area.

2.4 Overview of literature review and research gaps

Some findings of the existing literature reviewed deserve further examination. The majority of these studies utilized econometric tools that were insufficient in

representing the unpredictability of relationships between macroeconomic variables. Studying these literatures reveal conflicting and inconclusive evidence that raises doubts about the nature of the relationship between these macroeconomic variables. For instance Mbanga and Sikod (2008) found a unidirectional causality between external debt servicing and current account balance in Greece. This was in support of Morsy (2009) which found that external debt service granger causes current account balance. However, Kayikci (2011) revealed existence of bidirectional causality between current account balance and external debt servicing. Kayikci (2011) found that current account balance can be used to predict external debt service which was in conflict to Mbanga and Sikod (2008) and Morsy (2009).

Blanchard and Francesco (2002) found that increase in external debt borrowing which increases external debt servicing will affect the current account balance positively. However, Hermann and Jochem (2005) found that external debt servicing affected current account balance negatively. Studies such as Mutuku (2016); Mwangi (2014) and Kariuki (2009) yields mixed results about the factors that impact the movement of current account balance in Kenya. Mutuku (2016) revealed GDP growth rate, dependency ratio, trade openness, net foreign asset, national income, oil prices and real exchange rate as the determinants of current account balance. However Mwangi (2014) found that current account balance depends on financial deepening, savings, investment, rate of inflation and balance of trade. Due to these conflicting results from various studies, it is hard to make generalization on the relationship between external debt service and current account balance. This study took care of causality consequences using dynamic

modelling that aim at examining impulse responses to establish the empirical effects of external debt servicing on current account balance in Kenya.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was utilized in the study. It incorporates the research design, theoretical framework, model specification, description of variables, the type of data used and the method of data analysis.

3.2 Research Design

The main objective of this study was to establish the relationship between external debt servicing and current account balance in Kenya. Non experimental research design which uses economic models for analysis was utilized. This design is mostly used in predictive research to predict the future status of dependent variables. Annual time series data was used in the study to answer the research questions posed in the first chapter.

3.3 Theoretical model

This study adopted the absorption approach to current account balance. Murshed (1997) argued that the difference between domestic output and spending (absorption) represents the current account balance. If income is greater than absorption there would be a current account surplus and vice versa. The absorption approach emphasizes on changes in real domestic income and assumes that prices remain constant and thus real-income theory of the balance of payments (Kosimbei, 2002). According to absorption approach current account balance (CAB) is expressed as:

CAB = Y-A ----------3.1

Where Y is output and A is absorption.

Absorption (A) which is also known as aggregate spending is given by equation:

A = C+I+G----------3.2

Where:

C is Consumption

I is Investment and

G is Government spending

Inserting equation 3.2 into equation 3.1 yields:

CAB= Y-C-I-G ----------3.3

The behavioural equations for the components in equation 3.3 can be written as follows:

$C = a + bY^d$ ----------3.4

$Y^d = Y - T$ ----------3.5

$I = \partial + \gamma i$ ----------3.6

G = G^* ----------3.7

Where

Y is the level of output

C is the level of consumption

Y^d is the disposable income

T is the Tax revenue

I is Investment

∂ is exogenous investments

i is interest rate

G is exogenous government expenditure (G*) and

a, b, ∂ and γ are coefficients.

Substituting the behavioural equations into equation 3.3 and rearranging the resultant yields the following equation:

$$CAB = (1 - b)Y - (a + \partial) - \gamma i - (G^* - T) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.8$$

Budget deficit can be defined as the difference between government revenues and expenditures. With an assumption that the government`s total income is derived from taxes, then $G - T$ is equal to the deficit

Budget deficit (BD) can therefore be specified as:

$$BD = G - T \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.9$$

Substituting equation 3.9 into 3.8 results into:

$$CAB = (1 - b)Y - (a + \partial) - \gamma i - BD \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.10$$

Given the fact that Kenya is a small open economy with no ability to influence international economy, an empirical counterpart of equation 3.10 may be obtained by introducing the methods of financing the budget deficit such as external debt service (EDS) among other related policy variables into the function as part of the X-vector of explanatory variables. As per debt overhang theory, a government with debt overhang problem will always raise taxes on the private sector. This in turn, discourages investment by the private sector which causes debt crowding out effect. Since the available resources are used to pay debt

obligation the government public spending on infrastructure decreases. When countries are paying their external debt, they use their income from export to service the debt and thus reducing the funds available for imports.

Other factors have been identified from the previous chapter; they include rate of inflation (INF), terms of trade (TOT), nominal exchange rate (NER) and real gross domestic product (rGDP). The empirical model for this study was expressed in general form as:

CAB= f (INF, EDS, TOT,IR, NER, rGDP, BD) ---------- 3.11

3.4 Empirical Model specification

The Study utilized vector Auto Regressive (VAR) model. VAR model does not impose restrictions to the system but treats all the variables systematically (Sims, 1980). This is because there are insufficient macroeconomic theories linking the above variables and therefore Ordinary Least Squares (OLS) technique will not be applicable.The compact form of a VAR model that link current account balance and external debt service among other explanatory variables in equation (3.11) took the form:

$X_t = \Theta_0 + \Theta_1 X_{t-1} + \Theta_2 X_{t-2} + \Theta_3 X_{t-3} \ldots + \Theta_{\mathrm{p}} X_{t-p} + \varepsilon_t$ 3.12

Where by Θ_0 is n × 1 vector of constant coefficients, X_t is a n×1 vector of the selected endogenous variables (CAB, INF, EDS, TOT,IR, NER, rGDP, BD) and εt is a disturbance terms with a constant variance and Zero means. For example the equation for current account balance was expressed as:

$$CAB_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i \, CAB_{t-i} + \sum_{i=1}^{m} \beta_i \, EDS_{t-i} + \sum_{i=1}^{n} \beta_i \, INF_{t-i} + \sum_{i=1}^{p} \beta_i \, TOT_{t-i}$$

$$+ \sum_{i=1}^{s} \beta_i \, NER_{t-i} + \sum_{i=1}^{u} \beta_i \, IR_{t-i} + \sum_{i=1}^{q} \beta_i \, rGDP_{t-i} + \sum_{i=1}^{r} \beta_i \, BD_{t-i}$$

$$+ \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.13$$

Before the model was estimated the information criteria like Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC), Likelihood ratio (LR), and Final Prediction Error (FPE) were employed to decide the proper lag length for the VAR model.

The LR test was based on equation:

$$LR = (T - m)(\ln|\Sigma_r| - \ln(\ln|\Sigma_u|) \sim \chi^2(q) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.14$$

Where: T is the observations (after accounting for lags), M is the number of parameters estimated in each equation, $\ln|\Sigma_r|$ is the natural log of the determinant of the covariance matrix of residuals and q is number of the restrictions in the system

The information criteria (AIC and SIC) are not tests that choose the lag that minimizes the criteria, they only indicate goodness of fit of alternatives and therefore they were only employed as complements to the LR tests. The AIC and SIC were based on the following equations:

$$AIC = T \ln|\Sigma| + 2N \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.15$$

$$SIC = T \ln|\Sigma| + N \ln T \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.16$$

Where T is the observations (after accounting for lags) and N is the number of parameters estimated in each equation of the unrestricted system.

The cointegrating test results confirmed that there was cointegration and thus the relationship between the variables could be described by restricted VAR also known as Vector Error Correction model (VECM). A vector error correction model (VECM) is a restricted VAR that has cointegration limitations incorporated with the determination, so that it is intended for use with non-stationary series that are known to be cointegrated. The VECM specification limits the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while permitting an extensive variety of short-run dynamics. The cointegration term is known as the error correction term since the deviation from long-run equilibrium is amended gradually through a series of incomplete short-run modifications. The general vector error correction model with deterministic trend is:

$$\Delta Y_t = \emptyset + \pi Y_{t-1} + \alpha t + \sum_{i=1}^{p-1} \tau_t \Delta Y_{t-1} + \epsilon_t \quad \text{..... 3.17}$$

Where $\emptyset = \emptyset_1 - \gamma \emptyset_2 and \alpha = \alpha_1 - \gamma \alpha_2$

To estimate the equation 3.17 the equation was further rewritten as:

$$\Delta Y_t = \emptyset_1 + \alpha_1 t + \gamma(\beta' Y_{t-1} - \emptyset_2 + \alpha_2 t) + \sum_{i=1}^{p-1} \tau_t \Delta Y_{t-1} + \epsilon_t \quad \text{..... 3.18}$$

The intuition of this expression is that a change in Y_t can come from the time trend. The last part of the expression with a summation is used to eliminate serial correlation.

3.4.1 Granger Causality Test

X is said to Granger-cause Y if the future values of Y can be better determined utilizing the past values of both X and Y than it can by utilizing the past values of Y alone (Giles, 2011). The study tested for existence of causality between the economic variables using the granger causality test. This is a test which checks if one time series could be used to predict another time series (Engle and Granger, 1987). To examine Granger causation between external debt service and current account balance the granger causality test was done through estimation of two regression equation expressed as follows:

$$CAB_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i \, CAB_{t-i} + \sum_{i=1}^{m} \beta_i \, EDS_{t-i} + \sum_{i=1}^{n} \beta_i \, INF_{t-i} + \sum_{i=1}^{p} \beta_i \, TOT_{t-i} + \sum_{i=1}^{s} \beta_i \, NER_{t-i} + \sum_{i=1}^{u} \beta_i \, IR_{t-i} + \sum_{i=1}^{q} \beta_i \, rGDP_{t-i} + \sum_{i=1}^{r} \beta_i \, BD_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots 3.19$$

$$EDS_t = \alpha_0 + \sum_{i=1}^{l} \alpha_i \, EDS_{t-i} + \sum_{i=1}^{m} \beta_i \, CAB_{t-i} + \sum_{i=1}^{n} \beta_i \, INF_{t-i} + \sum_{i=1}^{p} \beta_i \, TOT_{t-i} + \sum_{i=1}^{s} \beta_i \, NER_{t-i} + \sum_{i=1}^{u} \beta_i \, IR_{t-i} + \sum_{i=1}^{q} \beta_i \, rGDP_{t-i} + \sum_{i=1}^{r} \beta_i \, BD_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.20$$

The joint hypothesis of F-test based Wald statistics for equation 3.19 and equation 3.20

$$H_0: \beta_1 = \beta_2 = \beta_3 = \cdots = \beta_l = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \cdots \beta_l \neq 0$$

3.4.2 The Long Run Relationship

The VAR equations presented above are generally in the form of an autoregressive distributed lag (ARDL) model. From the VAR model, it is possible to derive an equilibrium solution or the long run path, if the variables are constant (Harvey, 1990). The assumption is that the model must be stable where the roots of the polynomial representing the coefficients of the dependent variable are outside the unit circle.

From equation 3.13Let Y_t = CAB and X_t represents all the explanatory variables

$$Y_t = \delta_1 + \sum_{i=1}^{m} \alpha_i Y_{t-i} + \sum_{i=1}^{m} \beta_i X_{t-i} + \cdots + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.21$$

Where$\sum_{i=1}^{m} \alpha_i Y_{t-i}$ is the of the past values of Y up to lag m and $\sum_{i=1}^{m} \beta_i X_{t-i}$ is the sum of the past values of right hand side variables up to lag m and their coefficients.

Rearranging equation 3.21 and expanding the terms yields equation 3.22

$$Y_t - \alpha_1 Y_{t-1} - \alpha_2 Y_{t-2} - \cdots - \alpha_p Y_{t-p} = \delta_1 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots \beta_p Y_{t-p} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.22$$

Introducing lag operator in equation 3.22 yields:

$$Y_t - \alpha_1 L^1 Y_t - \alpha_2 L^2 Y_t - \cdots \alpha_p L^p Y_t = \delta_1 + \beta_1 L^1 X_t + \beta_2 L^2 X_t + \cdots + \beta_p L^p X_t + \varepsilon_t \ldots\ldots\ldots\ldots 3.23$$

Factoring Y_t and $X_t$from equation 3.23 yields the following equation:

$$(1 - \alpha_1 L^1 - \alpha_2 L^2 - \cdots - \alpha_p L^p) Y_t = \delta_1 + (\beta_1 L^1 + \beta_2 L^2 + \cdots + \beta_p L^p) X_t + \varepsilon_t \ldots\ldots\ldots\ldots 3.24$$

If it is assumed that in the long run, Y_t and$X_t$are constant, then equation 3.24 can be rewritten as:

$$Y_t = \rho_i + \mu_i X_t + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.25$$

Where ρ_i and $\mu_i are$ long run coefficients of the long run equations defined as:

$$\boldsymbol{\rho} = \frac{\boldsymbol{\delta_1}}{(\mathbf{1} - \boldsymbol{\alpha_1 L^1} - \boldsymbol{\alpha_2 L^2} \ldots - \boldsymbol{\alpha_p L^P})} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.26$$

$$\boldsymbol{\mu} = \frac{(\beta_1 L^1 + \beta_2 L^2 + \cdots + \beta_p L^p)}{(1 - \alpha_1 L^1 - \alpha_2 L^2 \ldots - \alpha_p L^P)} \ldots\ldots 3.27$$

Specifically the long run equations estimated were expressed as follows:

$$CAB = \rho_i + \mu_1 EDS + \mu_2 TOT + \mu_3 NER + \mu_4 IR + \mu_5 rGDP + \mu_6 INF + \mu_7 BD + \varepsilon_t \ldots\ldots \quad (3.28)$$

$$EDS = \rho_i + \mu_8 EDS + \mu_9 TOT + \mu_{10} NER + \mu_{11} IR + \mu_{12} rGDP + \mu_{13} INF + \mu_{14} BD + \varepsilon_t \ldots\ldots \quad (3.29)$$

3.4.3 The Dynamics Response

Studies have found that estimated coefficients of the VAR model have no economic interpretation because they are in form of reduced equations. Sims (1980) came up with a method of estimating VAR coefficients to trace the dynamics path of a specific variable in a system, given a certain effect of innovation or a shock brought about by a change in a variable.

