EFFECTS OF THE REAL EXCHANGE RATE ON THE TRADE BALANCE IN KENYA

A Research Paper presented by:

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In partial fulfilment of the requirements for obtaining the degree of
MASTER OF ARTS IN DEVELOPMENT STUDIES

Major:

Economics of Development
(ECD)

Specialization:

Global Economy

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The Hague, The Netherlands

December 2014

Disclaimer:

This document represents part of the author's study programme while at the Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

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Contents

List of Tables *v*

List of Figures *v*

List of Appendices *vi*

List of Acronyms *vii*

Dedication *viii*

Acknowledgement *ix*

Abstract *x*

Chapter 1 Introduction **1**

1.1 Background 1

1.2 Trend of the Trade balance in Kenya 3

1.3 Problem Statement 4

1.4. Objectives 5

1.4.1 General Objective 5

1.5 Research Questions 5

1.6 Justification of the Study 5

1.7 Scope and Limitations of the Study 5

1.8 Organization of the Study 6

Chapter 2 Kenya's Trade Position and the Exchange Rate Policies **7**

2.1 Introduction 7

2.1 Trading Policies in Kenya 7

2.1.1 Import-Substitution Phase 7

2.1.2 The Structural Adjustment Programme (SAPs) 8

2.1.3 Trade Liberalization 8

2.2 Commodity Exports and Imports in Kenya 9

2.3 Trend of Exports and Imports in Kenya 11

2.4 Kenya's key Trading Partners. 12

2.5 The Exchange Rate Policies and the Real Exchange Rate in Kenya 13

2.5.1 The Exchange Rate Regimes 13

2.5.2 The Real and Nominal Exchange Rates 14

Chapter 3 Literature Review **17**

3.1 Introduction 17

3.2 Theoretical Approaches 17

3.2.1 The Elasticity Approach 17
3.2.2 The Marshall-Lerner Condition 17
3.2.3 The Absorption Approach 18
3.2.4 The Monetary Approach 18
3.2.5 The J-Curve Approach 19
3.2.6 The Two Country Imperfect Substitute Model 19
3.3 Empirical Literature Review 20
Chapter 4 Methodology 35
4.1 Introduction 35
4.2 Research Design 35
4.3 Theoretical Framework 35
4.4 Model Specification 36
4.5 Definitions and Measurements of Variables 37
4.6 Data and Data Source 38
4.7 Estimation Technique 38
4.7.1 Unit Root Testing 39
4.8 Cointegration Analysis 39
4.9 Vector Error Correction Model (VECM) 40
Chapter 5 Results and Findings 41
5.1 Introduction 41
5.2 Descriptive and Summary Statistics 41
5.3 The Trend Analysis 41
5.4 Unit Root Analysis 42
5.5 Cointegration Analysis 44
5.6 The VECM Modelling 46
5.6.1 The Long Run Effects 47
5.6.2 The Short Run Adjustment Analysis 49
5.6.3 Other Tests in VECM 50
5.7 Granger Causality Test 51
Chapter 6 Conclusions and Policy Implications 53
References 55
Appendix 60

List of Tables

Table 1: The effect of real exchange rate on trade balance.....16
Table 2: Table of the empirical studies on the relationship of exchange rate on trade balance 26
Table 3: Description and Summary Statistics of the Variables.....41
Table 4: Unit Root tests in levels 43
Table 5: Unit Root tests for the first difference 44
Table 6: Optimal lag selection 45
Table 7: Cointegration rank test (Trace) 45
Table 8: Cointegration rank test (Maximum eigenvalue).....46
Table 9: Normality test of error terms 46
Table 10: Results of Cointegration Analysis.....47

List of Figures

Figure 1: Trend of Kenya's trade balance from 1963 to 2013.....3
Figure 2: Kenya's leading export commodities in millions from 2007 to 2013 ..9
Figure 3: Kenya's leading import commodities in millions from 2007 to 201310
Figure 4: Trend of Kenya's exports and imports as a percentage of GDP 11
Figure 5: Share of leading exports to major trading partners (in % of the total value of exports from 2009-2013) 12
Figure 6: Share of leading imports from major trading partners (in % of the total value of imports from 2008-2013).....13
Figure 7: Trend of the Real and Nominal Exchange Rate in Kenya from 1963-2013.....15
Figure 8: Trend of trade balance, money supply and domestic income (1963-2013).....42

List of Appendices

Appendix 1: Raw Data 60
Appendix 2: Trend of the variables in both levels and first difference.....61
Appendix 3: Maximum Lag selection for ADF test.....63
Appendix 4: Langrangian Multiplier test 63
Appendix 5: Impulse response functions (graph) 64
Appendix 6: Impulse response functions (table).....64
Appendix 7: Forecast of variables 65
Appendix 8: The Granger Causality test.....65

List of Acronyms

ADF	Augmented Dicky-Fuller test
AIC	Akaike's Information Criteria
ARDL	Autoregressive Distributed Lag
BRM	Bickerdike-Robinson-Metzler model
COMESA	Common Market for Eastern and Southern Africa
CVAR	Cointegrated Vector Autoregression
EAC	East African Community
ECD	Economics of Development
EPPO	Export Promotion Programme Office
EPC	Export Promotion Council
FPE	Final Prediction Error
GDP	Gross Domestic Product
HQIC	Hannan and Quinn Information Criteria
IMF	International Monetary Fund
IRF	Impulse Response Function
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KPSS	Kwiatkowski- Phillips –Schmidt-Shinn
LR	Likelihood Ratio
OECD	Organisation of Economic Cooperation and Development
OLS	Ordinary Least Squares
PP	Phillips-Perron test
REER	Real Effective Exchange Rate
RER	Real Exchange Rate
SAPs	Structural Adjustments Programmes
SBIC	Swartz – Bayesian Information Criteria
TB	Trade Balance
USA	United States of America
VAR	Vector Autoregressive
VDC	Variance Decomposition
VECM	Vector Error Correction Model

Dedication

The dedication is made to my late father, Bernard Omondi Ogutu and my family.

Acknowledgement

My first acknowledgement is to the Almighty God for having sustained my life and Studies at the Institute of Social Studies of Erasmus University Rotterdam. Great thanks goes to my family, parents and other family members who have provided the emotional support through the study period.

Further, my great pleasure is to offer great thanks to my supervisor, Prof. Peter van Bergeijk for his continuous and timely support and excellent guidance through the research paper writing process. I thank my second reader Dr. Howard Nicholas for the intellectual comments that helped in the further improvement of the research paper. I thank too Dr. John Cameron for the guidance through the research paper writing process in the seminars organized. In addition, I thank the entire staff of the International Institute of Social Studies especially the Economics of Development staff for their commitments to see that I complete the studies.

My gratitude also goes to NUFFIC scholarship that financed the entire study programme and my stay in The Hague, the Netherlands. I thank the government of Kenya through the Ministry of Devolution and Planning, for allowing me to study at the expense of continued service delivery to the people of Kenya.

I finally thank the entire ISS students especially the ECD students whom through teamwork, we shared academic support that helped in accomplishing the Masters in Development Studies.

Abstract

The trade balance is one of the main components of the current account balance and hence the balance of payment. This study established the long run relationship between the real exchange rate and the trade balance in Kenya using annual time series data from 1963 to 2013. Also, the real exchange rate had a positive and significant effect on both the long run period and the short run adjustment mechanisms on trade balance. Therefore, depreciation of the real exchange rate affects trade balance in the long run, even though the deficit continues but depreciation may have played a role to manage the decline. This study adopted the two-country imperfect substitute model of Rose and Yellen (1989) which analyses the relationship of the real exchange rate and the trade balance. The model also incorporates the elasticity, absorption and monetary approaches by simultaneously considering the real exchange rate, domestic and foreign income, money supply and exchange rate regime. The approach assumes that there is a linkage between the real exchange rate and the trade balance. Studies in both developed and developing countries show different results on the relationship of the real exchange rate on the trade balance. This study applied Cointegration Vector Autoregressive and Vector Error Correction modelling and established the relationship and the effects of the real exchange rate and other variables on the trade balance. The exchange rate regime had no effect on the trade balance. Policy makers thus need to ensure the stability and competitiveness of the real exchange rate for favourable trade balance in Kenya.

Relevance to Development Studies

Trade balance is a major constituent in the current accounts and so to the balance of payment in macroeconomic management. The progress of trade in a country enhances the international mutual benefits among regions and countries in promoting global development process. The adoption of the exchange rate mechanisms among countries helps in enhancing financial transactions hence inter-country(s) trading process in enhancing economic growth and improving the welfare of the people. The study findings highlight the effect of exchange rate on trade balance in Kenya among other factors that may affect the trade balance in the economy. The policy makers may consider formulating the exchange rate policies that needs to enhance the competitiveness of the Kenyan economy in enhancing the amount and value of exports as compared to imports hence improving the trade balance.

Keywords

Kenya, Trade Balance, Real exchange rate, Cointegration, Vector Error Correction Model

Chapter 1
Introduction

1.1 Background

Kenya attained her independence in 1963, and the planned action as outlined by the *Sessional Paper Number 10 of 1965,* was to ensure macroeconomic stability like the trade balance through the promotion of exports and the real exchange rate stability (Republic of Kenya 1965). The real exchange rate adjustment in Kenya started from 1963 with the fixed exchange rate regime up to 1981 and from 1982, the flexible exchange rate system was adopted with the aim of enhancing competitiveness in the economy. Therefore, according to Ndung'u (1999), the depreciation of the real exchange rate started when the nominal exchange rate depreciated against the United States of American dollar from 1982; but the government intervenes sometime to ensure the stability of the currency. In this case, Himarios (1989: 143) argued that, "A nominal devaluation is assumed to change the real exchange rate (a relative price) and thus improve competitiveness". Therefore, the devaluation according to economic theory improves the trade balance in the long-run even though there may be deterioration in the short run (Himarios 1989, Rose and Yellen 1989, Dornbusch et al. 1976). However, the effect of devaluation/depreciation may be negligible sometimes and other factors like domestic income and money supply may play a role in influencing the trade balance (Dornbusch 1973). In addition, according to Keynesian approach, the real exchange rate influences the allocation of global expenditure between foreign and domestic goods (as a relative price) which affects not only trade balance, but also adjusts inflationary situation and also controls the real income in an economy (Dornbusch et al. 1976). Further, the real exchange rate helps in the regulation of exports and imports of goods and services (Were et al. 2013).

Most of the studies on the relationship between the real exchange rate and the trade balance in both developed and developing economies have not been conclusive in establishing the relationships that may be uniform in most of the economies (Duasa 2007). Various econometric techniques have been applied but the results have been different. For instance, the study by Guechari (2012) in Algeria and Stučka (2004) in Croatia showed positive significant effect while Duasa (2007) in Malaysia showed positive but not significant effect and Rose (1991) showed no long run relationship. Therefore, such unclear relationship and effects makes this study analyse the Kenyan case. This is because countries have different economic foundations and policies implemented at different times. In 1963 the exchange rate was stable in Kenya but with time the adjustment started gradually. On the other hand, the trade balance in 1963 was favourable at 3 percent of the Gross Domestic Product (GDP) before it started declining gradually. The deterioration of the trade balance does not enhance the macroeconomic stability, like exchange rate stability as outlined in the government programme of ensuring the country's growth prospect that will make the country competitive at global level and improve the welfare of the Kenyan people and contribute to world development (Republic of Kenya 2007).

Accordingly, the trade balance forms the main constituent of the current account balances thus the balance of payment. Hence, the relationship between the real exchange rate and the trade balance to the policy makers helps to enhance inter-temporal trading activities apart from its effect in the national income (Hacker and Hatemi 2004). The trade balances in the developed and developing economies may either be in surpluses or deficits. The two natures of the trade balances may be explained as follows; trade surplus occurs as a result of more exports of the domestic economy than the imports while trade deficit arises when there are more imports as compared to the exports of goods and services (Mankiw 2003). Therefore, as noted by Ahmed et al. (2011), the presence of trade surplus or deficit may be favourable or unfavourable in relation to the nature and the state of the economy. Thus, the trade surplus may imply that there are more exports and hence increased competitiveness of the domestic firms in the foreign market (Ahmed et al. 2011). On the other hand, trade deficit implies that there are more imports hence increase in the foreign investment and savings that may lead to the "Oasis of prosperity[1]" (Mann 2002: 131); even though this may be harmful to the economy if it persists as it may lead to increased current account deficit, which could entail that a country is "living beyond its means" as the local saving may be low relative to the foreign investment and saving (Mann 2002: 131). Therefore, trade balance determines the economic progress of the economy among other macroeconomic factors.

Consequently, exchange rate adjustments help in changing the nature of trade balance by improving the level of competitiveness of the economy (Bahmani-Oskooee 2001, Collier and Joshi 1989). It is argued in theory that depreciation raises the level of exports because they become cheaper and imports are discouraged as they become expensive and as a result trade balance is improved (Bahmani-Oskooee and Ratha 2004). Besides, the real exchange rate needs to be more competitive as it is one of the important elements of the "outward-oriented" macroeconomic policy which increases export as compared to import hence better position of the trade balance (Williamson 1990). In addition, increased export may also rely on the confidence by the private sector which enhances the investment option in the export sector. However, currency depreciation may lead to inflation and impact unfavourably to trade balance. This inflationary effect may justify the use of the real exchange rate which takes into consideration the relative prices and hence its adjustment may lead to the increased competitiveness in the foreign market by the domestic economy (Bahmani-Oskooee 2001: 103).

In the Kenyan case, the real exchange rate has been depreciating and appreciating so that there could be increased competitiveness in the foreign market to ensure increased exports as compared to imports (Republic of Kenya 2012). The country's exchange rate policy emphasizes the continued adoption of the flexible exchange rate system besides the government intervention in ensuring competitive real exchange rate that improves productivity (Republic of Kenya 2007: 7). This intervention controlled some forces of the foreign exchange market from unfavourably impacting on the nominal exchange rate and

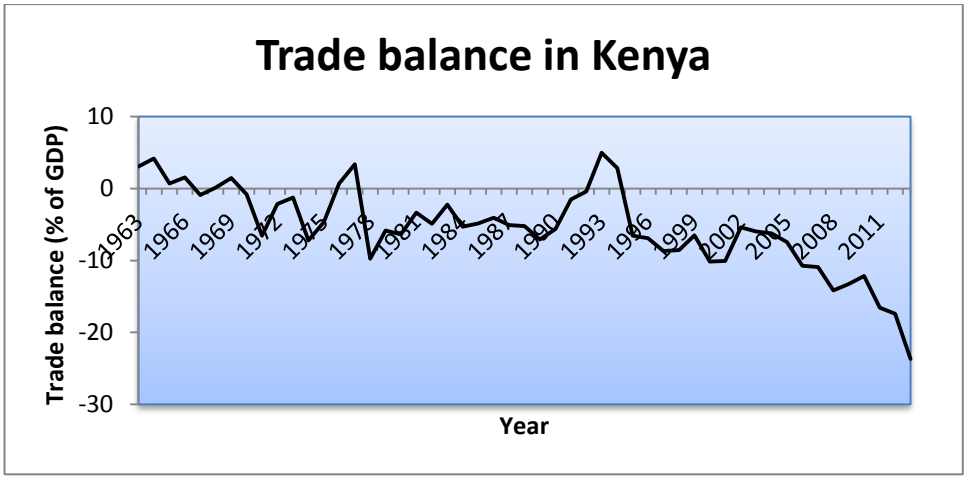
[1] According to Mann (2002), "Oasis of prosperity" means that there is more investment in a country and therefore more returns to investment that promotes economic growth.

hence the real exchange rate. Nonetheless, the depreciation of the nominal exchange rate may not mean that real exchange rate has also depreciated (Collier and Joshi 1989: 103). Also, the exchange rate adjustment could be unstable and may not adjust to equilibrate the balance of trade (Isard 1995: 190). However, as observed by Isard that the flexible exchange rate may face challenges that may affect trade balance like the exchange rate volatility and high price levels, increased unemployment within the economy, low investment opportunities and trade restrictions (Isard 1995). Such challenges identified may affect the real exchange rate in the economy.

1.2 Trend of the Trade balance in Kenya

Kenya's trade balance has been worsening recently as shown in the figure 1 from 1963 to 2013 as the percentage of GDP.

Figure 1: Trend of Kenya's trade balance from 1963 to 2013



Source: Author, computed based on the data from the World Bank (2014)

From figure 1, Kenya's level of trade balance was approximately 3 as the percentage of GDP in 1963. The level fluctuated though more steady until 1993 when it recorded the highest trade surplus as a percentage of GDP of approximately 5 percent. However, from 1994, trade balance began to deteriorate and in 2012, the deficit was approximately 21 percent. This sudden deterioration could have been as a result of the lagging effect of the post election violence that took place in early 2008 and the poor weather conditions that may have led to more import of food products (Republic of Kenya 2012). Also, the fluctuation in the domestic currency as a result of the global economic instability may have affected the country's trade balance (Republic of Kenya 2012). Therefore, if the trade deficit continues, then the country may increase current account deficit which affects adversely on the welfare of the people.

The trade balance may have relationship with the real exchange rate among other factors like foreign and domestic income, money supply and exchange rate regime. Therefore, this study focuses more on the relationship of real exchange rate and trade balance because the real exchange rate plays a major role in enhancing international competitiveness (Isard 1995). Conversely, changes in the real exchange rate may result to uncertainty and risks in the in-

ternational trade transactions hence trade levels that are likely to be unfavourable (Manzur 1993: 19). Theoretically, the real exchange rate should be an important determinant of exports and imports because it is an essential economic indicator of economy's international competitiveness.

This study seeks to find out the relationship/effect of the real exchange rate on the trade balance in Kenya over the period 1963 to 2013. Besides, this study adopts shifts in the exchange rate regimes that were implemented by the government to find its effects on the trade balance. The study also considers other macroeconomic variables like foreign income, domestic income and money supply (M2) in establishing their effects and relationships with the trade balance.

1.3 Problem Statement

The trade balance in the economy helps to determine the macroeconomic performance of the economy like the balance of payment, investments and savings in both the developed and the developing economies. Kenya is a developing country that has experienced both trade surplus and deficit in different periods of time. However, the deficit in the trade balance has continued to increase in Kenya. On the other hand, the real exchange rate plays a major role to improve the level of the trade balance because the economic theory stipulates that, the depreciation of the real exchange rate improves the level of trade balance in the long-run even though it may reduce the trade balance in the short-run (Chiu et al. 2010).

The illustration of the nature of the change in the trade balance started by especially more deterioration from 1995 when trade deficit dropped to -6.56 percent of GDP from 2.81 percent of GDP in 1994. Further, in 2006, the trade deficit dropped to -10.72 as the percentage of GDP and by 2013, the trade deficit had increased to -20.8 percent.

Besides, Kenya has adopted both fixed exchange rate and flexible exchange rate regimes; of which during the flexible exchange rate regime, there was increased deficit in the trade balance as compared to the fixed exchange rate regime. Therefore, these trends between the trade balance and the real exchange rate contradict theoretical economic view that currency depreciation improves the trade balance. As a result, the continued deficit in trade balance and the real exchange rate depreciation in Kenya may erode the country's competitiveness. Besides, the increased deficit hampers the economic growth of the country even though the government policy stipulated the economic growth of over 10 percent from 2012 but the growth has been less than 5 percent hence low welfare improvement for the people of Kenya.

Therefore, there is need to understand the relationship and effects of the real exchange rate on the trade balance in Kenya. Also, the consideration of other variables like broad money supply and the foreign and domestic income would help to give more information on the increasing deficit on trade balance. This information may help the government to consider policies that would improve trade balance in Kenya.

1.4. Objectives

1.4.1 General Objective

The main objective of this study is to find out how the real exchange rate and other factors relates /affects the trade balance in Kenya.

1.4.1.1 Specific Objectives

The specific objectives are; first, to find out the relationship of the real exchange rate and other factors on the trade balance in Kenya and secondly to offer policy advice based on the research findings.

1.5 Research Questions

The main research question is to establish how the real exchange rate and other factors relate to the trade balance in Kenya?

1.5.1.1 Sub-Questions

1. What is the strength and significance of the relationship of the real exchange rate and other factors on the trade balances in Kenya?
2. What are the policy implications for the study findings?

1.6 Justification of the Study

This study aims to suggest policies to enhance favourable trade balances and exchange rate adjustment mechanism that may improve the competitiveness of the economy. Also, this study improves future development by generating more knowledge and adding to the existing knowledge in the relationship of the trade balance with the real exchange rate and the other variables.

Furthermore, other studies have been carried out in analyzing the relationship of exchange rate on trade balance and the findings were different. Such studies include; Guachari (2012) in Algeria, Arize (1994) in nine Asian countries, Bahmani-Oskooee (1992) in USA, Rose (1991) in 5 OECD countries and Shao (2009) in Japan. This implies that there is still debate in this area of study and this study contributes too to this debate and adds to the existing knowledge new knowledge.

1.7 Scope and Limitations of the Study

This study made use of annual time series data from 1963 to 2013. The data is restricted from 1963 because that was the time when the country gained independence and started actively to be involved in international trade. The study was also limited by data availability among the trading partners with Kenya where most of the data especially on exchange rate starts from 1980s and 1990s and hence the calculation of the real exchange rate was based on the USA's consumer price index in relation to the Kenyan CPI.

The limitation of this analysis was based on Kenya's trade balance as the dependent variables and the real exchange rate as the main explanatory variable under consideration. Other dependent variables include domestic and foreign

income, money supply and exchange rate regime. The foreign income was aggregated based on the real domestic income of the major trading partners[2] with Kenya. On the aggregation of the foreign income, the study by Onafowora in 2003 aggregated the real GDP (as a measure of foreign income) of the four major industrial countries in establishing the relationship of exchange rate and trade balance in Ghana (Onafowora 2003). Also, Stučka (2004) aggregated data for foreign income for six trading partners with Croatia. It is suggested that data aggregation helps policy makers to have an averaged figure that can be favourable in policy formulation besides reducing the measurement error (Stučka 2004: 4).

1.8 Organization of the Study

This research project comprises of five chapters. In chapter one, the study comprises of the introduction, the problem statement, objectives, the research questions, justification and scope. Chapter two shows the background information in Kenya in relation to trade balance (policies, exports and imports) and exchange rate policies. Chapter three shows the empirical and theoretical literature review. Further, chapter four contains methodology and the research estimation technique and then follows chapter five which comprises of the empirical findings and the discussion of the results. Finally, chapter six comprises of the conclusions and policy implications of the results.

[2] The major importers of Kenyan goods and services are; The United States of America, the United Kingdom, The Netherlands, Germany, United Arab Emirates, Pakistan, Egypt, Uganda and Tanzania.

Chapter 2
Kenya's Trade Position and the Exchange Rate Policies

2.1 Introduction

This chapter contains information that is essential in explaining the trade pattern of Kenya and the external world. It contains trading policies in Kenya, values of the major exports and import of commodities, the major trading partners' in terms of export and import, the exchange rate policy/regimes in Kenya since independence and the trend of the real and nominal exchange rate. This chapter therefore gives the performance of the Kenyan economy in terms of how the country spends on the imports and what it receives from the exports especially from the main foreign importers of the Kenyan goods.

2.1 Trading Policies in Kenya

Kenya is a country within East Africa that has an estimated area of 582,650 km^2, with a population of approximately 40.7 million people as per the projection in 2013 with the population density of 69.85 people per square kilometres and absolute poverty rate of 46.5 percent (Republic of Kenya 2014).

Trade policies are essential in the international trading system. According to Murshed (1997), trade policies enhances the macroeconomic position of the economies in the various ways; it encourages regional trading blocs, for instance the East African Community (EAC) and Common Market for Eastern and Southern Africa (COMESA) of which, Kenya is a member; may act as the substitutes or the complements of the monetary or fiscal policies depending on the nature of the economy and the policy depicts the fairness of trade among countries.

Kenya's participation in international trade at global level is of major significance in enhancing economic growth and improving the welfare of the people. The country's trade policies and reforms have undergone through some phases since independence: first is the import-substitution (1960s and 1970s), then followed by the structural adjustment programmes (SAPs) and finally in 1990s there was the liberalization of trade.

2.1.1 Import-Substitution Phase

The import- substitution reform was aimed at enhancing the industrial development of the economy and the government was to play a leading role in formulating protectionist policies and guidelines that that could enhance manufacturing industries especially those producing goods for export (Were et al. 2009). As a result, there was improved economic growth and trade balance was favourable and the exchange rate appreciated. However, the policy was subjected to shocks like; first, the oil crisis in 1970-1971 which increased the importation prices and secondly, the fall of the East African Community (EAC) in 1977, which offered the expanded market of the Kenyan goods. Also, the

import-substitution policies are viewed as enhancing expensive distortions which affect exports and thus unfavourably affect the economy (Williamson 2002). The appreciation of the currency limits the value of exports. Consequently, the policy became ineffective.