The dynamic response is estimated through variance decomposition and the impulse response functions (IRFs). The effects of shocks to the system will be summarized by use of impulse responses functions. The impulse response functions will allow the determination of the signs of the effect of innovations or external change in each variable on others. IRF involves measuring unexpected changes in one variable (the impulse) in time t and then predict its effect on the other variable in time t, t+1, t+2… t+n (the responses). The IRF was based on equation:

$$y_t = \alpha_1 + \varepsilon_t + \Theta_2 \varepsilon_{t-1} + \Theta_2 \varepsilon_{t-2} + \cdots + \Theta_i \varepsilon_{t-i} \ldots\ldots 3.30$$

Where y_t is a vector of the considered dependent variables, ε_i is a vector of innovations for all variables that have been included in the model, α is a vector of the constants, and Θ_i is a vector of parameters that measure the reaction of the dependent variable to innovations in all other variables included in the model.

Taking two specific variables Y_t and X_t to represent CAB and EDS respectively, the IRF was expressed as follows:

$$Y_t = \alpha_1 + \varepsilon_{Y,t} + \gamma_1\varepsilon_{Y,t-1} + \gamma_2\varepsilon_{Y,t-2} + \cdots + \gamma_i\varepsilon_{Y,t-i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.31$$

$$X_t = \alpha_2 + \varepsilon_{X,t} + \varphi_1\varepsilon_{X,t-1} + \varphi_2\varepsilon_{X,t-2} + \cdots + \varphi_i\varepsilon_{X,t-i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.32$$

Where by φ's and γ'srepresent the amounts of responses

Equations 3.31 and 3.32 express how the dependent variable responds to previous innovations that happen to the endogenous variables included in the model.

3.4.4 Variance Decomposition Analysis

The variance decomposition analysis measures how important the error in the j^{th} equation is for explaining unexpected movements in the i^{th} variable (Enders, 1995). Variance decomposition tells how much of a change in a variable is due to its own shock and how much is due to shocks to other variables. In the short run a large portion of the variation of a variable is due to its own shock. The variance decomposition analysis was derived as follows:

In calculating the n-period forecast error of x in order to find that of y, equation 3.33 was utilized.

$$x_{t+p} - Ex_{t+p} = \emptyset_0\varepsilon_{t+p} + \emptyset_1\varepsilon_{t+p-1} + \emptyset_2\varepsilon_{t+p-2} + .. + \emptyset_{p-1}\varepsilon_{t+1}$$

$$= \sum_{i=0}^{p-1} \varepsilon_{t+p-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.33$$

Considering variable y which is the first element in the x matrix then the p-step forecast error is

$$y_{t+n} - Ey_{t+n} = (\Phi_{n,0}\varepsilon_{y,t+n} + \Phi_{n,1}\varepsilon_{y,t+n-1} + \ldots + \Phi_{n,n-1}\varepsilon_{y,t+1}) + \emptyset_{p,0}\varepsilon_{x,t+p} +$$

$$\emptyset_{p,1}\varepsilon_{x,t+p-1} + \emptyset_{p,2}\varepsilon_{x,t+p-2} + \ldots + \emptyset_{p,p-1}\varepsilon_{t+1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.34$$

3.5 Definition and measurement of variables

Current account balance (CAB): This is the value of Kenya's net exports of goods and services in one year. Grants were excluded because their inclusion will give biased results. In this study it was expressed as percentage of gross domestic product (GDP)

Inflation rate (INF): This is general change in prices paid by consumers over a given time. It was measured by the recorded inflation rate for the given year. Rate of inflation in year t = $\{(Pr_t - Pr_{t-1}) / Pr_{t-1}\}*100$

Where Pr is the price and t is the time frame.

External debt Servicing (EDS): External debt service is the payments of both principal and interest charged on the external debt. It also included any late payment fees. It was standardized by expressing it as a percentage of GDP.

Terms of Trade (TOT): This is the difference between the prices of goods exported and the prices of goods imported. In this study 2000 was used as the base year.

Interest rate (*IR*): Interest rate is the reward of parting with liquidity for a specified period usually one year. It was measured in percentage per annum by taking the annual average.

Budget deficit: This is the value of Kenya's Central government revenues net its expenditures in one year. In this study it was expressed as a percentage of GDP

Nominal Exchange Rate (NER): This is the price of a US dollar in terms of Kenya shillings given by annual average.

Real Gross domestic product (GDP): This is the monetary value of all the completed goods and services produced within a country's borders within one year. It was standardized by taking its annual growth.

3.6 Time series properties

The study tested for time series properties such as the presence of unit roots and cointegration before estimation. This was to guarantee meaningful regression results.

3.6.1 Stationarity test

The significance of this test was to model stationary series. This ensured that the resultant regression results are meaningful. For a series to be stationary it should have a constant mean and variance. To perform this test the study employed Augmented Dickey Fuller (ADF) test procedure which was explained by Dickey and Fuller (1976). The choice of ADF was supported by the fact that it retains the validity of the tests. The non-stationary time series were then differenced until they become stationary. To confirm the ADF test the Phillips-Perron (PP) test proposed by Phillips and Perron (1988) which takes care of structural breaks and

serial correlation in the time series was employed. Philips-Perron test takes care of the serial correlation in the error terms without adding lags by use of nonparametric statistical methods. The ADF test involved estimating the following three equations:

ADF without intercept and trend

$$\Delta y_t = \varphi y_{t-1} + \sum_{i=1}^{n} \lambda_i \Delta y_{t-i} + \mu_t \text{ ----------} \quad 3.35$$

(i) ADF with an intercept but no trend

$$\Delta y_t = \gamma + \varphi y_{t-1} + \sum_{i=1}^{p} \lambda_i \Delta y_{t-i} + v_t \text{ ----------} \quad 3.36$$

(ii) ADF with both the intercept and trend

$$\Delta y_t = \delta + \omega t + \varphi y_{t-1} + \sum_{i=1}^{n} \lambda_i \Delta y_{t-i} + \mu_t \text{ ----------} \quad 3.37$$

Where: δ is the intercept, ωt is the trend, i represents the number of lags in Δy_{t-i} with the maximum being n and μ_t is the random error term

The PP test involved the estimating equation 3.38

$$\Delta y_t = \alpha + \sum_{i=1}^{m} \beta_i y_{t-i} + e_t \text{ ----------} \quad 3.38$$

Where Δy_t is the first difference of the dependent variable, i represents the number of lags, β and α are the coefficients and ε_t is the error term

3.6.2 Cointegration Analysis

Two or more non-stationary time series are said to be cointegrated if they are integrated of the same order and a linear combination between them is stationary

(Greene, 2008). Thus, cointegration suggests that despite the time series being exclusively non-stationary, there is existence of a long run relationship between them. Cointegration makes it conceivable to capture relationship between non stationary time series inside a model which is stationary (Adam, 1988). The commonly used tests for Cointegration are Johansen's method and Granger two-step methods (Engle and Granger, 1987). Johansen's methodology was utilized to test for Cointegration in this study since it licenses for more than one cointegrating relationship, unlike the Engle– Granger technique (Johansen, 1988). There are two test statistics (Trace and Eigen) used to test the number of co integrating vectors based on the characteristic roots. The trace test and maximum Eigen value test were computed as:

$$\lambda_{trace}(r) = -T\sum_{i=r+1}^{k} \ln(1-\acute{\lambda}_i) \quad \ldots\ldots 3.39$$

$$\lambda_{\max(r,r+1)} = -Tln\left(1-\acute{\lambda}_{r+1}\right) \quad \ldots\ldots 3.40$$

Where T was the sample size and $\acute{\lambda}_i$ was the i^{th} largest canonical correlation. For both trace and the maximum Eigen value test, the null hypothesis was at most r cointegrating vectors. The alternative hypothesis for the trace test was at most k cointegrating vectors while the alternative hypothesis for the maximum eigen value test was at most r+1 cointegrating vectors.

3.7 Data type and source

Secondary annual time series data for the period between 1980 and 2015 was utilized. The sources of data included: statistical absracts from Kenya National bureau of statistics (KNBS), The World Bank African Development indicators and the Central Bank of Kenya (CBK).

3.8 Diagnostic tests

Diagnostic tests were undertaken to ensure consistent coefficient estimates. Various econometric tests such as Breusch-pagan test and Goldfeld-Quandt were conducted to test for heteroskedasticity and multicollinearity (Gujarati, 2004). Since some of the variables were lagged the study used Durbin's h test to test for serial autocorrelation (Gujarati, 2004). The Jarque-Bera test was also conducted to test normality of the error term. This is a test that involved computing standard deviation, skewness, probability and kurtosis. This test is important in helping with the identification of presence of outliers. The VECM model was also tested for stability. In this regard, CUSUM tests and CUSUM of squares tests were used to test for model stability. This ensured consistent results as well as efficient results.

3.9 Data and analysis techniques

To achieve the two objectives presented in chapter one, the study utilized annual time series data for the period between 1980 and 2015. E-views econometric software was used to analyse the quantitative data collected. Various diagnostic tests were conducted to test for econometric problems in the data. Some of the diagnostic test included the problem of heteroskedasticity, multicollinearity and serial autocorrelation. To interpret the VAR model once it has been fitted Variance decomposition and impulse response functions (IRF) was used.

To achieve the first objective of determining the nature of the relationship between external debt servicing and current account balance, granger causality was used which involved estimating equations (3.19) and (3.20). To achieve objective two of determining the long run relationship the study estimated the

ARDL equations (3.28) and (3.29). To determine the responsiveness of the variables to changes of another variable impulse response functions derived from the VECM model was used.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1 Introduction

This chapter presents the findings of the study. It gives the descriptive statistics and also the results of time series property test and diagnostic tests on the model estimated. The chapter also presents the findings and discussions on the relationship between external debt service and current account balance in Kenya.

4.2 Descriptive Statistics

The descriptive statistics reveal the salient features of the variables used in the study. The descriptive statistics helps one understand the nature of the variable one is dealing with. They include the measures of central tendency such as the mean and the median and also the measures of dispersion such as the standard deviation and the range. These statistics are presented in table 4.1.

Table 4.1 summary statistics for selected macroeconomic variables

	CAB	EDS	INF	GDP	*IR*	NER	TOT	BD
Mean	-6.207	5.568	11.264	3.789	7.440	53.114	90.945	-4.361
Median	-5.581	5.196	9.12	4.169	6.356	59.55	89.79	-4.15
Maximum	0.888	12.329	45.979	8.402	21.096	98.18	114.02	1.75
Minimum	-18.67	1.004	1.554	-0.799	-8.009	7.42	70.15	-17.78
Std. Dev.	5.1420	3.516	8.517	2.333	6.695	29.234	10.347	3.77
Skewness	-0.948	0.094	2.297	-0.18	0.069	-0.317	0.297	-1.302
Kurtosis	3.211	1.631	9.239	2.064	2.759	1.541	2.561	5.728
Jarque-Bera	5.465	2.863	90.0421	1.507	0.115	3.798	0.819	21.339
Probability	0.065	0.239	0	0.471	0.944	0.149	0.664	0.000
Sum	-223.466	200.473	405.505	136.439	267.855	1912.09	3274.02	-157
Sum Sq. Dev.	925.422	432.695	2538.779	190.455	1568.976	29911.52	3747.294	497.928
Observations	36	36	36	36	36	36	36	36

Source: Author

The average value of current account balance as a percent of GDP in Kenya was -6.207 percent against a target of -5 percent of the GDP. As a rule of thumb, current account balance below -5 percent of GDP is alarming especially if funded by short-term debt or foreign reserves. Current account balance in Kenya was below the world average current account balance which stood at -3.5 percent of the GDP by the year 2015. The minimum and maximum current account balance as a percent of GDP stood at -18.679 percent and 0.888 percent respectively during the same period. A standard deviation of 5.142 percent indicated a high variation from the mean during the period under study. The median current account balance of -5.582 percent as shown in table 4.1 which is not the same as the mean value of -6.207 percent indicates that the observations are not symmetrically distributed. The figures supported the study background that reveals that Kenya had instability in its current account balance with current account deficits dominating the scene and registering invisible current account surpluses.

The descriptive statistics also show that on average Kenya used 5.569 percent of GDP in servicing her external debt during the period under study. This interest and principal repayments on the external debt are done on foreign currency. This led to depreciation of the domestic currency. This high debt service means that external debt is not used in specific capital project but they are spent in servicing the existing external debt. If this is not controlled then debt repayment burden will be the biggest item in the budget when compared to other essential projects such as health and education. The external debt service in the country ranged between 1.004 percent and 12.329 percent of GDP and a standard deviation of

3.516percent which showed that there was a very high variation from the mean. The median external debt service was 5.197 percent of GDP.

Table 4.1shows that current account balance was negatively skewed implying that the distribution had a long left tail. The same results are presented in Appendix II figure A1.1. On the other hand external debt service is positively skewed implying that the distributions have long right tail as presented in Appendix II figure A1.2.

Another observation from table 4.1 is the Kurtosis which is also known as the fourth moment. Kurtosis measures the peakedness or flatness of the distribution. Current account balance has a distribution with kurtosis >3 which is called leptokurtic. Compared to a normal distribution, its tails are longer and flatter, and its central peak is higher and sharper. This was further confirmed by histogram with superimposed normal curves in Appendix II figure A1.1.

Jarque-Bera was used to determine whether the observations were normally distributed or not. The test statistic measures the difference of the skewness and kurtosis of observations. Table 4.1 shows that Jarque-Bera statistic rejects the null hypothesis of normal distribution for budget deficit and inflation rate (INF) because the probability is less than 0.05 ($P<0.05$). Since the p-value for the external debt service and current account balance was greater than 0.05 the study did not reject the null hypothesis of normal distribution hence external debt service was normally distributed. The normality results for current account balance and external debt service can further be confirmed by figure 4.1.

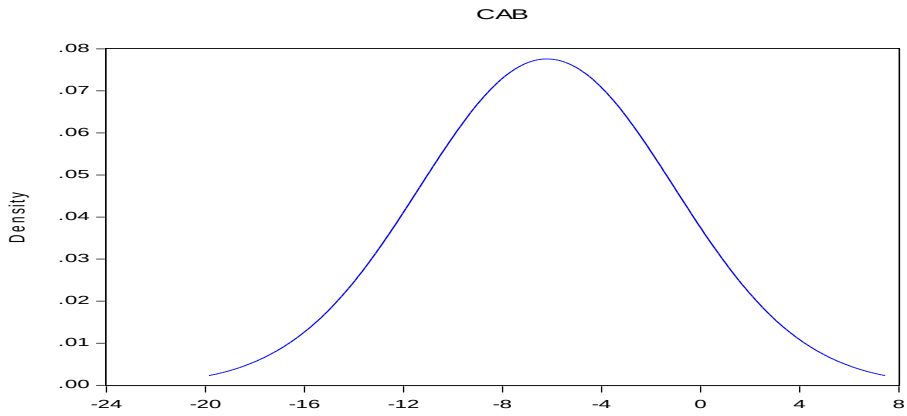


Figure 4.1(a) Distribution curve for CAB

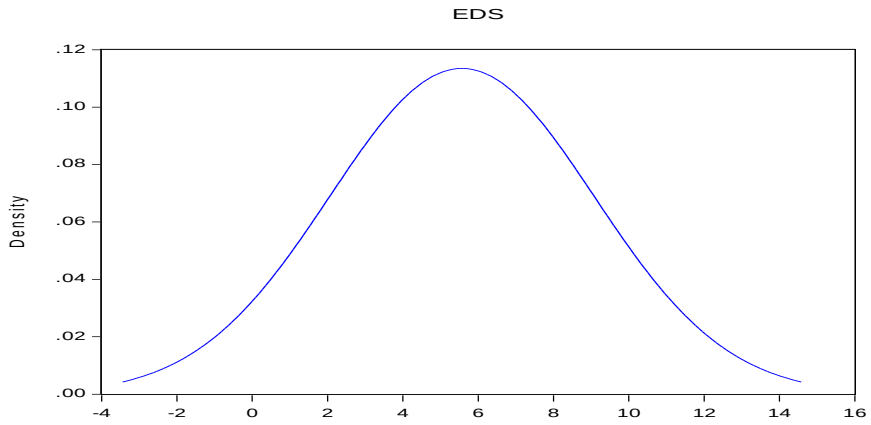


Figure 4.1(b) Distribution curve for EDS

The descriptive statistics in table 4.1 show that on average the budget deficit of Kenya was -4.36 percent of GDP during the period under study. The budget deficit in the country ranged between -17.78 percent and 1.75 percent of GDP and a standard deviation of 3.772 percent which showed that there was a very high variation from the mean. On average the GDP growth was 3.79 percent with standard deviation of 2.332 percent and it ranged between -0.799 percent and 8.4 percent during the same period under study. On average the interest rate was 7.44 percent with standard deviation of 6.69 percent. The rate of inflation in Kenya ranged between 1.554 percent and 45.979 percent as shown in table 4.1. On average the rate of inflation in the country was 11.264 percent during the period under study with a standard deviation of 8.51684 percent. The high standard

deviation of 8.51684 percent showed that there was high variation of the rate of inflation from the mean. Comparing also the mean and the median values of the inflation rate that is 11.264 percent and 9.12 percent respectively shows that the observations were not symmetrically distributed and therefore there could be some outliers inflating the mean.

The nominal exchange rate average was 53.114 between the year 1980 and 2015 with a high standard deviation of 29.234.The median of exchange rate value was 59.55 which was different from the mean and this shows that the observations were not symmetrically distributed and therefore there could be some outliers in the exchange rate. On average the terms of trade (TOT) was 90.945 between the year 1980 and 2015 with a high standard deviation of 10.347. The descriptive statistics can also be illustrated using box plots as shown in figure 4.2.

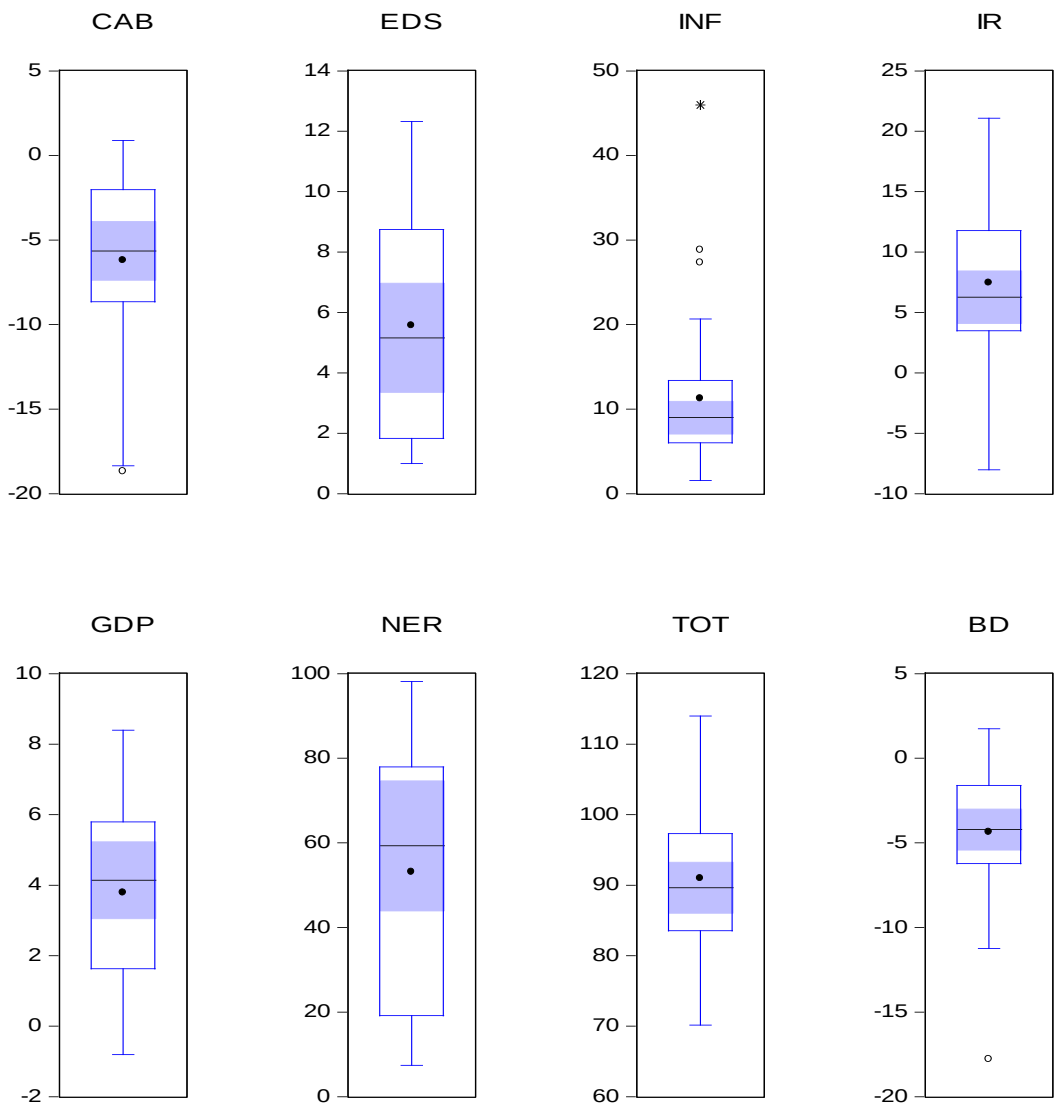


Figure 4.2 multiple box plots for the variables

Figure 4.2 reveals that the rate of inflation (INF) has near and far outliers. The data points outside the inner fences confirm the presence of outliers, as presented by the box plot of the rate of inflation. Corresponding to the negative skewness of current account balance, as presented in Table 4.1, these box plots present long vertical line below inner box for current account balance. For the external debt service the box plots presents a long vertical line above the inner box which confirms the presence of positive skewness as presented in table 4.1.

The mean of the variable is presented as a symbol or large bold point as shown in figure 4.2 while the median is illustrated using a line through the centre of the box. The graphs show that the mean of external debt service, inflation rate, terms of trade and the interest rate is greater than their median, which corresponds to their positive skewness, as presented in table 4.1. The mean for current account balance, gross domestic product and nominal exchange rate is smaller than the median which corresponds to the negative skewness presented in table 4.1.

4.3 Time Series property Results

Before estimation and interpretation of the results so as to answer the objectives of the study various time series properties were conducted. This was to ensure that spurious results would not result (Enders, 2004).

4.3.1 Unit Root Test

The study employed Augmented Dickey-Fuller test (ADF) and Phillip-Perron test (PP) to affirm Stationarity of variables under study. The PP test is a superior criterion because it takes care of serial auto correction and structural breaks. The ADF was done by estimating the three ADF equations (3.35, 3.36, and 3.37) presented in chapter three while the Philips-Perron test estimated equation 3.38 presented chapter three.

The null and alternative hypotheses tested in the study for Stationarity were:

H_0: $\rho = 0$ and

H_1: $\rho < 0$.