2.1.2 The Structural Adjustment Programme (SAPs)

The Structural Adjustment Programme (SAPs) period was channelled to most of the developing economies by the International Monetary Fund in the beginning of 1980s. The reforms aimed at enhancing export promotion instead of the import- substitution policy with more use of tariffs on imports (Were et al. 2009). The reforms were aimed at improving the economic stability of the country (Rono 2002). However, structural adjustments programmes led to reductions in the tariffs imposed on imports in addition to having other less controls on the imports. The SAPs failed to achieve the intended objective of improving exports and reducing imports so that there may be favourable external trade balance. This failure was as a result of the government failure to own up the policies because the policies were not domestically formulated and could not consider the economic characteristics of the economy (Rono 2002).

2.1.3 Trade Liberalization

In the early 1990s, the trade liberalization policies were put in place at the global level and Kenya was not left behind in the adoption of these policies. Following the country's unfavourable macroeconomic performance like the fall in the economic growth and increased budget deficit, the country needed to adopt the liberalization policies. In this case, the trade quotas were reduced and exports and imports tariffs were reduced and exchange rate stated to float (Were et al. 2009). The floating exchange rate system aimed to improve exports as exchange rate transactions could be accessed by many exporters and hence improved trade. The policies aimed at 'export led growth' to improve the economy but the experience in Sub-Saharan Africa, including Kenya was that the minimised regulation and less government intervention did not enhance balanced growth as there was no proper system to promote peoples' welfare countrywide (Weeks 2001: 48-50).

During this period of trade liberalization further, there were reduced tariffs imposed on the inputs. The inputs targeted were for the processed exports like the manufacturing under bond program which aimed at duty free imports of raw materials and factory equipment and plants that were to produce goods for export (Gertz 2009). Nonetheless, Gertz (2009) noted that most of the factories that were operating under the manufacturing under bond programme had shut down by the end of 1997 as a result of a decreased garment quota by the United States of American market and better performance of the real exchange rate which had appreciated. Besides, there were also the introductions of the Export Processing Zones in 1990 which provided incentives like provision of waivers for the import tariff and tax holidays that were geared towards encouraging new firms that are to undertake manufacturing of garments especially for export to the USA (Gertz 2009). Moreover, from 1993, the government introduced the Export Promotion Programme Office (EPPO) which was aimed at refunding the import taxes paid on the inputs that were used in the production of not only goods for exports but also for the domestic consump-

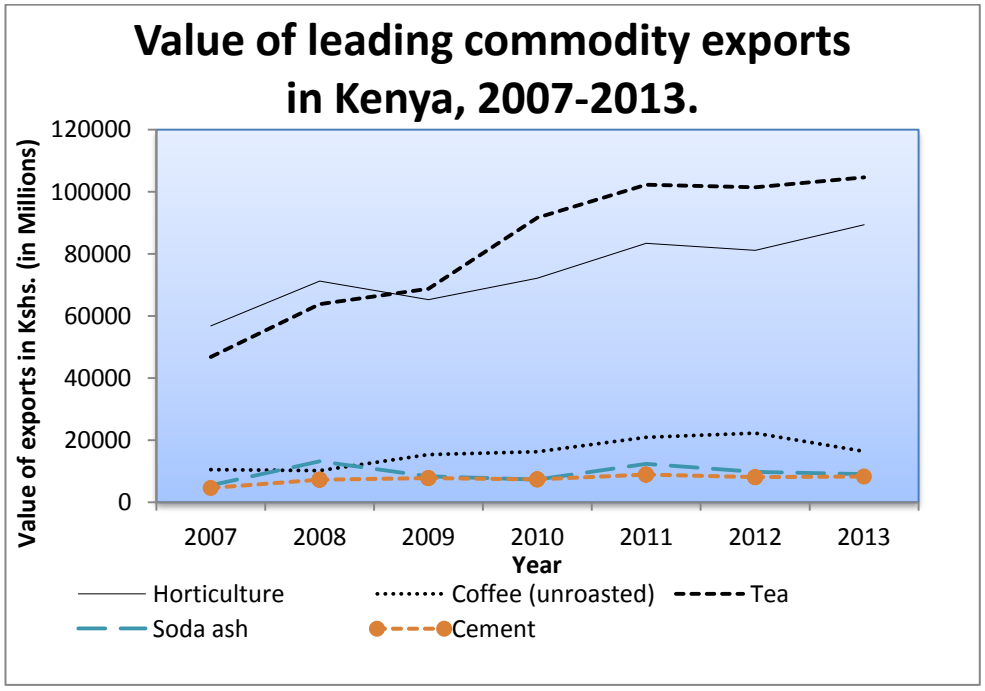
tion (Gertz 2009). The policy had improved the production level of the goods that especially aimed for export. The presence of the Export Promotion Council (EPC) aims at coordinating the increased export of goods and services in the international market which creates and empowers exporters with the opportunities and abilities for export (Republic of Kenya, 2014). However, globalization drives the level of international trade by influencing policies and hence a country may not independently and holistically formulate and implement policies that best suit the respective aim of improving trade but has to adhere to the international requirements (Kriesler and Nevile 2003).

In summary, the trade policies in Kenya have aimed at improving the level of exports hence trade balance. The gradual shift in policies from import substitution, structural adjustment programmes and the liberalization policies have had different achievements. However, the policies have faced various challenges like globalization of economies in enhancing exports and reducing imports.

2.2 Commodity Exports and Imports in Kenya

Kenya's major exports are mostly tea, horticulture and coffee which are agricultural goods while main imports are especially intermediate capital inputs: crude oil, petroleum products and transport equipment (Branson 1986). The agricultural products have low demand elasticity and are easily subjected to high shocks in the foreign market. Besides, Kenya also exports cement and Soda ash among other commodities though in a smaller quantity. The main commodity exports are shown in the figure 2 below;

Figure 2: Kenya's leading export commodities in millions from 2007 to 2013

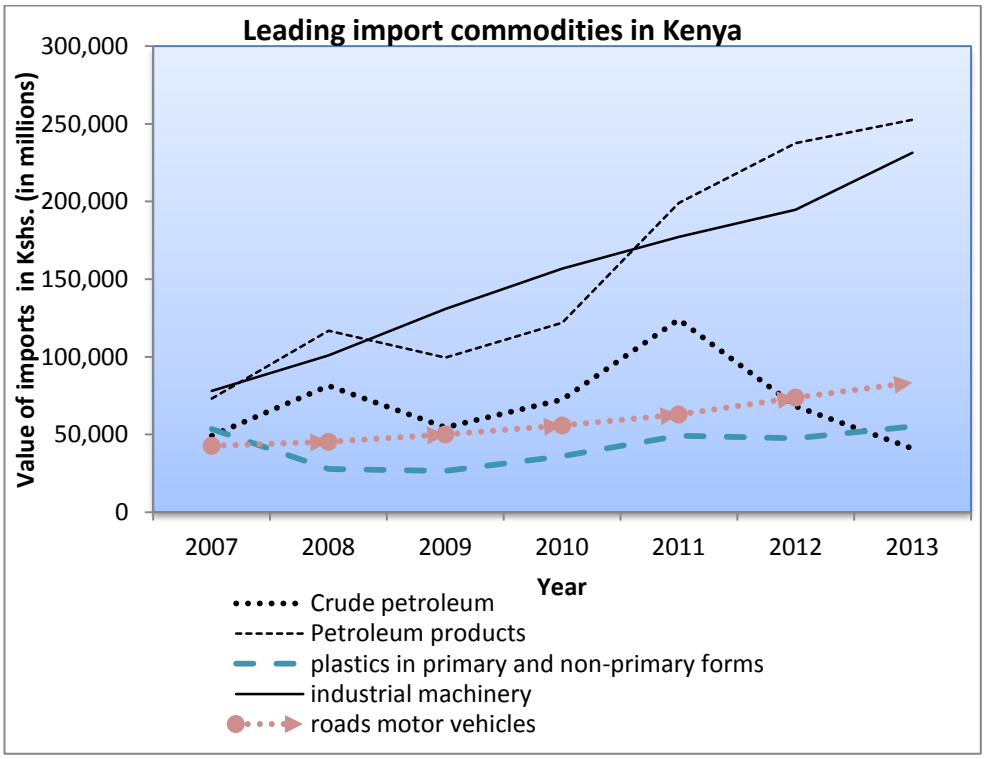


Source: Author, computed based on the Republic of Kenya (2014), Economic Survey data.

From the figure 2, tea and horticulture are Kenya's leading exports and they have been increasing overtime though at a lower rate. In 2007, export in tea accounted for kshs. 46,754 millions and had increased to Kshs. 104,648 million by 2013. Also, horticulture was leading in 2007 and was amounting to Kshs. 56,808 millions and by 2013; it was second to tea with the total value of Kshs. 89,339 millions. Other leading exports are coffee, cement and Soda ash. Kenya's export value amounted to a total of Kshs. 261,685 millions in 2007 and in 2013, it was Kshs. 322,660 millions (Republic of Kenya 2014). Therefore, there is need for the country to improve on the export so that it may increase the level of competitiveness in the international market.

On the other hand, the figure 4 below shows the country's major imports as from 2007 to 2013. The imports are mostly for consumption and manufacturing purposes.

Figure 3: Kenya's leading import commodities in millions from 2007 to 2013



Source: Author, computed based on data from the Republic of Kenya (2014), Economic Survey.

From the above figure 4, the petroleum products and industrial machinery were Kenya's leading imports. It can be observed that petroleum products which was at Kshs. 73,088 millions in 2007 and increased to Kshs. 252,673 millions in 2013. Also, industrial machinery increased from Kshs. 78,014 millions in 2007 to Kshs. 231,440 in 2013. The increased imports of machinery and other equipment help in the enhancement of the future productive and development capacity in the country. Other imports like crude petroleum decreased from Kshs. 124,042 millions in 2011 to Kshs. 41,037 millions in 2013. Subsequently, the total import values were Kshs. 605,112 millions in 2007 and in 2013 it was Kshs. 770,651 millions (Republic of Kenya 2014).

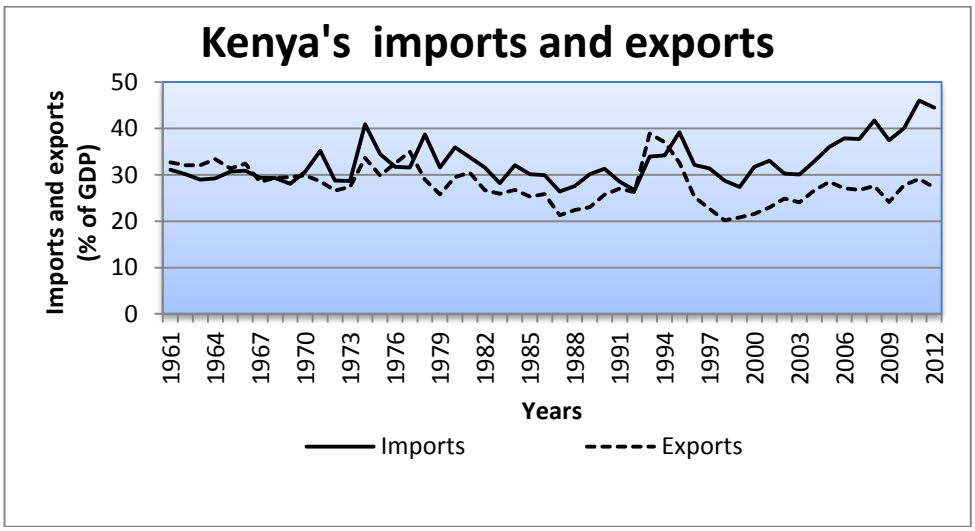
From the two figures 3 and 4, it can be observed that there is increasing imports as compared to exports hence increasing trade deficit. In this case, the Central Bank of Kenya noted in 2012 that the monetary policy measures were being put in place to minimize imports of machinery and equipments that were being directed to roads and energy sector (Republic of Kenya 2012: 15). Besides, there was an anticipation of the improvement in the weather condition that was favourable in food production and hence reduce also some food imports hence reduce the increasing trade deficit.

It could be also noted that the country is looking forward to ensure that the trend of exports is improved as compared to imports, of which recently, exports are lower as compared to imports. This trend reduces economic growth, even though the country projected the macroeconomic stability like favourable exchange rate and high economic growth (Republic of Kenya 2007). However, there was slow economic growth that was not enhanced by effective trade even if there had been a depreciated nominal exchange rate which may or may not have translated to improved export and hence trade balance (The World Bank 2013).

2.3 Trend of Exports and Imports in Kenya

Kenya's exports have been decreasing while imports are rising having an unfavourable effect on the country's competitiveness in the foreign market. The figure 4 below shows the level of trade balance in Kenya's exports and imports from independence as the percentage of GDP.

Figure 4: Trend of Kenya's exports and imports as a percentage of GDP



Source: Author, computed based on the World Bank (2014) data

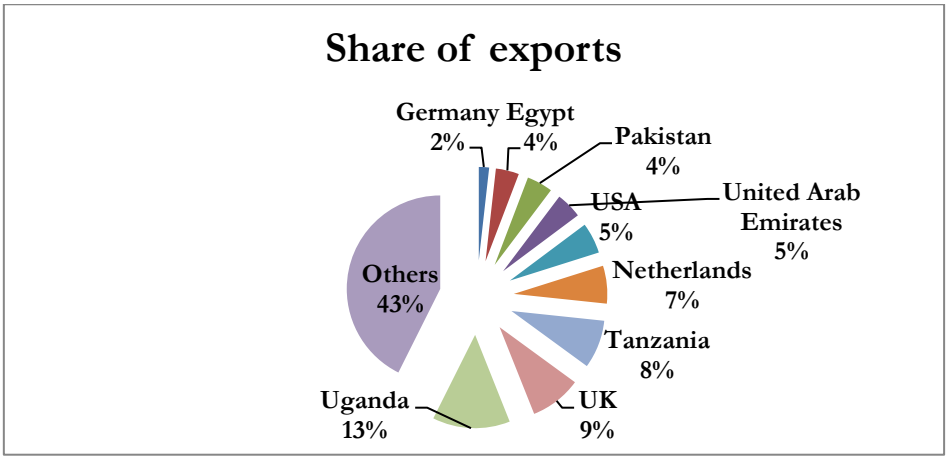
From the figure 4, Kenya's exports in 1962 were approximately 33 percent of GDP and it was fairly steady until 1977 where it was approximately 35 as the percentage of GDP. From 1977, the exports declined to 21 percent of GDP in 1987 as a result of the external shocks like drought which affected adversely agricultural production, but it improved again to 39 percent in 1993, which was the highest in five decades. The improvement was as a result of the favourable weather conditions. In 2012, the percentage of exports as a percentage of GDP

was approximately 27 percent. On the other hand, Kenya's imports had been fluctuating since independence. In 1963, the level of imports as a percentage of GDP was 30 percent and it remained fairly steady until 1974 when it rose to approximately 41 percent. The rise in imports value was exacerbated by the increase in the global price of oil which took place in 1973. The trend was fairly stable until 2012 when it increased to an estimated level of 45 percent. This increased import is mostly attributed to imports of intermediate goods, capital goods and some consumer goods. Therefore, the government should minimize on the imports but increase the level of exports of goods and services that could enhance favourable trade balance.

2.4 Kenya's key Trading Partners.

The trading levels of Kenya with other countries may not result to the objective of economic growth and the other benefits that are designed from trade. This is because of the barriers of trade that may exist between and among countries. Such barriers according to Veenstra et al. (2011: 182) include inefficient/ failure in the market system, different cultural practices, absence of trust among countries and inefficient government systems. Despite the existence of the barriers, trade enhances growth and development within and among countries. According to this study, Kenya's trading activities ranges within East Africa and Africa as a whole, USA, Europe and Asia. The figure 5 shows the total value of exports with major trading partners;

Figure 5: Share of leading exports to major trading partners (in % of the total value of exports from 2009-2013)

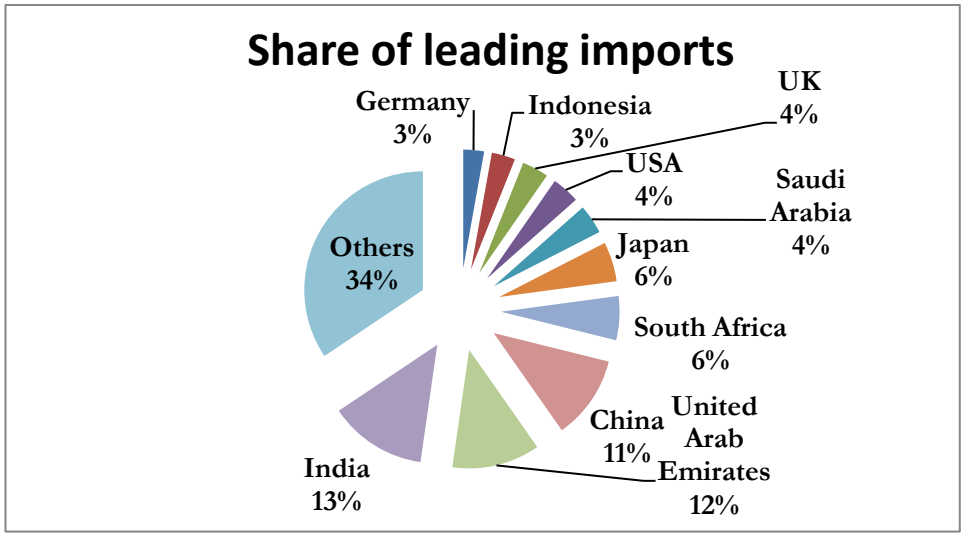


Source: Author, computed based on the data from the Republic of Kenya (2014), Economic Survey.

It is shown in the figure 5 that Kenya exports mostly to East African countries Uganda and Tanzania, which comprise of 13.43 and 8.37 as percentage of total value of exports from the period 2009-2013, then followed by the European Union countries and in this case the United Kingdom and the Netherlands which accounts for 8.92 and 6.54 as percentage of exports respectively. The USA accounts for 5.34 percent. The total value of exports from 2008 to 2013 accumulated to Kshs. 2,287,477 millions. The country's value of imports has continued to rise. This rise is due to continued development in the infrastruc-

ture activities, where construction and manufacturing inputs are mostly imported. The share of the imports of goods and services is shown in the figure 6 as follows;

Figure 6: Share of leading imports from major trading partners (in % of the total value of imports from 2008-2013)



Source: Author, computed based on the data from the Republic of Kenya (2014), Economic Survey.

From the figure 6 above, the value of the total imports for the period 2008 to 2013 shows that the country imports more from Asia which is led by India then China and both account for 13.33 and 11.4 respectively. Imports from the USA accounted for 3.8 percent of the total imports. The total value of imports from 2008 to 2013 accumulated to Kshs. 6,594,606 millions. It is therefore observed that imports are more than exports at a higher margin.

2.5 The Exchange Rate Policies and the Real Exchange Rate in Kenya

2.5.1 The Exchange Rate Regimes

Kenya's exchange rate regime can be traced in the global exchange rate shift process that started when the fixed exchange rate regime started to operate after the Second World War through the Bretton Woods system of 1946-1971 and in 1944, International Monetary Fund (IMF) and the World Bank were formed. IMF's main objectives were promoting international monetary cooperation, regulating the exchange rate system and assisting countries in solving their balance of payment problems (Isard 1995: 45). On the other hand, the World Bank was aimed for reconstruction and development especially in infrastructure. In summary, most of the countries in the world pegged their currencies to the US dollar until 1971 and after this year, some countries started to float their currencies (Isard 1995: 52). The shift from a fixed to a flexible exchange rate regime was experienced in both developed and developing countries, and this shift began in 1970s after the collapse of the Bretton Woods system; and some countries pegged their currency to the US dollar especially the International Monetary Fund's Special Drawing Rights (Isard 1995). According

to Hossain and Chowdhury (1998), the shift from fixed to flexible exchange rate was to serve three purposes in developing countries; first, to reduce the level of inflation through depreciation hence improve export; secondly, the shift was to ensure political stability and lastly to control the effects of the fluctuations of the major world currencies. In addition, developing countries through the shift to flexible exchange rates could absorb economic shocks to stabilize the economy (Mussa et al. 2000).

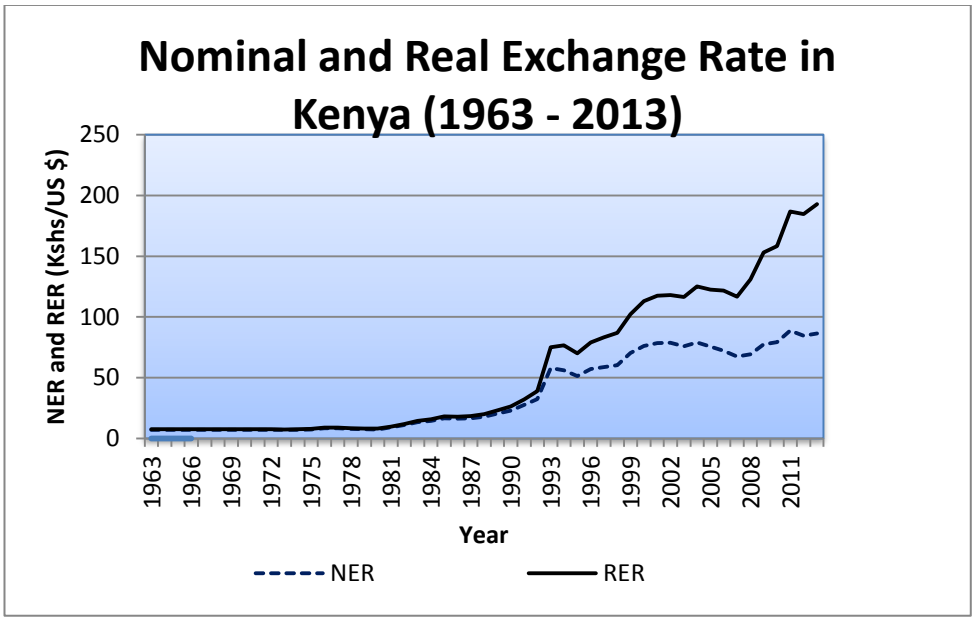
In Kenya, the process of macroeconomic adjustment started after independence. In this case, the exchange rate regimes in Kenya are mostly classified into two: fixed exchange rate which was in place from 1963 to 1981 and the flexible exchange rate which was in effect from 1983 to 2013, as is the scope of this study (Were et al. 2001, Ndung'u 1999). The shift in this regime was precipitated by the occurrence of the decline in trade balances that occurred in 1971 and 1978 to 1981 and the external shocks like the oil crisis experienced in 1973/74 and 1978/79 (Were et al. 2001: 3). From 1982, there was liberalization of the economy and implementation of the structural adjustment programme (Were et al. 2001). The liberalization was the neoliberal view which was adopted after the 'Washington Consensus' that advocated for privatization, deregulation of the economy, trade liberalization and also the countries were to maintain competitive exchange rates (Payne and Phillips 2010). This neoliberal view was against the Keynesian view of government intervention in the economy. Furthermore, the flexible exchange rate has had more other components of currency change like from 1982 to 1990, the currency was adjusted to crawling peg and from 1990 to 1993, there was the dual exchange rate system and thereafter, the currency was to float freely with the control of market forces (Ndung'u 1999). From 1993, the domestic currency has been prone to constant depreciation and the government has been intervening to ensure currency stability and hence macroeconomic stability. This currency fluctuation may have resulted in the more import values as compared to export values of goods and services hence resulting in the increasing trade imbalance.

2.5.2 The Real and Nominal Exchange Rates

The real exchange rate plays a role in the open macroeconomic setup in both developed and developing countries. According to Jha (2003), adjustment of the real exchange rate affects the trade balance even though RER may be affected by the adjustment in nominal exchange rate or the level of domestic inflation rate. Also, the Keynesian and the monetarist view on the importance of the RER is that the real exchange rate helps in addressing the external balances; given that the exchange rate policies is separate from the monetary policies (Qiao 2007: 766). According to the Keynesian view, devaluation increases exports, helps in the enhancement of employment opportunities, promotes domestic saving and increases income for the country (Gala 2008). Further, Gala (2008: 275) argued that, "If the country is able to move from traditional commodity production to manufacturing for world markets by the help of competitive currency, exchange rate policy may promote better 'non-price characteristics' of the goods". For the Kenyan case, most of the exports are agricultural and the shift to manufacturing would improve the role of the real exchange rate in the economy. The real exchange rate effectiveness is essential as it affects the ability of the economy to adjust and respond to exogenous shocks, in addition to influencing imports and exports of goods and service

(Were et al. 2001). The real and nominal exchange rate in Kenya has been depreciating since 1982. The figure 7 below shows the trend from 1963 to 2013.