If the computed t-statistics is greater than the asymptotic critical values in absolute terms, the null hypothesis that the series contained unit root was rejected

and the series was concluded to be stationary (Gujarati, 2004).The findings of the test are shown in table 4.2

Table 4.2 Unit Root Tests Results

Variable	Type of test	Form of test	Test statistics	Conclusion
CAB Level	ADF	Intercept	-2.822	Non-stationary
		Trend & Intercept	-2.879	
	PP	Intercept	-2.825	Non-stationary
		Trend & Intercept	-2.724	
CAD 1st Difference	ADF	Intercept	-6.619**	Stationary
		Trend & Intercept	-6.589**	
EDS Level	ADF	Intercept	-0.537	Non-stationary
		Trend & Intercept	-3.012	
	PP	Intercept	-2.235	Non-stationary
		Trend & Intercept	-2.768	
EDS 1st Difference	ADF	Intercept	-4.518**	Stationary
		Trend & Intercept	-4.524**	
INF Level	ADF	Intercept	-3.127**	Stationary
		Trend & Intercept	-3.735**	
	PP	Intercept	-3.153**	Stationary
		Trend & Intercept	-3.258*	
NER Level	ADF	Intercept	-0.596	Non-stationary
		Trend & Intercept	-1.845	
	PP	Intercept	-0.590	Non-stationary
		Trend & Intercept	-1.929	
NER 1st Difference	ADF	Intercept	-5.391**	Stationary
		Trend & Intercept	-5.296**	
TOT Level	ADF	Intercept	-2.041	Non-stationary
		Trend & Intercept	-2.436	
	PP	Intercept	-2.289	Non-stationary
		Trend & Intercept	-2.676	
TOT 1st Difference	ADF	Intercept	-5.887***	Stationary
		Trend & Intercept	-5.825**	
BD	ADF	Intercept	-5.234***	Stationary
		Trend & Intercept	-5.323**	
	PP	Intercept	-5.373**	Stationary
		Trend & Intercept	-5.456***	
GDP	ADF	Intercept	-3.42***	Stationary
		Trend & Intercept	-3.687**	
	PP	Intercept	-3.46***	Stationary
		Trend & Intercept	-3.707**	
IR	ADF	Intercept	-4.018***	Stationary
		Trend & Intercept	-3.955**	
	PP	Intercept	-4.043***	Stationary
		Trend & Intercept	-3.993**	

Source: Author

Note: ***stationary at 1%; ** stationary at 5%; * stationary at 10% levels of significance

ADF Asymptotic Critical Values with intercept only

		T-statistic
Test critical values:	1% level	-3.632900
	5% level	-2.948404
	10% level	-2.612874

ADF Asymptotic Critical Values with trend and intercept

Test critical values:	1% level	-4.243644
	5% level	-3.544284
	10% level	-3.204699

The unit root test results show that, for budget deficit (BD), gross domestic product (GDP), inflation rate (INF) and interest rates (IR) the test statistics was greater than the critical value at 5 percent for both ADF and PP test in absolute terms. The study therefore rejected the null hypothesis of non-stationary at level and therefore the above variables were integrated of order zero I (0). Current account balance (CAB), external debt service (EDS), nominal exchange rate (NER) and terms of trade (TOT) were non-stationary at level but become stationary at first difference hence integrated of order one I (1).

4.3.2 Cointegration Analysis

Johansen's methodology was utilized to test for Cointegration in this study since it licenses for more than one cointegrating relationship, not at all like the Engle–Granger technique (Adam, 1988). Johansen Cointegration test was applied to examine the number of co integrating vectors in the model. Both Trace and Eigen values were used to determine the number of co integrating vectors. The results are reported in table 4.3

Table 4.3 Cointegration results

Unrestricted Cointegration Rank Test (Trace)				
Series: CAD EDS INF IR GDP BD TOT NER				
Lags interval (in first differences): 1 to 1 Trend assumption: No deterministic trend (restricted constant)				
No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.88779	244.0809	169.5991	0
At most 1 *	0.767004	169.7099	134.678	0.0001
At most 2 *	0.652816	120.181	103.8473	0.0027
At most 3 *	0.549124	84.21238	76.97277	0.0126
At most 4 *	0.455551	57.12924	54.07904	0.026
At most 5*	0.444016	36.45787	35.19275	0.0363
At most 6	0.241728	16.4993	20.26184	0.1523
At most 7	0.188248	7.091043	9.164546	0.1217
Trace test indicates 5 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigen value)				
No. of CE(s)	Eigen value	Max-EigenStatistic	Critical Value (0.05)	Prob.**
None *	0.88779	74.37097	53.18784	0.0001
At most 1 *	0.767004	49.52894	47.07897	0.0267
At most 2 *	0.652816	35.96863	40.9568	0.0337
At most 3 *	0.549124	27.08314	34.80587	0.0496
At most 4	0.455551	20.67137	28.58808	0.3625
At most 5	0.444016	19.95857	22.29962	0.1028
At most 6	0.241728	9.408261	15.8921	0.3913
At most 7	0.188248	7.091043	9.164546	0.1217
Max-eigen value test indicates 4 cointegrating eqn (s) at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level **Mackinnon-Haug-Michelis (1999) p-values				

Source: Author

Trace value test statistic indicates that there were at most five cointegrating vector equations at the 0.05 level among the variables (P<0.05). The Max-eigen value test statistic indicates that there were at most three cointegrating vector equations at the 0.05 level among the variables (P<0.05). Using the trace value test statistic the study rejects the null hypothesis of no cointegrating vector and also the null hypothesis of at least four cointegrating vectors at 5 percent level of significance. However, using the Max-eigen value test statistics the study rejects the null hypothesis of no cointegrating vector and also the null hypothesis of at

least three cointegrating at 5 percent level of significance. The cointegrating test results confirmed that there was cointegration and thus the relationship between them could be described by Vector Error Correction model (VECM).

4.4 Lag Order Selection

Before estimating the VECM model, the study determined the optimal lag length (K).This was to ensure that the model specified should have the "right" number of lags included. This is because including too many lags will lead to lose of degrees of freedom. If the included lags are too few then the model will be imprecise. The information criteria like Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), Likelihood ratio (LR), and Final Prediction Error (FPE) were employed to choose and affirm the appropriate lag length. The results for the lag length selection are given in Appendix III table A1.3. From the results on VAR Lag Order selection Criteria, SC, AIC and LR selected 2 lags as the optimal.

4.5 Post estimation Diagnostic Test

Diagnostic tests were undertaken to ensure consistent coefficient estimates

4.5.1 Multicollinearity Test

Multicollinearity between regressors leads to inaccurate estimates since the presence of multicollinearity makes standard errors of affected coefficients to be large thereby affecting the predictors. To avoid having inaccurate estimates, correlation between regressors was done to test for multicollinearity. To affirm the absence of multicollinearity, the correlation coefficient between variables should be less than 0.8 (Gujarati, 2004). The results of the correlation coefficients are represented by correlation matrix in table 4.4.

Table 4.4 Multicollinearity results

	DCAB	DEDS	DTOT	DNER	GDP	INF	I	BD
DCAB	1							
DEDS	-0.48596	1						
DTOT	-0.28549	-0.35089	1					
DNER	0.191596	0.399829	0.23038	1				
GDP	-0.1509	-0.03865	-0.01865	-0.37223	1			
INF	0.007864	0.349402	0.316592	0.669139	-0.5353	1		
I	-0.4124	0.277698	-0.25596	-0.20294	0.425137	-0.4491	1	
BD	0.370515	-0.4071	-0.29423	-0.43754	-0.03766	-0.1621	-0.176	1

Source: Author

Multicollinearity results indicate that the correlation coefficients between independent variables were less than 0.8 proving there was no serious multicollinearity among the variables.

4.5.2 Normality Test

The basic assumption of good regression model is that the error term of the regression model should be normally distributed. To affirm the normality test, the probability of the Jarque Bera should be more than 0.05. The normality results are presented in Appendix III Table A1.2. The Jarque Bera Statistics was found to have probability value greater than 0.05 (5 percent). Thus, the null hypothesis was not rejected meaning that the residual was normally distributed.

4.5.3 Serial Correlation Test

Serial correlation is present if residuals of one period are related to the residuals of the previous period. Breusch-Godfrey Serial Correlation LM test was employed in the study to test for the presence of serial correlation. The null hypothesis for serial correlation test was stated as, H_0: There is no serial correlation. If the probability value (p-value) is greater than 5 percent, the null

hypothesis is not rejected. The results on Breusch-Godfrey Serial Correlation LM Test are presented in table 4.5.

Table 4. 5 Breusch-Godfrey Serial Correlation LM Results

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.715367	Prob. F(2,20)	0.2053
Obs*R-squared	4.978288	Prob. Chi-Square(2)	0.083

Source: Author

Table 4.5 confirmed that there was no evidence of autocorrelation as the probability of the observed R-squared was greater than 0.05 hence the study did not reject the null hypothesis of no serial correlation.

4.5.4 Heteroskedasticity Test

Heteroskedasticity transpires when the variance of the residuals in a model is not constant. Breusch-Pagan-Godfrey test was employed to test for the presence of heteroskedasticity. The null hypothesis for the test, H_0: Variance is constant (homoscedasticity). If the probability value (p-value) is greater than 5 percent, the null hypothesis is not rejected. The results are presented in table 4.6.

Table 4. 6 Heteroskedasticity Test Results

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.981475	Prob. F(11,22)	0.4907
Obs*R-squared	11.1925	Prob. Chi-Square(11)	0.4273
Scaled explained SS	7.619553	Prob. Chi-Square(11)	0.7469

Source: Author

Since the probability value is greater than 5 percent, the null hypothesis of variance is constant is not rejected, concluding there is no problem of heteroskedasticity

4.5.5 Regression Specification Error Test (RESET)

The RESET test which was proposed by Ramsey (1969) was utilized to determine the departure from the classical linear regression assumptions. In classical normal linear regression the disturbance vector ϵ is ventured to follow the multivariate normal distribution N $(0,\sigma^2$ I). Specification error is an omnibus term which covers any take-off from the assumptions of the maintained model. Serial correlation, heteroskedasticity, or non-normality of all violate the assumption that the disturbances are distributed N $(0, \sigma^2$ I). Ramsey and Alexander (1984) affirmed RESET as a test for correlation between independent variables and residuals, omitted variable problem and incorrect functional relationship in a model. In most cases the specification errors is due to measurement errors of the independent variables and expression of the independent variable as a function of lagged values in the model. The previous diagnostic test for normality, and heteroskedasticity proved that the estimated model satisfies all the OLS assumption hence desirable. Further, Ramsey RESET test was employed to examine the estimated equation. The results are presented in table 4.7

Table 4. 7 Ramsey Test Results

Dependent Variable	No. of terms	Test statistic		Conclusion
		F-statistic	Prob. (F-stat)	
Current account balance	1	2.4150	0.1063	No misspecification error evidence
	2	1.7934	0.1948	

Source: Author

4.5.6 Model stability

Finally, stability test of the models recursive estimates was conducted on the estimated equation. In this regard, CUSUM tests and CUSUM of squares tests were run. The CUSUM test proposed by Brown and Durbin (1975) is based on the cumulative sum of the recursive residuals. It therefore plots the cumulative sum together with the 5 percent critical lines. If the cumulative sum goes outside the area between the two critical lines then the test finds parameter instability. The CUSUM stability test results presented in Appendix II figures A1.3 gave sufficient evidence to reject the null hypothesis of the model not being stable at 5 percent level of significance. The results therefore supported the claim that the model is stable since the residuals lie within the dual standard error range.

4.6 Granger causality test

To achieve objective one the study tested for the nature of causality between current account balance and external debt service using the granger causality test. X is said to Granger-cause Y if the future values of Y can be better determined utilizing the past values of both X and Y than it can by utilizing the past values of Y alone (Giles, 2011). This is a test which checks if one time series could be used to predict another time series (Engle and Granger, 1987). To examine Granger causation between external debt service and current account balancethe granger causality test was done through estimation of two regression equation 3.19 and 3.20 presented in chapter three. The results were presented in the table 4.8

Table 4. 8 Granger causality Results

Var granger causality/block exogeneity wald tests Included observations: 33 Dependent variable: current account balance			
Excluded	Chi-sq	Df	Prob.
External debt service	0.00414	2	0.0186
Nominal exchange rate	1.7925	2	0.0451
Terms of trade	8.26193	2	0.0042
Gross domestic product	0.1478	2	0.0556
Inflation rate	0.624	2	0.4294
Interest rate	0.6182	2	0.4317
Budget deficit	4.174393	2	0.0409
ALL	21.433	14	0.0032
Dependent variable: External debt service			
Excluded	Chi-sq	Df	Prob.
Current account balance	0.0928	2	0.07606
Nominal exchange rate	0.0058	2	0.9391
Terms of trade	0.2927	2	0.5885
Gross domestic product	4.2111	2	0.0402
Inflation rate	2.637	2	0.1044
Interest rate	0.0335	2	0.8547
Budget deficit	1.9595	2	0.1616
All	8.3356	14	0.0057

Source: Author

Table 4.8 reveals that the study rejects the null hypothesis of no granger causality between external debt and current account deficit (P=0.0186< 0.05). This implies that there is unidirectional causality between external debt and current account balance. This implies that external debt could be used to explain current account balance in Kenya. This was further confirmed by a p-value (0.076) for null hypothesis that current account balance do not granger cause external debt service. Since 0.076>0.05 we do not reject the null hypothesis hence current account balance do not granger cause external debt service.

These findings are in concurrence with various studies such as Mbanga and sikod (2008) and Morsy (2009) which found that external debt servicing granger caused current account balance in Greece and Oil exporting countries respectively. The finding implies that external debt servicing trends can be used to predict the position of current account balance. The findings in this study differed with Kayikci (2011) which revealed bidirectional causality between external debt servicing and current account balance. According to Kayikci (2011) current account balance can be used to predict external debt servicing. Kayicki (2011) argued that a country facing current account deficit uses some of its borrowed funds which should be used for other projects to finance the deficit. However, the findings in this study revealed that current account balance cannot be used to predict external debt servicing. According to the findings presented in table 4.8 policies on external debt management should therefore be carefully designed so as not to weaken the current account balance.