Figure 7: Trend of the Real and Nominal Exchange Rate in Kenya from 1963-2013



Source: Author, computed based on the World Bank (2014) data

The figure 7 shows the fluctuation of the RER and the NER in Kenya. The real exchange rate has been fluctuating since independence. Both exchange rates remained steady until 1981 and from 1982 to current periods, there was gradually fluctuation of the Kenyan currency against the US dollar. The period of fluctuation is associated with the flexible exchange rate regime which through liberalization policies, the currency was to be regulated by the forces of demand and supply in the exchange rate market. Therefore, the currency was free floating especially from 1993. However, the government has continued to intervene through the Central Bank of Kenya to stabilize the currency.

On the other hand, the nominal exchange rate in Kenya was fairly steady from 1963 up to 1981 and also started fluctuating thereafter. From 1982, the exchange rate was pegged to the US dollar and the change in the domestic currency was little up to 1992 when it was exchanging at Kshs. 32.32 against the dollar. In 2000, the currency weakened against the US dollar by approximately 6.5 percentage points in relation to 1999. Moreover, there was currency appreciation of approximately 13 percent in 2007 as compared to 2004. The change was as a result of the shift in the government implementation of the policies and strategies that were designed for economic recovery hence leading to the higher economic growth of 7.1 percent which was the highest growth rate from independence (Republic of Kenya 2007). However, in 2008, there was currency depreciation of about 24 percent as compared to 2007. This was the time when the country was recovering from post election violence. In 2011, the shilling depreciated further against the US dollar by approximately 13 percent. As a result, the nominal exchange rate affects the RER hence fluctuations leads to the fluctuations in the RER even though the RER is also affected by the changes in the price levels of both the domestic and foreign economy.

However, Weeks (2001: 52) states that according to the Orthodox view, the exchange rate requires deregulation in the foreign market to enhance the

competitiveness of the exchange rate that would encourage more exports and enhance 'efficient' import substitution. Therefore, the increase in export is viewed to maintain favourable trade balance. Conversely, the heterodox stipulates that relative prices are essential in enhancing economic adjustment; but it requires efficient operation of the market and if regulations are not there then the relative prices and floating exchange rate system may not have favourable effect on external balances (Weeks 2001: 55). Therefore, the regulations are necessary to ensure competitive exchange rates and hence the government intervenes to maintain stability of both the nominal exchange rate and the real exchange rate.

2.5.2.1 The Linkage of the Real Exchange Rate and the Trade Balance

The results of the effects of the real exchange rate on trade balance have not been conclusive and the table 1 below gives more information.

Table 1: The effect of real exchange rate on trade balance

Real exchange rate	Investment effect	Domestic absorption	Import	Export	Trade balance
Appreciation	Decrease	Decrease	Decrease	Decrease	?
Depreciation	Increase	Increase	Increase	Increase	?

Source: Qiao (2007: 771)

Table 1 shows that the effect of the exchange rate changes on the trade balance may be undetermined even though it may be unclear (Qiao 2007). This unambiguous nature of the real exchange rate on trade balance was also noted by Edwards and Wilcox (2003) in South Africa. The appreciation of the currency according to the economic theories is expected to increase imports and reduce exports hence trade deficit. Besides, appreciation reduces the investments in an economy. However, depreciation is expected to increase exports and reduce imports thus favourable trade balance. Nevertheless, depreciation may increase both imports and exports hence making it sometimes difficult to determine the nature of the trade balance. Conversely, the appreciation of the currency may also decrease both imports and exports resulting to undetermined trade balance.

Chapter 3
Literature Review

3.1 Introduction

This chapter discusses the theoretical literature review that is related to the relationship of exchange rate and trade balance. It indicates further the empirical literature that shows the previous studies and their findings on the effects /relationships of exchange rate and other variables on trade balance.

In an overview of the theoretical approaches, the elasticity approach aims to test the Marshall-Lerner condition; the absorption approach considers the economy from the aggregate expenditure side; the monetary approach considers the excess demand and the excess supply of money as having an effect on the trade balance; the J-curve approach shows that devaluation deteriorates trade balance in the short run but in the long run trade balance improvement is supposed to hold. Besides, the two country imperfect substitute model stipulates direct linkage/effects and relationship of exchange rate on trade balance besides considering other factors.

3.2 Theoretical Approaches

The relationship of exchange rate and trade balance is explained by various theoretical approaches like the elasticity approach, absorption approach, monetary approach and the two country imperfect substitute model approach.

3.2.1 The Elasticity Approach

The elasticity approach is also called the Bickerdike-Robinson-Metzler model (BRM) approach to trade balance. The The approach is based on the effects brought about by consumption and production and the substitution effect that is as a result of the adjustment in exchange rate. The model is a partial equilibrium of the two countries and the two goods model and it assumes the existence of perfect competition in the foreign market in the analysis of the effect of exchange rate adjustments on trade balance (Shao 2009). The elasticity approach is analyzed by the separation of the markets for imports and exports; besides considering the income of both the foreign and domestic economy (Shao 2009). However, in this model, the real exchange rate is measured by the terms of trade and also domestic and foreign price are assumed to be constant or are exogenously determined. Consequently, the devaluation is expected to increase the volume of home country's exports and lower the imports by the home country hence improve on trade balance (Jha 2003).

3.2.2 The Marshall-Lerner Condition

The Marshall-Lerner Condition states that, "devaluation of a currency will improve a country's trade balance in the long-run if the sum of absolute values of imports and exports demand price elasticities exceeds unity" (Mahmud et al. 2004: 231). The approach assumes a stable rate of exchange as the one that

could improve the trade balance. However, exchange rate is prone to external shocks and may fail to be stable. Therefore, this study does not focus on the Marshall-Lerner condition as it focuses on the relationship between exchange rate and trade balance by adopting linear model. Also, imports and exports are not considered separate in the analysis.

3.2.3 The Absorption Approach

The absorption approach was developed by Alexander in 1952 and was elaborated further by Johnson, who defined trade balance as the difference between aggregate domestic income and aggregate domestic expenditure (Johnson 1972: 256) . This definition shifts away from the definition of the trade balance as the difference between exports and imports (Johnson 1972: 256). The approach further stipulates that devaluation increases net exports if real income is increased or decreased basing on the assumption that government spending is fixed. Further, the approach highlights that devaluation or depreciation improves trade balance if the economy is not at full employment and conversely, if the economy is at full employment, then devaluation or currency depreciation may not improve trade balance (Mankiw 2003). The approach also takes into account the Keynesian income expenditure assumption that volumes of exports are independent of the national income and that national income affects positively the level of imports. However, the approach treats devaluation as a single policy that could be implemented without incorporation of other policies which may be relevant to achieve desired effect of improving trade balance (Johnson 1972: 257). The approach also considers the economy from the aggregate expenditure side; especially it stipulates that the exchange rate has a direct effect not only on relative prices, absorption and income, but also on trade balance (Duasa 2007). Therefore, the study considers the level of real income and real exchange rate in finding its relationship and effect on trade balance in Kenya.

3.2.4 The Monetary Approach

The monetary approach explains trade balance by looking at the supply and demand of money, where the supply of money is managed by the government through the central bank. If there is more domestic demand of money more than what the central bank is able to supply, then there would be need for the money from the foreign countries to fill the gap of the excess demand and as a result, trade balance may be favourable (Duasa 2007: 23). On the contrary, in the situation of having more money supply in the domestic economy by the monetary authority than is demanded, then there would be excess money supply and this may result to outflow of money outside the economy and hence there may be decline in trade balance. Therefore, this approach considers excess money demand and money supply as having an effect on the trade balance. In this study, money supply is used to establish how this relates to trade balance in Kenya (Republic of Kenya 2014). There has been increase in money supply in the country and from the analysis in this model, the increase in money supply has negative effect on trade balance and this for improved trade balance there needs to be low supply of money.

3.2.5 The J-Curve Approach

The J-Curve effect to trade balance stipulates that a country's trade balance measured in home currency units may be expected to deteriorate in the short run after the depreciation of the home currency and then in the long run, trade balance may improve (Isard 1995: 95, Jha 2003). The theory assumes that in the short run, import prices in the home currency would rise more rapidly than the export prices, whereas trade volume would only respond with a time lag which makes J-curve approach different from other approaches. This is because, when the currency is devalued, imports tend to be expensive assuming that imports and exports change immediately hence leading to a negative effect on the trade balance. After a short while, the volume of exports may begin to rise because of their lower competitive prices in the foreign market and the local consumers purchase less imports. Consequently, the trade balance improves as the devaluation occurs. Also, the foreign consumers may opt to buy the goods that are exported to their home country as they become cheaper in the foreign currency as compared to their domestically produced goods (Hacker and Hatemi 2004). However, devaluation may lead to low investment hence reduced economic growth (Weeks 2001: 65). Therefore, this study may analyze if the J-curve exists in the Kenyan economy though it is not the main focus in the study.

3.2.6 The Two Country Imperfect Substitute Model

The two country imperfect substitute model of Rose and Yellen (1989) is another approach to trade balance. This approach shows the nature of the relationship of real exchange rate on trade balance in both short and long run. It stipulates that depreciation of the real exchange rate improves trade balance. Besides, the model assumes that there are no perfect substitutes in the imports and exports for the locally produced goods and services (Rose and Yellen 1989). The model assumes also the following; first, price elasticities of demand and the domestic and foreign income elasticities are positive. Secondly, the income in the foreign or importing country may influence the level of exports by the domestic economy besides the price of domestic substitutes and the price of the imported goods. Moreover, there is need to prevent money illusion by considering that demand function is homogenous. The model is expressed as the partial reduced form of the domestic trade balance which is a function of the real exchange rate, domestic and foreign income. The reduced form equation was derived from the incorporation of the relative price of imports which was a function of real foreign price, real income and the real exchange rate. By the adoption of this model by Rose and Yellen (1989), it was concluded that foreign income and the real exchange rate have positive effects on trade balance while on the other hand the domestic income has negative effect on trade balance. The advantages of this model are that a single equation is adopted in the analysis process. Also, there is no need of the structural parameters and as a result it is likely to give the desired or undesired relationship /effect of the real exchange rate on the trade balance (Rose 1991). However, the model incorporates variables from other approaches and hence is not 'stand alone' model. These variables as outlined are RER, domestic income and foreign income. Other variables may also be included in the model. The model may also adopt the analysis of the Marshall-Lerner condition but this is not the aim of

this study. In addition, the model may analyse the existence of the J-curve effect on trade balance following currency depreciation.

Therefore, the different theoretical approaches discussed show various effects of real exchange rate and other variables like money supply, domestic and foreign income on trade balance. According to Bahmani-Oskooee (1992), the real exchange rate was identified by the elasticity approach as having a major effect on trade balance and hence supports the policy of currency devaluation to improve trade balance. Besides, the monetary approach stipulates that money supply may be used as a tool to improve trade balance but excess money supply may lead to trade deficit. Also, Bahmani-Oskooee (1992: 85) highlighted that domestic income is advocated by the Keynesian approach to affect the trade balance and advised that contactionary fiscal policy was favourable to improve trade balance. On the other hand, the two country imperfect substitute model relates the real exchange rate between two bilateral countries/trading partners and the trade balance of the home country. However, the model adopts variables from other approaches to establish the relationship and effects and hence it is not a 'stand alone' model. It follows that within this model, the elasticity, absorption and the monetary approaches to trade balance are tested and hence favourable in this study. Consequently, the real exchange rate, income and broad money supply are incorporated. The model also allows the incorporation of other variables and this study, the shift in the exchange rate regime was included to find the effect it has on the trade balance. Thus the study adapts the two country imperfect substitute model by Rose and Yellen (1989) to find out the relationship of the real exchange rate on the trade balance in Kenya. The model also was adopted in some studies like Guechari (2012) and Onafowora (2003).

3.3 Empirical Literature Review

The empirical literature review in this study focuses on the empirical studies undertaken to establish the relationship of the exchange rate on trade balance. Various studies have been undertaken and established different results and these are explained as follows;

Shahbaz et al. (2010) carried out a study with the aim of establishing changes in the real exchange rate and the respective effect on trade balance (measured in terms of trade) in Pakistan. The study made use of the quarterly data from 1980 to the end of 2006 with only real exchange rate[3] being dependent variable and by using the autoregressive distributed lag (ARDL) technique; the long run relationship was established to exist between real exchange rate and the trade balance. The study made use of the J-Curve approach to trade balance. The VECM was carried out and the impulse response function was also used to check on the existence of J-curve, which failed to exist according to the study. The effect was negative and significant and hence currency devaluation was noted to unfavourably affect trade balance. The table 2 below shows more results of on the different empirical studies undertaken;

[3] The RER was measured basing on the US dollar and the consumer price index of the USA.

Table 2: Table of the empirical studies on the relationship of exchange rate on trade balance

Author and year	Country	Theoretical approach	Method of analysis	Independent variable	Sign and Significance (5 % level)	Remarks
Duasa (2007)	Malaysia (study on determinant of trade balance)	Elasticity approach, absorption approach and monetary approach	Autoregressive distributed lag (ARDL) using annual time series data from 1974 to 2003.	Exchange rate	(+) Significant	Variance decomposition and IRF were used as further inferences; The study was to establish only the effects of the variables considered but not the relationship; Recommendation: absorption and monetary approaches were to be adopted In Malaysia.
				Foreign direct investment	(+) Significant	
				Budget deficit	(+) Significant	
Guechari (2012)	Algeria and the world; Algeria with two trading partners (USA and France)	Two country imperfect substitute model of Rose and Yellen (1989)	Cointegration; VECM and impulse response function using quarterly data 1981 to 2009	Real effective exchange rate	(+) significant in the long run (-) Significant in the short run	Real devaluation improved exports hence trade balance in Algeria; Granger causality showed that the real exchange rate granger caused trade balance; In Algeria, currency depreciation improves exports hence trade balance.
				Domestic income	(-) Significant	
				Foreign income	(+) Significant	
Kennedy (2013)	Kenya (study on determinant of trade balance)	Marshall-Lerner condition approach	Cointegration and VECM using annual data from 1963 to 2012	Exchange rate	(+) Significant	The study was to test the Marshall -Lerner condition in Kenya but not the relationship of the real exchange rate on trade balance; From the study, the Marshall-Lerner condition was established.
				Foreign direct investment	(+) Significant	
				Budget deficit	(+) Significant	
Onafowora (2003)	Malaysia, Indonesia and Thailand (with the bilateral trade with USA and Japan).	Two country imperfect substitute model of Rose and Yellen (1989)	Cointegration vector autoregression and VECM using uarterly data from 1980 to 2001	Real exchange rate	(+) Significant	Long run relationship was established among the variables; **Findings**: Depreciation of the RER led to fall in the trade balance in the short run but improved it later in the long run hence J-Curve effect was established; The Marshall-Lerner condition was also established.
				Domestic income	(+) Significant	
				Foreign income	(-) Significant	
				Dummy4 (D97)	significant	

[4] The dummy variable captured the shifts in bilateral trade relations after the financial crisis in 1997.

Author and year	Country	Theoretical approach	Method of analysis	Independent variable	Sign and Significance (5 % level)	Remarks
Petrović and Gligorić (2010)	Serbia	J-Curve approach	ARDL and Johansen's method using Monthly data from January 2002 to September 2007	Real effective exchange rate	(+) significant	Impulse response were used also as a method of further inferences; Findings: the depreciation of the real exchange rate improved the trade balance.
				GDP	(-) Significant	
Rose (1991)	5 OECD countries – USA, Japan, Germany, Canada and the United Kingdom	Two country imperfect substitute model of Rose and Yellen (1989)	OLS and other non-parametric method using monthly data for the period 1974 to 1986.	Real exchange rate, Money supply (M1), Short term interest rate Foreign output Domestic output.	No long run relationship	The study established that there was no effect of the real exchange rate on the trade balance and hence fluctuations of the RER had no significance.
Stučka (2004)	Croatia and the trading partners[5]	Two country imperfect substitute model of Rose and Yellen (1989).	ARDL (IV) and Bewley methods using quarterly data from 1994 to 2002.	Real exchange rate	(+) Significant	The long run relationship was established the Marshall-Lerner condition which was the main aim. **Relevance:** Devaluation improves trade balance even though there may be increased debt servicing hence affecting the economy. It was observed that various methods give different results hence inconsistency in policy formulation.
				Domestic income	(-)	
				Foreign income	(+)	
Wilson and Tat (2001)	Singapore with USA as the trading partner	Reduce model of Rose and Yellen (1989)	ARDL technique Quarterly using data from 1970 to 1996	RER Domestic income Foreign income	Not significant	Findings: Little evidence of J-curve established. No long run relationship existed between the trade balance and the independent variables. Therefore, devaluation failed to improve trade balance.

[5] The main trading partners for Croatia were Germany, Austria, France, Italy, United Kingdom and Slovenia and the foreign income of these countries was aggregated so minimize measurement errors and hence enhance effective policy formulation.

The empirical studies in table 2 show that in most countries, the relationships of the real exchange rate on the trade balance differ across countries. Different methods of analysis were adopted basing on different theoretical framework to find out the effects of the real exchange rate on the trade balance; in consideration of the other variables like the foreign and domestic income as modelled by the two country imperfect substitute model of Rose and Yellen (1989). Therefore, this study seeks to find out the relationship and effects of the real exchange rate on the trade balance in Kenya; in consideration exchange rate regime and money supply besides income whose no known study has been done in Kenya. This helps the study to contribute in the debate and in addition fill also the information gap using the cointegrated analysis method which is favourable to apply in the non-stationary time series data.

Chapter 4
Methodology

4.1 Introduction

This chapter presents the research design, the theoretical framework and the empirical model. It also presents the data and the data source, definitions and measurements of variables, testing procedures and the data analysis.

4.2 Research Design

The study made use of the quantitative research design because of the quantifiable and the numerical data that is produced in the process. This research dealt with the manipulation of the empirical variables from time series data for the period 1963 to 2013. This period ranges from independence time in Kenya with various government policies and reforms. These include trade reforms, exchange rate policies and other global reforms like the liberalization of the economy and the Structural Adjustment Policies (SAPs).

4.3 Theoretical Framework

The study considers the real exchange rate basing in the two countries, which are Kenya and the USA which had the available data on exchange rate since independence and also the US dollar is the major unit of transaction in the international market. Therefore, the study adopted a Two-country imperfect substitute model of Rose and Yellen (1989) to establish the relationship of the real exchange rate and trade balance. Also, the approach models trade balance as a function of the real exchange rate, domestic income and foreign income. Therefore, the model shows that a depreciation of the exchange rate may lead to improvement in the trade balance. The model also postulates that the volume of exports to a foreign country is likely to rise as the real income and the purchasing power of these trading partners rises. The empirical model is stipulated in the reduced equation as below;

$$TB = f(RER, Y, Y^*)$$

$$\frac{dTB}{dY} < 0;\ \frac{dTB}{dY^*} > 0\ and\ \frac{dTB}{dRER} > 0 \qquad \ldots \quad (4.1)$$

Where, TB is trade balances[6], RER is the real exchange rate, Y is the domestic income and Y^* foreign income.

The coefficient of domestic income is negative because increase in domestic income would imply that there is an increased import which may negatively affect trade balance (Jha 2003: 185). Also, the coefficient of foreign income is expected to be positively related with the trade balance because increased foreign income is expected to increase import of Kenya's domestic goods in the foreign market especially by the major trading partners (Jha 2003: 185). It would also be noted that the coefficient of real exchange rate may take either a positive or a negative sign. Therefore, if the coefficient of the real exchange rate is positive, then increase in real exchange rate may lead to improvement in trade balances and if the coefficient is negative, increase in real exchange rate could imply that there is deterioration in trade balance because the value of the imports increases (Onafowora 2003). This model was adopted by some authors like Bahmani-Oskooee and Ratha (2004) who showed no evidence of the existence of the long-run relationship between exchange rate and trade balance. Also, the study by Baharumshah (2001), Boyd et al. (2001) and Arize (1994) by adopting the model showed the evidence of the existence of the long run relationship between exchange rate and trade balance. In addition, Rose (1991) and Rose and Yellen (1989) showed that there was insignificant effect of the exchange rate on trade balance upon adopting the model. Therefore, the results by using this model are not conclusive across countries.

4.4 Model Specification

The model is specified as indicated below to show the long – run relationship of equation (4.1) with the incorporation of other control variables;

$$TB=\beta_0+\beta_1 RER + \beta_2 Y + \beta_3 Y^* + \beta_4 MS + \beta_5 D_{82} + \mu \quad \ldots. \quad (4.2)$$

$$RER = NER \left\{\frac{CPI\ (Kenya)}{CPI\ (USA)}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (4.3)$$

On priori expectation;

$\beta_1 > 0$; $\beta_2 < 0$; $\beta_3 > 0$; $\beta_4 < 0$; $\beta_5 \geq 0$ or $\beta_5 \leq 0$

Where;

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ *and* β_5 Are the coefficients.

TB is trade balances
RER is the real exchange rate
Y is the domestic income (measured in GDP)

[6] Trade balance was expressed as a raw figure in terms of the US dollars and it was not expressed as ratios (Himarios 1989: 144).

Y^* is the foreign income (measured in GDP)
MS is the broad money supply (M2)
NER is the nominal exchange rate
CPI is the consumer price index with the base year of 2010 in both countries. The calculation of the RER[7] using CPI was preferred because the updated data for the CPI was available from 1963 to 2013 with the base year of 2010. Also, CPI enhances the measurement of the competitiveness of the economy (Ellis 2001).
μ is the error term (which is assumed to be normally identical and independently distributed)
D_{82} is the dummy for the exchange rate regime and takes the value 0 and 1. In this case, 0 represents the fixed exchange rate regime from 1963 to 1981 and 1 represents the flexible exchange rate regime from 1982 to 2013.

The inclusion of the RER, Y and Y* is as given in the two country imperfect model and have also been tested in other empirical studies in different countries. The inclusion of the broad money supply (M2) is the control variable. The variable (M2) was adapted in a study by Bahmani-Oskooee (1992) in the USA to establish the effect of monetary policy. The shift in the exchange rate regime shows the structural changes in exchange rate that was implemented by Kenyan government and if this changes had an effect on the trade balance. For instance, the study in the three Asian countries: Malaysia, Thailand and Indonesia adapted the shift in the financial crisis in Asia as the dummy variable in establishing the J-curve effect in those economies (Onafowora 2003).

It could be noted that trade balance may be zero when the trade balance is in equilibrium and this arises during the initial nominal exchange rate (Isard 1995).

4.5 Definitions and Measurements of Variables

Trade Balance (TB)
Trade balance is the difference in monetary value between exports and imports. This was measured in terms of the US dollars.

Real Exchange Rate (RER)
This is the product of the nominal exchange rate (Kenya Shilling against the US dollar) and the ratio of the consumer price index 2010 as the base year in both countries[8] which are Kenya and the United States of America.

Domestic Income (Y)
This is the total value of goods and services produced domestically within a period of time. It was measured by the annual real gross domestic product.

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[7] Calculation of the RER was according to Ellis (2001).
[8] The calculation of the real exchange rate was based on the US dollar because most of the world transaction is pegged on the dollar (Mussa et al. 2000). Also, most of these trading partners' data on the respective exchange rate was not available and hence calculation of the weighted real exchange rate of these countries was a challenge and required more time to look for the data from the various sources.

Foreign Income (Y*)
It is the total aggregate value of goods and services produced by trade partners within a period of time. It was measured by the production index of countries that are the major trading partners with Kenya. These countries included the USA, United Kingdom, the Netherlands, Germany, United Arab Emirates, Pakistan, Egypt, Uganda and Tanzania. The total income of these countries is approximated in the US dollars.

Broad Money Supply[9] (M2)
Are the currency and coins in circulation plus the demand deposits held by non-banking institutions, deposits and certificates of deposits held by public and private sectors.

Exchange Rate Regime
This is a dummy variable that takes the value 0 from 1963 to 1981 when it was the fixed exchange rate regime and 1from 1982 to 2012 when it was the flexible exchange rate regime in Kenya.

4.6 Data and Data Source

The data used is this study is the time series data on annual basis from 1963 to 2013. The data on the money supply, domestic and foreign income and the consumer price indexes for both Kenya and USA was from the World Bank (2014), the Central Bank of Kenya reports and the Kenya National Bureau of Statistics (KNBS) through the Economic Survey reports. The nominal[10] exchange rate and the CPIs were used in the calculation of the real exchange rate.

4.7 Estimation Technique

The specification of the functional relationship in equation (4.2) was estimated using the annual time series data for the period of 1963. The regression analysis was done and different statistical tests undertaken. The multivariate Cointegrated Vector Auto Regression (CVAR) was adopted to establish the long run relationship between trade balance and the respective variables, but having special consideration of the real exchange rate on the trade balance. The cointegrated vecto auto regression was preferred because it shows the long run relationship among variables besides establishing the long run and short run effects through the vector error correction model (Gujarati 2003). The presence of cointegration implies the presence the long run relationship in the series (Gujarati 2003, Wooldridge 2003). Therefore, the cointegration was established and the parsimonious model by use of Vector Error Correction Model (VECM) was carried out to es-

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[9] The definition of M2 is given in the Republic of Kenya (2014).