4.7 Long-run relationship between external debt servicing and current account balance

To achieve objective two of determining the long run relationship between external debt service and current account balance the study estimated ARDL equation (3.28) presented in chapter three. Equation 3.29 was not estimated since from objective one it was already established that current account balance cannot be used to predict external debt servicing. The current account balance was therefore treated as the dependent variable. The estimated results are presented in table 4.9.

Table 4.9 Regression Results

Dependent Variable: Current account balance				
Method: ARDL				
Included observations: 35 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CAB(-1)	0.365043	0.143641	2.5413	0.0179
EDS	-1.5625	0.6812	-2.293	0.0367
BD	0.2511	0.1688	1.4894	0.1571
NER	0.6459	0.14729	4.3857	0.0005
INF	0.1872	0.1120	1.6708	0.1155
GDP	-0.5825	0.2913	-2.002	0.045
IR	-0.240	0.1189	-2.02	0.049
TOT	-0.6064	0.1154	-5.255	0.0001
C	27.8353	8.292	3.356	0.0026
R-squared	0.8696	Mean dependent var		-0.2201
Adjusted R-squared	0.7218	S.D. dependent var		4.5519
S.E. of regression	2.4006	Akaike info criterion		4.8917
Sum squared resid	86.441	Schwarz criterion		5.70814
Log likelihood	-62.2080	Hannan-Quinn criter.		5.166113
F-statistic	5.885	Durbin-Watson stat		2.59615
Prob(F-statistic)	0.0000617			

Source: Author

Substituted Coefficients:

$$CAB = 27.8353 - 1.5625EDS - 0.6064\,TOT + 0.6459\,NER - 0.240\,IR - 0.5825\,rGDP + 0.1872\,INF + 0.2511\,BD \ldots\ldots\ldots\ldots\ldots .4.1$$

Table 4.9 shows that the variations in the explanatory variables jointly explain 86.96 percent of the variations in current account balance holding other factors

constant. The remaining 13.04 percent of the current account balance variations are explained by other variables which were not included in the model. An adjusted R-squared of 72.18percent shows that the independent variables in the model accounts for 72.18percentof the variations of the current account balance when adjusted for degrees of freedom. Since the adjusted R-Squared is more than 50 percent is an indicator that the model has a good fit and can explain the changes in current account balance. The remaining 27.82 percent of the variations in current account balance could be attributed to variables that are not captured in the model.

External debt servicing is found to affect current account balance negatively in the long run. The coefficient for external debt service is -1.5625 and a probability value of 0.0367. This means that one per cent increase in external debt service would lead to about 1.5625 percent decline in the current account balance. This supports the balance of payment constraint model which argues that accumulation of external debt leads to increase in imports and a decrease in exports. Increase in imports of goods and services will worsen the current account balance. The p-value (0.0000617) of the F-statistic indicates that the overall model was significant in explaining the relationship between the current account balance and the selected macroeconomic variables. Durbin-Watson statistic (2.59) which is greater than 2 implies no serious autocorrelation problems. This is also supported by the serial correlation test.

These findings are in concurrence with other studies such as Chinn and Prasad (2003) that revealed that external debt servicing and current account balance were negatively related in non-oil developed countries. According to Chinn and Prasad

(2003) a unit increase in external debt servicing led to 2.523 percent decline in current account balance. Hermann and Jochem (2005) also found that there was existence of a negative relationship between current account balance and external debt servicing in East European unions. According to Hermann and Jochem (2005) increasing external debt servicing by one percent declines the current account balance by 1.026 units. This implied that countries with high external debt service as a percentage of GDP faced a huge current account deficit.

Other factors that affect current account balance negatively are gross domestic product, interest rates and terms of trade where by the three variables are statistically significant at 5 percent level of significance. One percent increase in gross domestic product leads to 0.5825 percent decrease in current account balance with p-value of 0.045 which is less than 0.05. This supports the argument that as the GDP of a country grows the country tends to increase its imports and thus affecting the current account balance negatively. Similarly one percent increase in the terms of trade leads to 0.6064 percent decline in the value of current account balance with p-value of 0.0001 which is less than 0.05. The interest rate coefficient is -0.240 which means that one percent increase in interest rate leads to 0.240 percent decline in current account balance.

Table 4.9 further shows that nominal exchange rate and current account balance have a positive relationship in the long run. The nominal exchange rate coefficient is 0.6459 with p-value of 0.0005 which is less than 0.05. This means that one percent increase in exchange rate (depreciation) will improve the current account balance by 0.6459 percent. These results were supported by Mwangi (2014) that found a positive relationship between current account balance and

nominal exchange rate. This confirms the elasticity approach to current account balance where by depreciation of domestic currency makes exports cheaper and imports more expensive. The country with a weaker currency will therefore export more goods and services than it imports thus improving the current account balance. The p-values of the inflation rate and budget deficit were greater than 0.05 hence the study could not reject the null hypothesis of insignificant. The study concluded that the budget deficit and the rate of inflation were statistically insignificant in explaining the variations in current account balance.

4.8 The Responsiveness of the current account balance to changes in the external debt servicing

To analyse the impact of the current account balance due to shock in external debt service impulse response functions and variance decomposition analysis were utilized. The forecasting was done over 36years' time horizon.

4.8.1 Impulse response function (IRF)

Impulse response function traces the effects of each variable in VECM model over given period of time. A shock to the i^{th} variable not only directly affects the i^{th} variable but is also transmitted to all of the other endogenous variables through the dynamic (lag) structure of the VECM. Impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables. IRF forms the basis of interpreting VECM models despite their criticism by many economists. The impulse response function involved estimation of equation 3.31 and equation 3.32 presented in chapter three. The plots of impulse responses presented in appendix III Figure A1.5 summarize the results of the shock evaluation, indicating the responses of each

variable over the 36 years horizon to the initial one standard deviation positive shock to each of the variable in the VECM equation. The result reveals that when there is one standard deviation shock on the external debt the current account reacts positively and increases sharply in the first two years. Between the 2nd and the 4th year the effect drops sharply. After the 4th year the effect increases slightly up to the 5th year. After the 5thyear the effect swings in to the negative territory suggesting that the external debt service has negative impact on current account balance and then after the first 9 years the effect fizzles out. The effect was initially positive for a period of two year and then moved to the negative territory. This suggests that external debt service affects the current account balance negatively because the effect takes longer in the negative territory. These findings were in concurrence with Mbanga and Sikod (2008) which revealed a negative impact of external debt on current account balance. This supports the debt overhang theory which states that accumulation of external debt will reduce the investment in the short run and thus improve the current account balance. In the long run the external debt will increase government expenditure which will worsen current account balance according to intertemporal approach to current account.

4.8.2 Variance Decomposition Analysis (VDA)

The variance decomposition analysis was conducted as shown in Table A1.5 which was extracted from Appendix III Table A1.4. The variance decomposition analysis was done by estimating equation 3.33 presented in chapter three. The VDA presented a further step of determining what percentage of the variation in a series was due to its own shocks and which percentage was due to shocks of other variables in the model at a given period (Enders, 1995). Table A1.5 reveals that

all the variations of current account were due to its own shock at 100 percent in the first year. In the second year it was established that 66.01 percent variations in current account were explained by its own shocks, 10.912 percent of the variations were explained by external debt service. The remaining 23.078 percent of the variations were explained by the other variables included in the model such as the terms of trade, nominal exchange rate, gross domestic product, budget deficit, inflation rate and interest rate. In the fourth period it was established that 64.252 percent current account balance variations were explained by shocks in the current account balance itself while 11.88 percent of the variations were explained by external debt service. The remaining 23.868 percent of the variations were explained by the other factors.

Further it was established that the variations in the current account balance as a result of external debt service shock decreased from the 2^{nd} period to the 3^{rd} period and the increased steadily up to the 7^{th} period. From the 7^{th} period it started diminishing again but at low rate stabilizing at 13.77percent in the 20^{th} period.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1 Introduction

This chapter gives a summary of the study findings and makes conclusions based on the study findings. It further discusses the policy implications of the study from the findings and highlights the areas for further research.

5.2 Summary

The general objective of this study was to investigate the relationship between external debt servicing and current account balance. Specifically, the study investigated the nature of causality between external debt servicing and current account balance, the long run relationship, and dynamic response between current account balance and external debt servicing. The real inspiration of this study was based on the fact that persistent current account deficits of the country have been of concern to economists in the Kenyan economy. The precise quantitative nature of the relationship between the two variables would be meaningful to national treasury since it will inform how external debt servicing affects the current account balance when preparing the national policies.

To achieve the objectives of the study secondary annual time series data for the period between 1980 and 2015 was collected. The sources of data included; statistical absracts from Kenya nationa bureau of statistics (KNBS), The World Bank Development indicators and the Central Bank of Kenya (CBK).

This study adopted the absorption approach to current account balance which emphasizes changes in real domestic income and assumes that prices remain constant. Time series properties were tested such as the presence of unit roots and cointegration of the variables to ensure that spurious results would not result. Current account balance, external debt service , nominal exchange rate and terms of trade were non-stationary at level but became stationary at first difference hence integrated of order one I(1). The stationary series were included in analysis, whereas the non-stationary series were differenced once before their inclusion.

Cointegration results confirmed that the variables were cointegrated and therefore the study estimated vector error correction model (VECM).VECM allowed the test causality in two different ways; first it allowed for short-run causality test, which was examined by lagged differences of the variables and second the long-run causality determined by the significance of the coefficient. Before interpreting the results the estimated models were subjected to pre and post diagnostic test. Some of the diagnostic tests conducted were residual normality test, multicollinearity test, serial correlation test, regression specification error test, model stability and normality tests.

The first objective of this study was to determine the nature of causality between external debt service and current account balance. The study adopted granger causality test to establish the nature of relationship between external debt service and current account balance alongside other control variables such as terms of trade, budget deficit, nominal exchange rate, real gross domestic product, rate of inflation and interest rates. The main interest was to know which variable can be used to predict the other variable between external debt service and current

account balance. The study found that external debt service granger causes current account balance in Kenya.

To achieve objective two of determining the long run relationship between external debt service and current account balance the study estimated ARDL equation. The empirical findings show that external debt service has significant negative effect on current account balance. The coefficient for external debt service was negative with a coefficient of -1.5625 and a probability value of 0.0367. This meant that a percent increase in external debt service would lead to about 1.5625 per cent decline in the current account balance. Increase in imports of goods and services will worsen the current account balance. Other factors which affect current account balance negatively are gross domestic product, interest rates and terms of trade where by the three variables are statistically significant at 5 percent level of significance. In addition, nominal exchange rate and current account balance have a positive relationship in the long run

The study also analysed the dynamic response of the current account balance due to one standard deviation shock to external debt service. After estimating the VECM model the coefficients were used to derive impulse response functions. The impact of unexpected changes in external debt service lasted for long period before finally fizzling out. However it was established that one standard deviation shock to external debt service had mixed effect both negative and positive and the effect persisted for a long time in the economy. The result reveals that when there is one standard deviation shock on the external debt the current account reacts positively and increases sharply in the first two years. Between the 2^{nd} and the 4^{th} year the effect drops sharply. After the 4^{th} year the effect increases slightly up to the 5^{th} year. After the 5^{th} year the effect swings in to the negative territory

suggesting that the external debt service have negative impact on current account balance. After the first 9 years the effect fizzles out. The effect was initially positive for a period of two year and then moved to the negative territory. This suggests that external debt service affects the current account balance negatively because the effect takes longer in the negative territory.

5.3 Conclusions

The study concludes that external debt service granger causes current account balance. In addition external debt service has significant negative effect on current account balance. In the short run external debt service crowded out private investment thus affecting current account balance positively. In the long run high external debt service resulting from high external debt burden will lead to increase in imports and government spending thus affecting the current account balance negatively. Innovations in external debt service would persist for over nine years before it fizzles out.

5.4 Policy Implications

The study established that external debt service granger causes current account balance. The results implied that this causation should be vital tool of designing external debt policies. The national treasury should consider the linkage between external debt and other macroeconomic variables such as current account balance before exposing itself to any external debt. To achieve the current account balance of -5 percent of GDP which is the recommended threshold then the national treasury need to reduce the external debt servicing by 1 percent. This is on the grounds that solvency requires that the nation be willing and able to produce adequate current account surpluses to reimburse what it has borrowed to finance the current account deficits.

The study recommends that there should be clear implementation of the medium term debt strategy. This medium term debt strategy should aim at having an optimal borrowing mix between domestic debt and external debt. This will guard against vulnerability to external debt shocks and crowding out effect. Policies on external debt management should be carefully designed not to weaken macroeconomic fundamentals because they take long time before fizzing out.

5.5 Areas for Further Research

The main focus of the study was limited to the relationship between external debt service and current account balance in Kenya. The study established that external debt service granger cause current account balance and that in the long run external debt service affected current account balance negatively. The study proposes further investigation on the relationship between other macroeconomic variables and current account balance to determine their short term and long term effect on current account balance in Kenya. Further the study proposes more investigation between external debt service and other macroeconomic variables in Kenya.

References

Adam, C. (1988). Macroeconomic management: New methods and policy issues, time series econometrics for developing Countries, *Centre for the study of African Economies.* Oxford: University of Oxford.

Bahmani, D.A and Ratha, W. (2004). A Forecasting Model of Kenyan Economy . *Economic Modelling* , vol.19(1) Pp 801-814.

Blanchard, Oliverj and Francesco giavazzi. (2002). Current Account Deficit in the Euro Area. The End of the Feldstein Horioka Puzzle. *Brookings papers on Economic Activity* , 2:411-434.

Brien.O and Ryan T.C . (1999). *Aid and Reforms in Africa. An analysis of Kenya.* Washington , DC: The World Bank group.

Central Bank of Kenya (2014), Economic survey, Government Printer

Central Bank of Kenya (2015), Economic survey, Government Printer

Chinn, H.S. and Prasad F.G. (2003) "Current Account Deficit in the Euro Area. The End of the Feldstein Horioka Puzzle", Journal of Economic Economic Dynamics, Vol. 2 No.4, pp. 21-34.

Classens.S, Detragiache.E, Kanbur.R and Wickhan.p. (1996). Analytical Aspects of the Debt problems of Heavily Indebted poor Countries. *Paper presented to the World Bank seminar.* Washinhton, DC: World Bank.

Cohen, D. (1993). Low Investment and Large LDC Debt in the 1980s. *The American Economic Review,June*

Dickey, D.A and W.A. Fuller. (1976). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association* , Vol. 74, 427-431.

Dornbusch R. and Fisher, S. (1991). *Moderate inflation. Policy Research Working paper 807.* Washington, DC: World Bank.

Edwards s. (2001) Does the Current Account Matter? National Bureau of Economics Research Working Paper No.8275.

Elbadawa. A, J.B. Ndulu, and N. Ndungu. (1996). Debt Overhang and Economic Growth in Sub-Saharan Africa. *World Bank conference on External Financing for Low-income Countries.* Washington, DC: World Bank.

Engle, R.F and C.W Granger. (1987). Co integration and error correction. *Representation, estimation and testing, Econometrica* , Vol.55, 251-276.

Gaincarlo. G. (2002). *International Finance and Open- Economy Macroeconomics.* Springer.

Ghosh AR and Ostry JD. (1997). Macroeconomics Uncertainty, Precautionary Saving and Current Account. *Journal of Monetary Economics* , 40:121-139.

Ghosh, A. and Ramakrishnan, U. (2006). Do Current Account Deficit Matter? *International Monetary Fund* .

Greene, W. (2008). *Econometric analysis, 6th ed.* New Jersey: Pearson-Prentice Hall.

Gujarati, D. (2004). *Basic econometrics, 4 th ed.* New York: McGraw Hill Companies.

Herrmann.S and A. Jochem. (2005). Determinants of Current Account Developments in the Central and East European Member States. *Consequences for Enlargement of the Euro Area* , Discussion Paper No 32/2005.

Johansens. S (1988) *Statistical Analysis of Cointegration Vectors, Journal of Economic Dynamics and control*, 12,231-234

Kariuki, G. M. (2006), Exports and Economic Growth Relationship in Kenya: Cointegration and Causality Analysis, Unpublished Master of Arts (Economics) Research Paper, University of Nairobi

Kariuki, G. M. (2009) Determinanants of current account balance in kenya: The intertempoaral approach. *KIPPRA Discussion paper* , No.93.

Kayikci Fazil. (2011). *Determinants of the current account balance in Turkey: Vector auto regression approach.* Yildiz Technical University.

Kenen, P. B. (1995): Understanding Interdependence: The Macroeconomics of the Open Economy. Princeton University Press

Kosimbei, G. (2002). *The relationship between fiscal deficit and current account balance in Kenya: 1965 to 2000.* Nairobi: Kenyatta University: Unpublished M.A research paper.

Lensink.R and White H. (1999). Is there an Aid Laffer Curve?'. *Credit Research Paper No.99/6. Nottingham: Centre for Research in Economic Development and International Trade.*

Magero O. Joshua (2015). Total debt servicing and Macroeconomic Performance in Kenya: Kenyatta University: Unpublished M.A research paper

Mbanga G.N and Sikod.F. (2008). The impact of Debt and Debt-Service Payment on Investment in Greece. *Final report presented at the AERC Biannual Research Workshop*

Morsy, H. G. (2009). *The Intertemporal Approach to Current Account and Currency Crises.* Cambridge University.

Muchapondwa, E. (2008). *Estmation of the aggregate agricultural supply response: The ARDL approach to Cointegration.* University of Cape town: Working paper Number 90.

Mudida. (2012). Testing Marshal - Lerner Condition in Kenya. *Economic Modelling, Vol.19* , 1-13.

Murshed, S M (1997) Macroeconomics for Open Economies, London: Dryden Press.

Mutai N., Maana I. and Owino R (2008) Domestic Debt and its Impact on the Economy: The Case of Kenya. African Econometric Society Conference Pretoria: Central Bank of Kenya.

Mutuku, C. M. (2007), What Drives Current Account Deficit in Kenya? Nairobi: University of Nairobi, School of Economics

Mwangi K. Samuel (2014), Determinants of Current Account Balance in Kenya. Nairobi: Kenyatta University: Unpublished M.A research paper

Mwenga, F. M. (2007), The Exchange Rate, External Balance and Economic Growth in Kenya, Nairobi: University of Nairobi, School of Economics

Myers, S. (1977). Determinants of Corporate Borrowing. *Journal of Financial Economics*. 5 (2): 147–175

Nusrate, A. (2008). *The Role of Exchange Rate in Trade Balance. Empirical evidence From Bangladesh.* UK: University of Birmigham.

Ogwuru, H. (2008). Exchange Rate Dynamics and Current Account Balance in Nigeria. *Jounal of Finance and Economic Research, Vol. 3* , 289-326.

Pesaran, M.H, Shin Y, J.R Smith. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics* , Vol. 16(3), 289-326.

Philips, P.C.B and Perron. (1988). Testing for a Unit root in time series regression. *Biometrika* , Vol. 75, 335-346.

Ramsey, J. B. (1969). Tests for Specification Errors in Classical Linear Least Squares Regression Analysis. *Journal of the Royal Statistical Society, Series B*. 31 (2): 350–371.

Ramsey, J. B. and Alexander, G (1984) convenient specification tests for logit and probit models, Journal of Econometrics, 25, 241-62.

Repbulic of Kenya (1982). *Economic survey.* Nairobi: Government Printer.

Sims.C. (1980). Macroeconomics and Reality. *Econometrica* , 48,1-48.

Sobrino, C. R. (2010). The Effects of Inflation Targeting on the Current Account: An Empirical Examination. *Economics Bulletin, Vol. 30 no.2* , 1105-1112.

Stock, J.H. &Watson, M.W. (2001). Vector Autoregressions, *Journal of Economic Perspectives* , 15(4), 101-115.

Summer L, (1996). Sustainability of Current Account Deficits in Turkey: Markov Switching Approach. International Journal of Economics and Finance, 4(2), p135

Thirlwall A.P. (1986) The Elasticity Approach to the Balance of Payments. In: Balance-of-Payments Theory and the United Kingdom Experience. Palgrave Macmillan, London

Todaro, M.P. and S.C. Smith (2003), Economic Development, Eighth Edition, India: Pearson Education, Inc.

Tsikata, T. (2013). Exchange rate liberalization in selected Sub-Saharan African Countries: Success, Failures and Lessons. *IMF Working Paper* , WP/13/32.

Were, M. (2001). The Impact of External Debt on Economic Growth in Kenya. Nairobi: Kenya Institute for Public Policy and Research Analysis

APPENDICES

APPENDIX 1: DATA

YEAR	CAB(%GDP)	GDP (%)	INF	NER (Ksh/us$)	TOT (year 2000)	IR(%)	EDS (%GDP)	BD(%GDP)
1980	-12.0608417	5.591976207	13.866	7.42	100.72	0.94258924	5.966	-0.35
1981	-8.19304696	3.773544197	7.895	9.05	88.11	1.41050609	7.075	-11.23
1982	-4.74747964	1.506478254	13.821	10.92	81.62	2.60541241	7.725	-10.02
1983	-0.79027844	1.309050242	11.603	13.31	77.37	3.57239445	8.613	-4.44
1984	-2.04946965	1.755216977	20.667	14.41	87.02	3.83512032	9.346	-5.76
1985	-1.87478425	4.30056182	11.398	16.43	76.69	5.25753765	10.125	-4.25
1986	-0.62148711	7.177555391	10.284	16.23	85.5	4.86449505	9.356	-7.45
1987	-6.29861584	5.937107446	13.007	16.45	77.86	8.15738964	8.674	-4.05
1988	-5.640536	6.20318382	4.804	17.75	81.06	8.02623232	8.828	-4.59
1989	-7.12799751	4.690348768	7.617	20.57	79.37	6.81521194	8.557	-6.21
1990	-6.14864228	4.192050974	11.2	22.91	70.15	7.33279707	9.226	-7.28
1991	-2.61695817	1.438346791	19.104	27.51	78.69	5.74551265	8.825	-1.87
1992	-2.19456002	-0.79949396	27.332	32.22	81.03	1.82532919	8.1644	-3.65
1993	-4.55283033	0.353197256	45.979	58	94.87	3.41347241	10.987	-6.23
1994	-6.28016733	2.632784519	28.814	56.05	107.23	16.4281099	12.329	-0.82
1995	-17.4462046	4.406216526	1.554	51.43	103.88	15.8016483	9.998	-17.78
1996	-7.97942029	4.146839267	8.862	57.11	108.25	-5.7765885	6.954	-0.83
1997	-13.6527925	0.47490192	11.924	58.73	114.02	16.8795685	5.007	-1.44
1998	-18.6798241	3.290213723	6.716	60.37	109.91	21.096326	4.702	0.63
1999	-18.3406998	2.305388596	5.753	70.33	98.08	17.4540488	5.386	1.75
2000	-1.56935079	0.599695392	9.955	76.18	100	15.3274334	4.666	-1.61
2001	-2.46632258	3.779906496	5.824	78.56	95.12	17.812501	3.738	-1.26
2002	-0.8949754	0.54685953	2.156	78.75	91.6	17.3581406	4.043	-2.62
2003	0.88845032	2.932475546	5.983	75.94	90.92	9.77051093	3.899	-1.64
2004	-0.81870302	5.104299776	8.381	79.17	89.71	5.0452576	2.227	-2.78
2005	-1.34655851	5.906666082	7.823	75.55	89.87	7.60998755	2.886	-1.72
2006	-1.97646895	6.472494299	6.041	72.1	88.98	-8.0098669	1.668	-1.59
2007	-3.2293696	6.850729771	4.265	67.32	86.31	4.81909079	1.429	-1.02
2008	-5.5232963	0.232282746	15.101	69.18	86.06	-0.9849969	1.151	-3.93
2009	-4.56087776	3.306939815	10.552	77.35	96.58	2.83707816	1.049	-4.94
2010	-5.92173032	8.402277064	4.309	79.23	95.21	12.025898	1.004	-7.12
2011	-9.13006656	6.11161346	14.022	88.81	91.99	3.8406757	1.043	-4.5
2012	-8.44083402	4.563200169	9.378	84.53	92.03	9.45660685	1.168	-4.7
2013	-8.84145659	5.879763868	5.717	86.12	87.82	11.5477305	1.162	-5.6
2014	-10.3255803	5.351839858	6.878	87.92	88.12	7.81563439	2.009	-8
2015	-12.012	5.713382918	6.92	98.18	102.27	5.89623185	1.488	-8.1