[10] TheGlobalEconomy.com (Last updated 2014) 'Kenya Economic Indicators'. Accessed 24 June 2014 <http://www.theglobaleconomy.com/Kenya/Dollar_exchange_rate/>.

tablish the short run relationship. Besides, the impulse-response function and the variance decomposition technique were adopted to also examine the long- run relationship and the short-run adjustment. However, the cointegration analysis requires that the data of each variable is examined of the integration order by stationarity test because the variables are cointegrated if there is same order of integration among variables otherwise the relationship may be meaningless (Shao 2009). Therefore, there is need to first carry out the test described below;

4.7.1 Unit Root Testing

The time series data usually exhibit a non-stationary process and if Ordinary Least Squares (OLS) is applied directly, it gives spurious results, which arise with the regression of the non-stationary series that are unrelated hence indicating that the series are correlated (Wooldridge 2003, Favero 2001). The test for stationarity was carried out using both the Augmented Dicky –Fuller (ADF) tests and the Phillip-Perron (PP) test and these two tests are asymptotically the same (Gujarati 2003). A stationary series is a time series which has no unit root and the joint density function does not depend on time (Favero 2001: 35). Hence, if the series is integrated of order zero, I (0), estimation may not bring problems and no differencing is required. However, non-stationary series needs to be made stationary by differencing before estimation. A series is integrated of order (d) i.e. if after differencing d times; it becomes stationary (Engle and Granger 1987). These tests of stationarity involved the test of a null hypothesis of non-stationary against alternative of stationarity on models depicting random walk, random walk with a drift or random walk with a drift and a trend. The ADF unlike the Dicky Fuller (DF) unit root test considers autocorrelation of the error term (Gujarati 2003). According to Favero (2001), the DF and the ADF has been of significant success in analyzing empirical studies in time series and the auxiliary regression is given as shown below;

$$x_t = \hat{\mu} + \hat{\gamma}t + \hat{\delta}x_{t-1} + \sum_{i=0}^{k} \widehat{\varphi}_i \Delta x_{t-i-1} + \widehat{\epsilon_t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots \; 4.4$$

Assuming no autocorrelation of the error term biases, the tests and hence its control ensures that the error term is a white noise (Wooldridge 2003). These tests are essential also as they may reduce the policy implication dilemma.

4.8 Cointegration Analysis

Cointegration means that despite the data being non-stationary at levels in each variable, a linear combination of two or more time series can be stationary and this means that there exist a long-run equilibrium relationship among them (Gujarati 2003). The null hypothesis is that the series is not cointegrated against the alternative hypothesis that the series is cointegrated. If the series is cointegrated, modeling of the long-run relationship among variables is necessary. In such a case, the VECM is applied to reconcile the static long-run equilibrium relationship of cointegration with its dynamic short-run equilibrium in time series (Maddala and In-Moo Kim 1998).

To test for coingration among variables, two approaches are applied; the Engel and Granger (1987) and the Johansen (1988) and Johansen and Juselius (1990). The Engel and Granger (1987) approach applies single-equation estimates of the equilibrium errors which appear to be stationary while the Johansen (1988) and Johansen and Juselius (1990) approach analyses multivariate cointegrated system based on the VAR approach. The latter defines maximum likelihood estimation to establish the rank of the cointegrating vector and it is considered superior to Engel and Granger (1987) approach (Shao 2009: 19-20). Also, the approach assumes that the error terms are independent and normally distributed (Maddala and In-Moo Kim 1998: 173) and hence this approach is very sensitive to the normality of errors. The normality test was undertaken to check on this assumption. Therefore, the Johansen approach is adopted in this study.
Therefore, the Johansen test of cointegration formulates the VAR system, with a vector of *p* variables and $Z_t = Z_{1t}, \dots, Z_{pt}$ is generated by the k-order vector autoregressive process with Gaussian errors:

$$Z_t = A_1 Z_{t-1} + \cdots + A_k Z_{t-k} + \mu + \varepsilon_t, t = 1,2, \dots, T \quad \dots\dots\dots\dots 4.5$$

Where
Z_t is a p×1vector of the I(1) variables
A_k are the coefficients estimates
μ is the constant vector
ε_t is assumed to be *iid N(0,∑)*
And *k* is the order to be established in the model
The method was also adopted by Boug and Fagereng (2010) in Norway.

4.9 Vector Error Correction Model (VECM)

The VECM is adopted in the VAR analysis if there exists cointegration in the series. The VECM is determined by differencing the series and is given by;

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \dots\dots + \Gamma_{k-1} \Delta_{t-k+1} + \Pi Z_{t-k} + \mu + \varepsilon_t, t = 1,2, \dots .4.6$$

The rank of the coefficient matrix Π establishes the level of the cointegrating vectors of Z_t. On the other hand, Π =αβ' where α and β represents *p*×*r* matrices and 0<*r*<*p* and r represents linearly independent cointegrating vector (Shao 2009). Consequently, the trace statistics and the maximum eigenvalue tests help in determining the number of cointegrating vectors (Shao 2009). The VECM not only helps in establishing the short run adjustment, but also it helps in establishing impulse-response functions (IRFs) and carry out variance decomposition, which gives more information among the endogenous variables.

Chapter 5
Results and Findings

5.1 Introduction

The chapter presents descriptive and summary statistics, the estimation results and consequently the interpretations of the results which transforms to policy implications.

5.2 Descriptive and Summary Statistics

These descriptive statistics comprise of the mean, standard deviation, number of observations, minimum and maximum values for the variables under considerations in this study.

Table 3: Description and Summary Statistics of the Variables

Variables	No. of observation	Mean	Median	Standard deviation	Minimum	Maximum
Trade balance	51	-1.06e+09	-3.65e+08	1.79e+09	-7.44e+09	2.85e+08
RER	51	20.9028	2.117	29.5758	0.3564	106.5051
DY (real GDP)	51	4.7445	4.3006	4.35402	-4.6555	22.1739
Foreign income	51	9.53e+12	5.25E+12	7.59e+12	7.21e+11	2.43e+13
M2	51	32.5667	30.9819	9.97102	4.2893	51.54
D_{82} (ERRG)	51	0.6274	1	0.488294	0	1

Source: Author, computed by stata based on the data from the World Bank (2014)

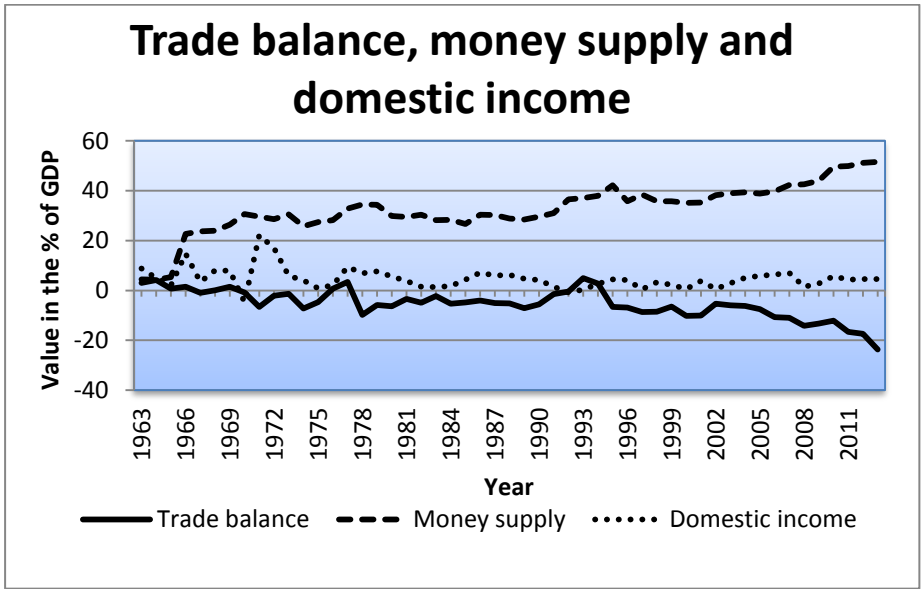
The table 3 shows that there is more variability in the real exchange rate because of the higher standard deviation as compared to other dependent variables. Also, trade balance has the lowest statistics in terms of its mean and the minimum value as compared to other variables. More information on the data of the variables under study is presented in the appendix 1.

5.3 The Trend Analysis

The figure 8 below shows the trend of the trade balance, money supply and the domestic income. It is observed that money supply increases though at

a steady rate but trade balance seems to fall in the long-run. On the other hand the economic growth fluctuates though steadily.

Figure 8: Trend of trade balance, money supply and domestic income (1963-2013)



Source: Author, computed based on the data from the World Bank (2014)

From the figure 8, some relationship between trade balance and money supply may be derived. It can be observed that trade balance is falling while the money supply and domestic income increase. However, no conclusion can be derived from such trend and hence further investigation of the effects and relationships of money supply and domestic income on trade balance could be established by econometric analysis. Moreover, the trends of foreign income of the trading partners continue to increase in nominal terms as portrayed in appendix 2; which also considers the individual trend of the variable in level and first difference.

5.4 Unit Root Analysis

The unit root analysis helps to establish the stationarity or non-stationarity of the time series data (Gujarati 2003, Wooldridge 2003). This test is essential before applying cointegrating procedure so that it can enhance the determination of the integration order. The unit root testing was based on the lag selection criteria (appendix 3). This test was undertaken by use of the Augmented Dickey-Fuller (ADF) test and the Phillips and Perron (PP) tests which almost gives the same stationarity test conclusion (Gujarati 2003). The results are given as shown below;

Table 4: Unit Root tests in levels

ADF-Test						
Test critical values						
Variable	**Opt Lag**	**Test statistcs**	**1% level**	**5% level**	**10% level**	**Prob***
TB	4	3.275	-2.423	-1.684	-1.303	0.9989
RER	4	3.288	-2.423	-1.684	-1.303	0.9989
DY	4	-2.567	-4.187	-3.516	-3.190	0.2953
FY	4	1.550	-2.423	-1.684	-1.303	0.9355
MS	4	-0.134	-2.423	-1.684	-1.303	0.4471
PP- Test						
TB		6.966	-18.900	-13.300	-10.700	1.0000
RER		4.377	-18.900	-13.300	-10.700	1.0000
DY		-44.78	-25.700	-19.800	-16.800	0.0000
FY		-2.921	-25.700	-19.800	-16.800	0.7515
MS		-5.081	-18.900	-13.300	-10.700	0.1832

Source: Author, computed by stata based on the data from the World Bank (2014)

The table 4 shows the results with pure random walk, a drift term and even some variables with trend as it was analyzed by the various variables in the regression analysis. The results shows that there is need to fail to reject the null hypothesis of non-stationarity the trade balance, real exchange rate, foreign income, domestic income and money supply at 1%, 5% and 10% significance level basing on both ADF-test for all variables and the Phillip-Perron test, which gave exception of the domestic income.

Table 5: Unit Root tests for the first difference

ADF-Test						
Test critical values						
Variable	**Opt Lag**	**Test statistics**	**1% level**	**5% level**	**10% level**	**Prob***
DTB	3	-1.501	-2.421	-1.683	-1.303	0.0705
DRER	3	-1.617	-2.421	-1.683	-1.303	0.0568
DDY	3	-7.419	-4.187	-3.516	-3.190	0.0000
DFY	3	-2.481	-2.421	-1.683	-1.303	0.0086
DMS	3	-4.260	-2.421	-1.683	-1.303	0.0001
PP -Test						
TB		-34.355	-18.832	-13.268	-10.680	0.0000
RER		-37.730	-18.832	-13.268	-10.680	0.0000
DY		-58.576	-25.572	-19.724	-16.752	0.0000
FY		-30.630	-25.572	-19.724	-16.752	0.0004
MS		-53.183	-18.832	-13.268	-10.680	0.0000

Source: Author, computed by stata based on the data from the World Bank (2014)

The table 5 shows that the null hypothesis of non-stationarity in the first differenced form of the variables trade balance, real exchange rate, domestic income, foreign income and the money supply is rejected based on the unit root testing using both the ADF and the Phillip-Perron test. The variable trade balance using ADF test is stationary at 10% significance level. Therefore, these variables are integrated of order 1, I (1). It should be noted that the exchange rate regime[11] was not included in the test for the presence of unit root. Therefore, the cointegration analysis of the series from the period 1963-2013 was carried out after establishing same integration order.