Table A1.1 Refined data

Source: World Bank economic indicators

APPENDIX II: FIGURES

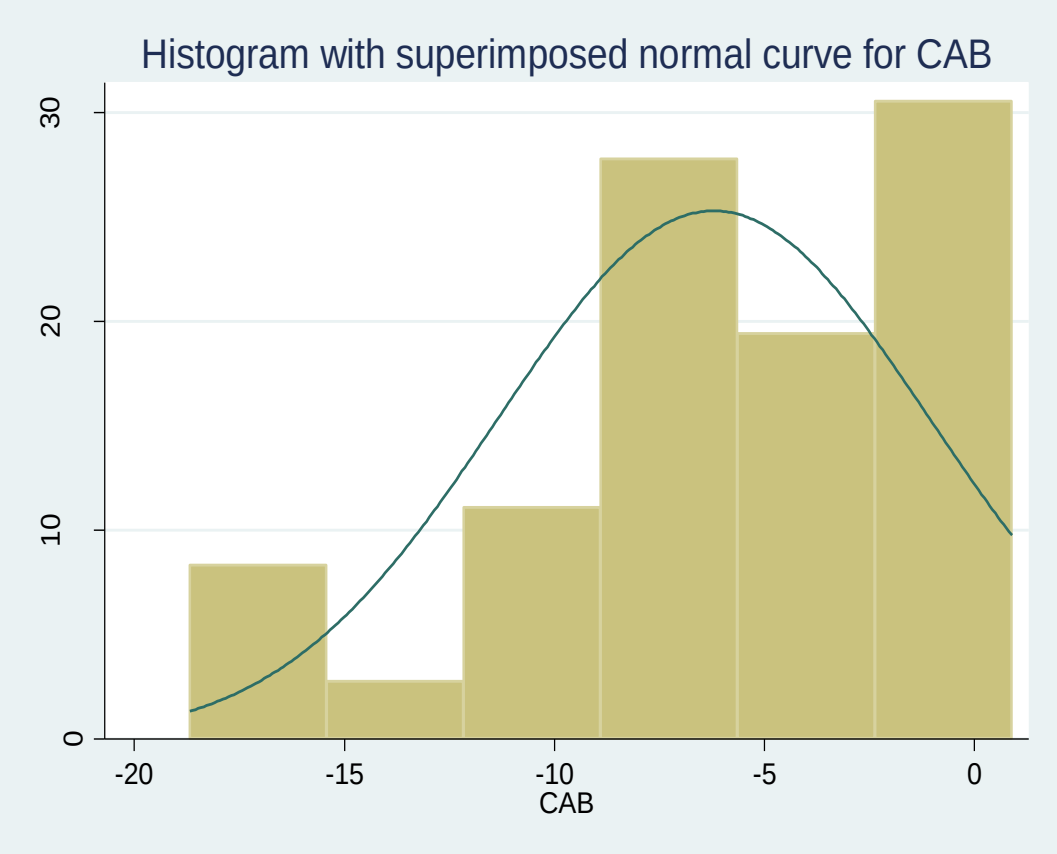


Figure A1.1 Histogram with superimposed normal curve for CAB
Source: Author (2018)

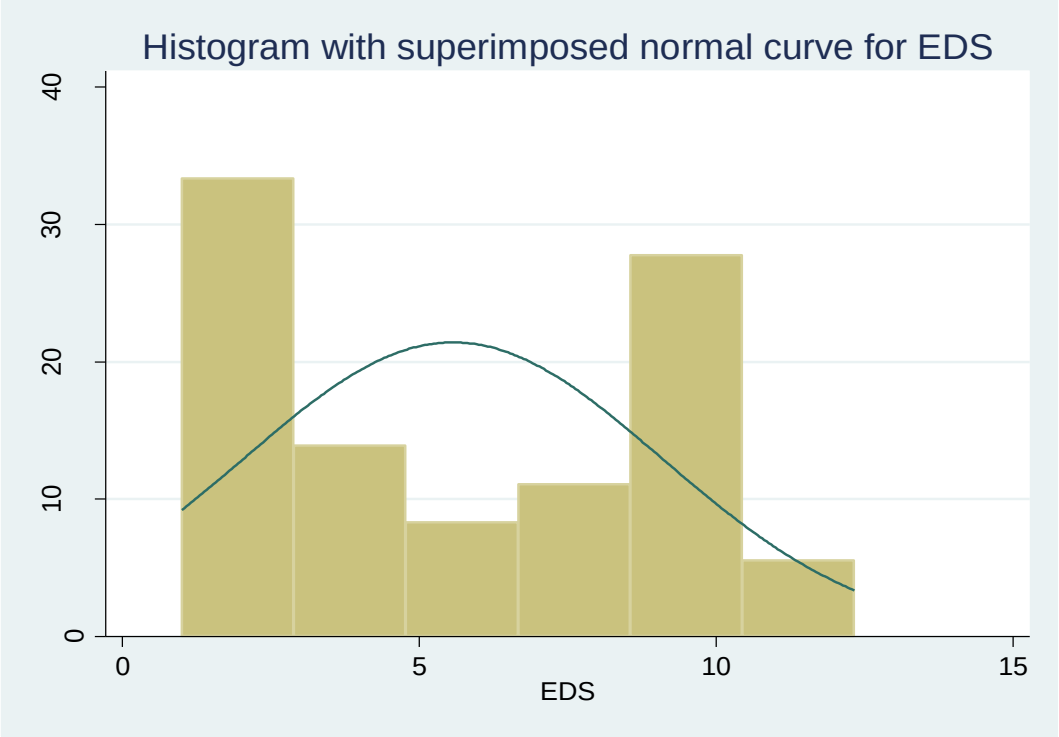
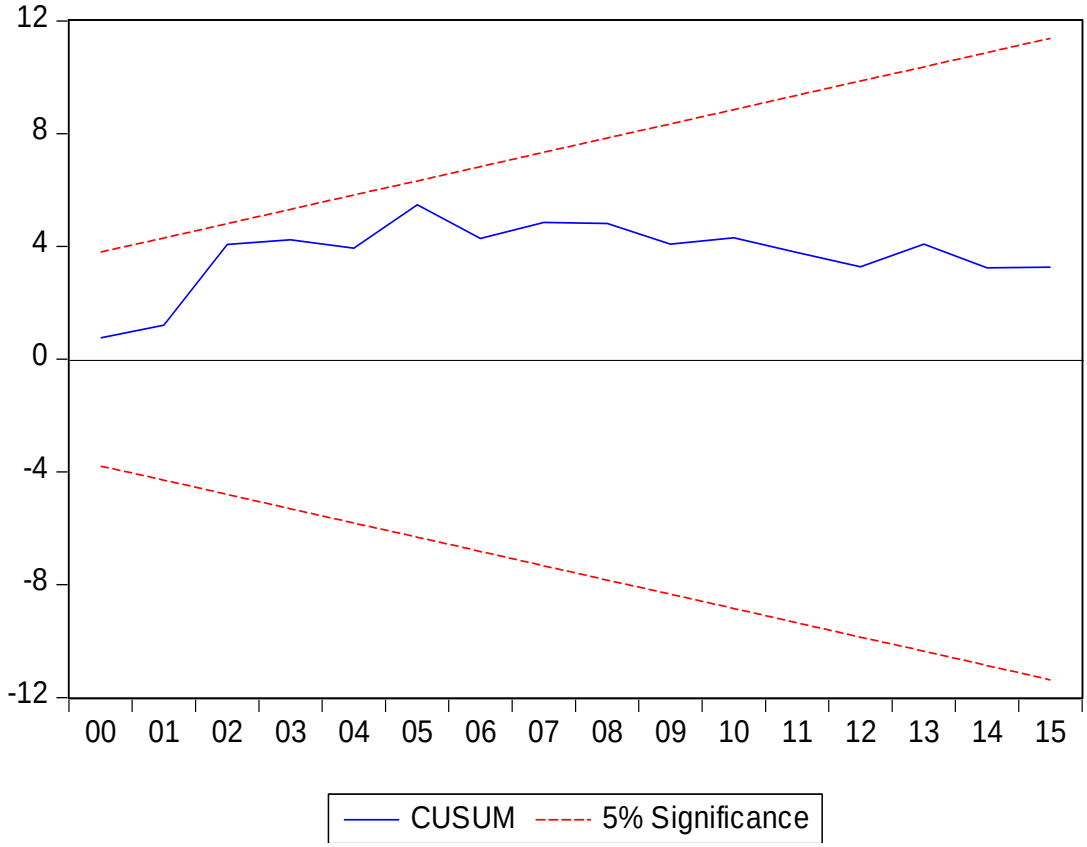


Figure A1.2 Histogram with superimposed normal curve for EDS

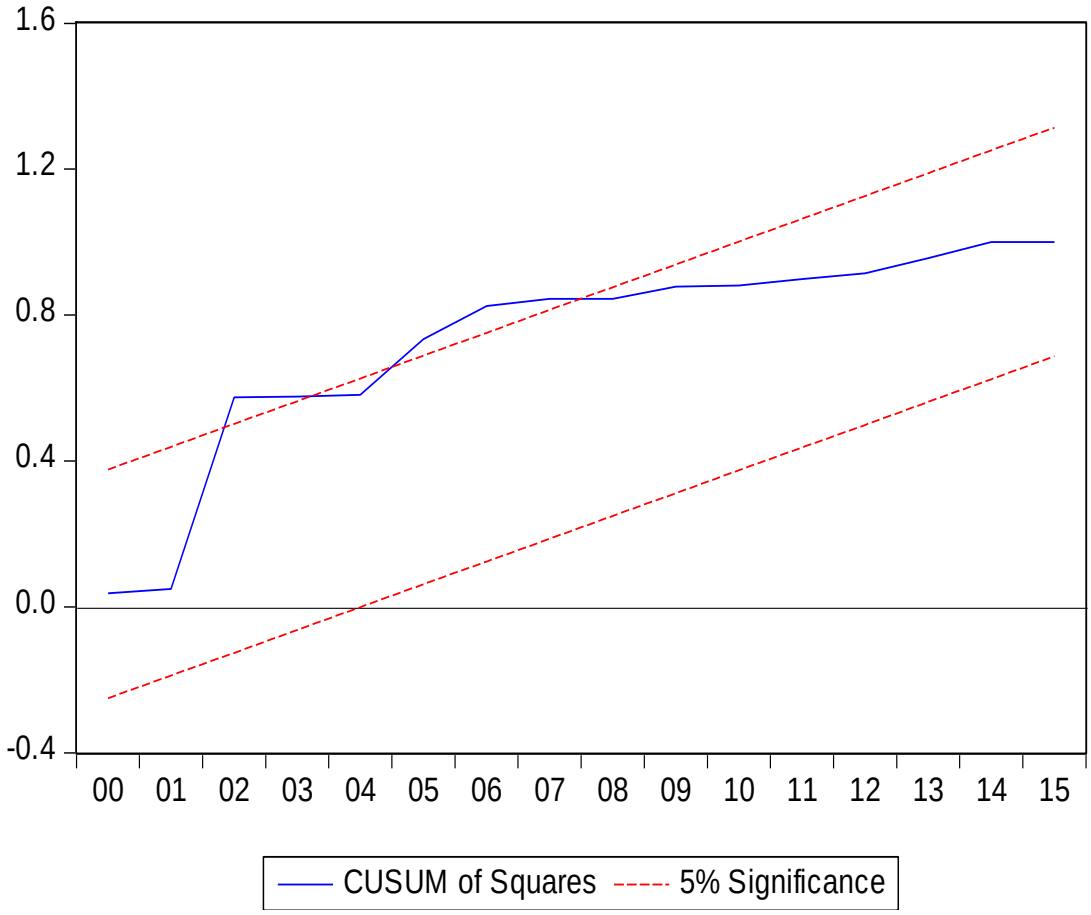
Source (author, 2018)

Figure A1.3: CUSUM Stability Test Result.



Source: Author (2018)

Figure A1.4: CUSUM of squares Stability Test Result.



Source: Author (2018)

APPENDIX III: TABLES

Table A1.2 The residual normality test

VEC Residual Normality Tests			
Orthogonalization: Cholesky (Lutkepohl)			
Null Hypothesis: residuals are multivariate normal			
Sample: 1980 2015			
Included observations: 33			
Component	Jarque-Bera	Df	Prob.
1	2.735552	2	0.2547
2	0.629777	2	0.7299
3	0.633974	2	0.7283
4	2.169775	2	0.3379
5	1.225907	2	0.5417
6	0.725281	2	0.6958
7	2.824655	2	0.2436
8	2.831989	2	0.2427
Joint	13.77691	16	0.6153

Source: Author

Table A1.3 Lag length selection results

VAR Lag Order Selection Criteria						
Endogenous variables: CAB EDS TOT NER INF GDP IR BD						
Exogenous variables: C						
Sample: 1980 2015						
Included observations: 33						
Lag	Log L	LR	FPE	AIC	SC	HQ
0	-714.8503	NA	1.47e+09	43.80911	44.17190	43.93117
1	-627.7909	126.6318	4.06e+08*	42.41157	45.67668	43.51018*
2	-560.4204	65.32895*	7.08e+08	42.20730*	48.37472*	44.28245

* indicates lag order selected by the criterion
LR: sequential modified 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

Source: Author

Table A1.4 VECM estimation results

Vector Error Correction Estimates
Date: 10/16/17 Time: 14:08
Sample (adjusted): 1982 2015
Included observations: 34 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Coint Eq	CointEq1	CointEq2	Coint3
CAB(-1)	1.000000	0.000000	0.000
EDS(-1)	0.000000	1.000000	0.000
GDP(-1)	0.000000	0.000000	1.000
INF(-1)	0.322930	-0.294117	0.022
	(0.17317)	(0.03677)	(0.06)
	[1.86480]	[-7.99835]	[0.33]
NER(-1)	0.143728	0.106465	-0.073
	(0.03806)	(0.00808)	(0.01)
	[3.77637]	[13.1733]	[-5.00]
IR(-1)	0.112502	-0.400785	0.251
	(0.17394)	(0.03694)	(0.06)
	[0.64677]	[-10.8506]	[3.76]
)(-1)	0.621711	-0.012791	-0.436
	(0.3347)	(0.07108)	(0.12)
	[1.8572]	[-0.17994]	[-3.39]
TOT(-1)	-0.356825	-0.002698	0.354
	(0.11956)	(0.02539)	(0.04)
	[-2.98437]	[-0.10626]	[7.73]
C	24.33457	-5.507178	-33.40
	(9.87622)	(2.09718)	(3.78)
	[2.46396]	[-2.62599]	[-8.82]

ror Correction:	D(CAB)	D(EDS)	GDP)	D(INF)	D(NER)	D(IR)	D(BD)	D(TOT)
CointEq1	-0.27681	-0.059404	0.001156	-0.642464	-0.692093	-0.256429	-0.199934	0.07115
	(0.1537)	(0.04084)	(0.11423)	(0.34788)	(0.25972)	(0.27716)	(0.16453)	(0.2915)
	[-1.8004]	[-1.45450]	[0.01012]	[-1.84679]	[-2.6647]	[-0.92521]	[-1.21520]	[0.2440]
CointEq2	-0.196924	-0.213647	-0.424176	0.070340	-2.173377	0.997512	0.779986	1.02150
	(0.40510)	(0.10761)	(0.30097)	(0.91662)	(0.68434)	(0.73027)	(0.43351)	(0.7682)
	[-0.48611]	[-1.98533]	[-1.40934]	[0.07674]	[-3.1758]	[1.36594]	[1.79924]	[1.3298]
CointEq3	-0.630318	-0.214922	-0.189540	-1.577277	-1.192973	-0.421881	-0.014743	-0.66514
	(0.31309)	(0.08317)	(0.23262)	(0.70844)	(0.52891)	(0.56442)	(0.33505)	(0.5936)
	[-2.01320]	[-2.58407]	[-0.8148]	[-2.2264]	[-2.255]	[-0.7474]	[-0.0440]	[-1.1204]

D(CAB(-1))	-0.095111	-0.011440	0.004115	0.448532	0.156304	0.231748	-0.066294	-0.42493
	(0.14137)	(0.03755)	(0.10503)	(0.31987)	(0.23881)	(0.25484)	(0.15128)	(0.2680)
	[-0.67280]	[-0.30464]	[0.03918]	[1.40222]	[0.65451]	[0.90938]	[-0.43822]	[-1.585]
D(EDS(-1))	0.041175	-0.067842	-0.015049	-2.902800	-1.496051	-0.759633	-0.812572	-0.29087
	(0.63938)	(0.16985)	(0.47504)	(1.44675)	(1.08012)	(1.15263)	(0.68423)	(1.2123)
	[0.06440]	[-0.3994]	[-0.0316]	[-2.0064]	[-1.3850]	[-0.6590]	[-1.1875]	[-0.2399]
D(GDP(-1))	0.138313	0.196125	-0.143405	1.381219	0.925781	0.192941	0.474286	-0.67607
	(0.35977)	(0.09557)	(0.26730)	(0.81406)	(0.6077)	(0.64857)	(0.38500)	(0.6821)
	[0.38445]	[2.05212]	[-0.53650]	[1.69670]	[1.5232]	[0.29749]	[1.23190]	[-0.9910]
D(INF(-1))	-0.099573	0.054365	-0.131430	0.162085	-0.020805	0.262548	0.394486	-0.32348
	(0.12602)	(0.03348)	(0.09363)	(0.28514)	(0.21288)	(0.22717)	(0.13486)	(0.2389)
	[-0.79015]	[1.62401]	[-1.40377]	[0.5684]	[-0.0977]	[1.15572]	[2.92525]	[-1.3538]
D(NER(-1))	0.195006	0.002955	0.050829	-0.106192	-0.102240	0.489313	0.003219	0.8521
	(0.14565)	(0.03869)	(0.10821)	(0.32957)	(0.2460)	(0.26257)	(0.15587)	(0.2761)
	[1.33885]	[0.07637]	[0.4697]	[-0.32221]	[-0.415]	[1.86356]	[0.02065]	[3.0854]
D(IR(-1))	-0.104831	0.006486	-0.08862	0.193381	-0.330650	0.121601	0.104972	0.10569
	(0.13333)	(0.03542)	(0.0990)	(0.30168)	(0.22523)	(0.24035)	(0.14268)	(0.2528)
	[-0.78627]	[0.18313]	[-0.8947]	[0.64101]	[-1.4680]	[0.50593]	[0.73573]	[0.4180]
D(BD(-1))	-0.257278	-0.046800	-0.108058	-0.473228	-0.230488	0.399717	-0.619052	0.07196
	(0.12585)	(0.03343)	(0.09350)	(0.28477)	(0.21260)	(0.22688)	(0.13468)	(0.2386)
	[-2.04428]	[-1.39984]	[-1.15564]	[-1.66179]	[-1.0841]	[1.76183]	[-4.59648]	[0.3015]
D(TOT(-1))	-0.294497	-0.014721	0.170224	-0.361693	0.156440	0.243107	-0.092121	-0.10866
	(0.10242)	(0.02721)	(0.07610)	(0.23175)	(0.17302)	(0.18463)	(0.10960)	(0.1942)
	[-2.87537]	[-0.54108]	[2.23700]	[-1.5607]	[0.9041]	[1.3166]	[-0.84049]	[-0.559]
R-squared	0.656119	0.587914	0.334599	0.481139	0.378114	0.617621	0.647870	0.45084
Adj.R-squared	0.5066	0.408747	0.045294	0.255547	0.107729	0.451369	0.494770	0.21208
Sum sq. resids	232.49	16.40691	128.3390	1190.372	663.4977	755.5659	266.2540	835.905
S.E. equation	3.1794	0.844597	2.362193	7.194115	5.371008	5.731552	3.402391	6.02857
F-statistic	4.3883	3.281363	1.156562	2.132783	1.398427	3.714975	4.231679	1.88824
Log likelihood	-80.926	-35.85673	-70.82526	-108.6901	-98.75371	-100.9627	-83.23145	-102.680
Akaike AIC	5.4074	2.756278	4.813251	7.040596	6.456101	6.586042	5.543026	6.68709
Schwarz SC	5.901281	3.250101	5.307073	7.534419	6.949923	7.079865	6.036849	7.1809
Mean depen	-0.112322	-0.164324	0.057054	-0.028676	2.621471	0.131933	0.092059	0.41647
S.D.depen	4.526359	1.098405	2.417579	8.337938	5.686007	7.738062	4.786738	6.79162

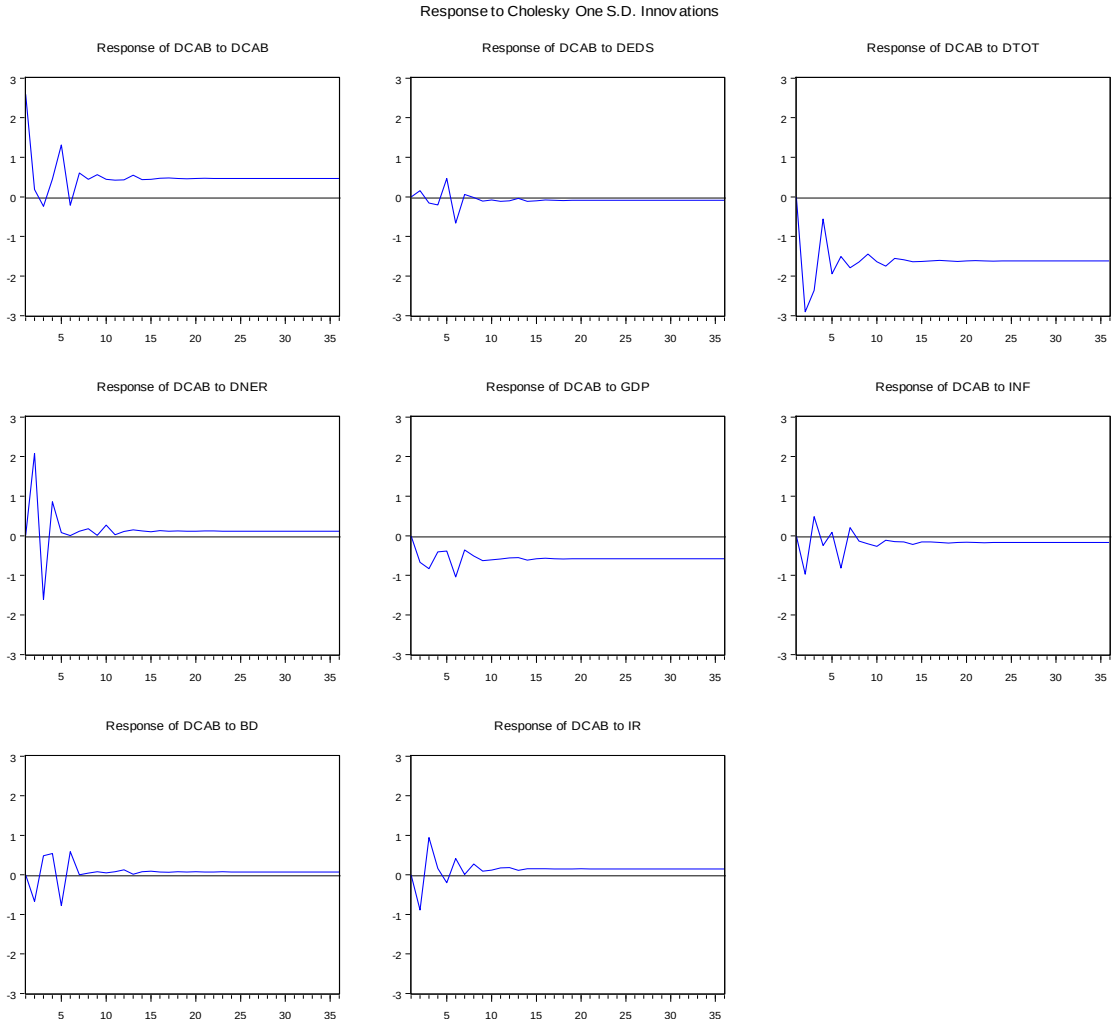
Source: Author

Table A1.5 Variance decomposition analysis

Period	S.E	DCAB	DEDS	DNER	DTOT	GDP	INF	IR	BD
1	4.026560	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	6.374869	66.01637	10.91239	0.100773	12.23808	0.409195	5.758811	4.225945	0.338426
3	7.059190	67.35718	8.954301	3.682156	10.62826	0.512124	4.942826	3.481695	0.441457
4	8.006674	64.25227	11.88630	4.921548	9.108554	0.775896	5.157385	3.548258	0.349787
5	9.017374	63.89291	13.83522	4.408197	9.084593	1.145125	4.088251	3.147820	0.397886
6	9.476651	64.99601	12.62014	4.017396	8.637856	1.313550	5.130165	2.875732	0.409159
7	10.25638	64.85973	13.98409	3.446661	8.528401	1.170430	4.610412	3.040867	0.359403
8	10.76672	65.67516	13.82308	3.136696	8.558528	1.072222	4.555194	2.852255	0.326866
9	11.26537	66.68895	13.58822	2.867258	8.301730	0.982381	4.521601	2.750943	0.298921
10	11.81396	66.79399	13.89437	2.607302	8.340994	0.893909	4.461142	2.734731	0.273558
11	12.26964	67.44057	13.76490	2.438113	8.257882	0.829691	4.379036	2.636080	0.253727
12	12.73146	67.82644	13.74530	2.265069	8.176492	0.773250	4.384924	2.592871	0.235659
13	13.19554	68.09102	13.83034	2.118443	8.160500	0.720464	4.305289	2.553399	0.220540
14	13.60910	68.46241	13.74644	1.993263	8.106964	0.680304	4.304037	2.499243	0.207342
15	14.03739	68.69723	13.79145	1.875495	8.066507	0.639443	4.261521	2.473096	0.195260
16	14.44240	68.92892	13.78672	1.774824	8.045795	0.604386	4.237520	2.437156	0.184680
17	14.83338	69.16887	13.76599	1.684745	8.007010	0.573519	4.218347	2.406372	0.175153
18	15.22212	69.33717	13.78348	1.601472	7.986291	0.544770	4.196600	2.383680	0.166539
19	15.59550	69.52175	13.77501	1.528476	7.962669	0.519284	4.176383	2.357610	0.158812
20	15.96123	69.68191	13.77065	1.460701	7.939204	0.496144	4.163164	2.336503	0.151723

Source: Author

Figure A1.5: Impulse response function.



Source: Author