5.5 Cointegration Analysis

For the cointegration analysis, the lag length for the VAR model was established to enhance the multivariate cointegration test. The lag length is identified by the selection criteria which comprise of the Swartz-Bayesian information criteria (SBIC), the Akaike's information criteria (AIC), Final Prediction Error criteria (FPE), modified LR test statistics (LR) and the Hannan and Quinn information criteria (Gujarati 2003). These criteria are used to recommend the optimal lag length by making use of the lowest value in every criterion but the lag length should be supported by the ma-

[11] The exchange rate regimes include the structural break in the exchange rate system and hence such structural breaks are not included in the test for the presence of unit root (Gujarati 2003: 819).

jority criteria. These criteria and the respective lag length are shown in the table 6.

Table 6: Optimal lag selection

Lag	LR	FPE	AIC	HQIC	SBIC
0	-	8.2e+45	122.743	122.832	122.979
1	600.38	1.1e+41*	111.501*	112.123*	113.154*
2	64.403	1.4e+41	111.663	112.818	114.733
3	68.345	1.8e+41	111.74	113.429	116.228
4	63.952*	3.4e+41	111.912	114.134	117.816

Note: * shows the lowest lag in those selection criteria.

The table 6 recommends the optimal lag length of 1 because for criteria (FPE, AIC, HQIC and SBIC) this lag length as having the lowest value. On the other hand, LR recommends the optimal lag length of 4 which is not recommended according to this series. It is also noted that some variables had drift and trend terms during the modeling process and therefore this is incorporated in the cointegration analysis at 5 percent level of significance. On carrying out the other diagnostic tests, it was clear that that the study failed to reject the null hypothesis of no autocorrelation in the series after carrying out the Langrangian Multiplier test at lag 1 of the residuals (appendix 4).

After establishing the lag length, the Johansen cointegration test is carried out to establish the long run relationships among the variables. These tests take two forms; the cointegration test using trace statistic and the maximum eigenvalue. The results are shown as follows;

Table 7: Cointegration rank test (Trace)

Maximum rank	Eigenvalue	Trace statistic	5 percent critical value
None	-	134.3485	94.15
At most 1	0.74655	65.7190*	68.52
At most 2	0.54601	26.2349	47.21
At most 3	0.25399	11.5839	29.68
At most 4	0.16935	2.3065	15.41
At most 5	0.04508	0.0000	3.76
At most 6	0.0000	-	-

Note: * means cointegration exists at rank 1 at 5 percent significance level.

Table 8: Cointegration rank test (Maximum eigenvalue)

Maximum rank	Eigenvalue	Maximum eigenvalue	5 percent critical value
None	-	68.6295	39.37
At most 1	0.74655	29.484*	33.46
At most 2	0.54601	14.6511	27.07
At most 3	0.25399	9.2773	20.9
At most 4	0.16935	2.3065	14.07
At most 5	0.04508	0.0000	3.76
At most 6	0.0000	-	-

Note: * means cointegration exists at rank 1 at 5 percent significance level.

The tables 7 and 8 shows that there is a rank of 1 in both trace test and the maximum eigenvalues test implying that there is need to reject the null hypothesis of no cointegration in favour of the alternative hypothesis of the existence of cointegration. Therefore, there is one cointegrating equation at 5 percent level of significance, based on both tests and hence the existence of the long-run relationship among these variables: trade balance, real exchange rate, exchange rate regime, money supply, foreign income and domestic income. These results lead in the modelling of the parsimonious model using the Vector Error Correction Model (VECM) where if the cointegration is established (as is in this case) then VECM is related and needs to be carried out to establish short run adjustment (Maddala and In-Moo Kim 1998: 157).

5.6 The VECM Modelling

As a result of the cointegration analysis, the vector error correction model is based on one rank and one lag. But before the analysis of the VECM, there was need to carry out the Jarque-Bera which shows the normal distribution of the series. The results are shown in table 9.

Table 9: Normality test of error terms

Jarque-Bera test Equation	LM -statistics	df	Prob.
D_TB	9.058	2	0.01079
D_RER	16.229	2	0.00030
D_DY	56.313	2	0.00000
D_FY	1.035	2	0.59601
D_MS	134.236	2	0.00000
D_ERRG	1843.553	2	0.00000
ALL	2060.424	12	0.00000

Source: Author, computed by stata based on the data from the World Bank (2014)

The study according to the results in table 9 fails to reject the null hypothesis that errors are normally distributed at 5 percent significance level. Therefore, the VECM results are presumed to be consistent in policy formulation and decision making. Therefore, VECM is modelled to find out

the short-run relationship between variables. Since the result shows one cointegrating equation among these variables, the trade balance as the dependent variable was normalized to be 1 by stata in the cointegrating vector.

The long-run relationship of the various variables under consideration was established and the long run coefficients (β) and short run adjustment (α) below;

Table 10: Results of Cointegration Analysis

Variable	Trade balance	Real exchange rate	Domestic income	Foreign income	Money supply (M2)	ERRG
(β)	1	7.78e+07** (2.07e+07)	-1.86e+07 (4.96e+07)	0.000257** (0.00013)	0.32657 (3.53e+07)	0
(α)	-0.086** (0.023)	9.03e-10** (1.97e-10)	1.62e-10 (3.36e-10)	67.4852** (9.1352)	-2.11e-11 (1.96e-10)	-7.2e-12 (8.27e-12)

Note: Values in parenthesis are the standard errors of the coefficients and **p<0.05. Also, β shows long run coefficients and α show short run adjustment coefficient.

The table 10 shows both the long run coefficients (row 1) that shows the effects and the short run adjustment coefficients (row 2) that shows the level of adjustment to equilibrium.

5.6.1 The Long Run Effects

The long run coefficients in the table 10 show the long-run effects among the variables on trade balance which is normalized to 1 (being the dependent variable). The relationship is further shown below;

Trade Balance = 7.78e+07RER - 1.86e+07DY + 0.000257FY + 0.32657MS 5.1

From the equation 5.1, the constant is zero meaning that if all these independent variables are zero, then the trade balance would be zero implying no trade between Kenya and the foreign countries. Also, Isard (1995: 94) supported that zero trade balance arises during when the nominal exchange rate is at initial rate and based on the assumption of the law of one price for both exports and imports. However, it may not be easy for the law of one price to hold basing on the different level of economies.

The results show that the real exchange rate has a positive effect (7.78e+07) on trade balance. This effect is significant at 5 percent level. The positive sign of the coefficient of real exchange rate was the one anticipated by the model. This implies that rise in the real exchange rate leads to improvement of the trade balance. Therefore, trade balance in Kenya would have been worse if depreciation of the real exchange rate reduces would not have played a role to reduce the deficit. Therefore, devaluation policies need to be advocated for improved trade balance. Nonetheless, the government makes some intervention also to control the level of the real ex-

change rate movement with the other currencies especially the USA dollar. The study by Guechari (2012) in Algeria also established a positive and significant effect of the real exchange rate on the trade balance.

Also, it was established that the shift in the exchange rate regime from fixed to flexible exchange rate has no effect on trade balance in the Kenyan economy in the long run. Therefore, the change in the exchange rate regime would have less effect on trade balance and hence the government should maintain the flexible exchange rate system even though the Central Bank of Kenya makes intervention to control depreciation and may not entirely leave it the market forces.

Also, the effect of the domestic income is negative with the coefficient of 1.86 million units. The negative sign is according to the expectation of the partial reduced model that was adopted in the study. This implies that the increase in domestic income has negative effect on trade balance but this is not significant at 5 percent level. The study by Onafowora (2003) established a negative and significant effect of domestic income on trade balance in Malaysia, Indonesia and Thailand. Thus, an increase in the domestic income raises imports as compared to exports and hence worsens trade balance. As it is in the Kenyan case, there is increased deficit in trade balance as the domestic income rises. This implies that there may be low level of foreign and domestic investment especially in the manufacturing sector that may be mainly for export. Also, the country imports more of the intermediary goods and the import may be as a result of the foreign aid either through the foreign direct investment or other support to mitigate on disasters like hunger which is prone in some regions in Kenya. The government needs to enhance better policies and regulations that need to address export-oriented industries that will promote income and at the same time raise exports relative to imports. However, the result is inconsistent the monetary approach view that the rise in domestic income raises money demand that results in an increased exports and hence the improved trade balance.

Additionally, on the foreign income, the results showed the expected positive sign according to the model; hence there was a positive effect on the trade balance meaning an increase in the foreign income is expected to improve trade balance. This effect is significant at 5 percent level. The result was supported by Stučka (2004) and who established a positive and significant effect of foreign income on trade balance in Croatia. Thus, when foreign income increases, Kenya's products may be highly demanded in the foreign market even though the quantities imported by other countries from Kenya had low magnitude (0.0002569) in the long-run. As a result, the government needs to increase the level of exports by increasing the export promotion strategies, improve the nature and the quality of the goods being exported taking into account that most of the agricultural products exported are perishable goods. For instance, the horticultural products needs to adhere to the safety measures required in the international market (Republic of Kenya 2014: 148). Moreover, the manufacturing sector needs to be expanded for increased production of exportable goods. Also, the infrastructural facilities like air, road and railway networks needs to be improved to enhance quick movement and flow of goods and services both domestically and internationally. However, some challenges to

trade exist like different mutual relationships within and among countries, different trade policies and the geographical location. These challenges may affect the level of trade.

Moreover, the broad money supply[12] had a positive effect on trade balance with the coefficient of 0.3265684 which was contrary to the expected sign. The result was highly insignificant at both 5 and 10 percent level of significance. Therefore, the results shows that increase in money supply improves trade balance but according to Keynesians approach, increase in money supply leads to more purchase of the foreign goods hence decline in trade balance. As a result, the government needs to implement monetary policies that would reduce trade deficit. Also the policies may aim at reducing inflation level to below 5 percent (Republic of Kenya 2008: 148). The Central Bank of Kenya manages the supply of money through other channels like the management of the reserve requirements and the management of the interest rate with the commercial banks. Thus, the expansionary policy may be implemented in Kenya but it may not have significance in the long run. Nonetheless, Bahmani-Oskooee (1992) established that broad money supply (M2) had a long run negative effect on trade balance implying decrease in money supply reduces trade deficit and hence contractionary monetary policy was supported in the US economy.

5.6.2 The Short Run Adjustment Analysis

The short-run adjustment coefficients (**α**) are shown in table 11 and **α** show the adjustment towards the equilibrium (Stata.com 2013). From the results, the trade balance adjusts to equilibrium by -0.0875 and this adjustment is significant at 5 percent significance level. The low level of adjustment as argued by Weeks (2001) that in the short run, imports and exports may be insensitive as a result of the undeveloped structural strategies like low industrialization level. Therefore, there may be need for the vibrant strategies to enhance industrialization process so that more exports as compared to imports are stimulated.

Also, from the results, the real exchange rate and the foreign income have positive sign and hence improve trade balance towards equilibrium. This adjustment in the short run is significant at 5 percent level even though the magnitudes of the coefficients are smaller with RER having 9.03e-10 while foreign income has 67.48516. This means the adjustment of the trade balance to equilibrium would take a longer time. Therefore, the exchange rate policies to depreciate the real exchange rate in the short run would have significant effect in reducing trade balance. Also, the policies to improve exports in the foreign market improve the foreign earnings that reduces trade deficit in the short run. On the other hand, domestic income, money supply and the exchange rate regime adjustment to equilibrium is not significant at 5 percent level; even though broad money supply has the negative adjustment effect (-2.11e-11) in the short run. This implies in the

[12] The study also tried to adopt excess money supply and the same result was achieved as the one achieved by M2. The data for M2 and M3 was the same hence same result.

short run, increased money supply adjusts to improve trade balance but the adjustment is not significant.

Therefore, from the short run and long run analysis undertaken in this study, it is observed that there exist long run relationship between the trade balance and the variables considered. Also, the real exchange rate has both positive and significant effect in the long run and in the short run adjustment coefficients on the trade balance. However, the adjustment in the short run is significant but with small magnitude which requires long time to reach equilibrium. Maddala and In-Moo Kim (1998: 175) argues that, "Economic theories are supposed to be about long run behavior and there is very little that can be said about short run behavior". Hence, the short run effects /significance may fail explain more on the expected economic outcomes.

5.6.3 Other Tests in VECM

The other tests that are adopted for further inferences when using the VECM are; the impulse response functions (IRF) and the Variance decomposition (VDC). The IRF and the VDC enhances the dynamic interaction of the variables in the system as innovations in VAR can have contemporaneous correlation and hence any shock in a variable can have effect on the other variables through the contemporaneous correlation with the innovation (Duasa 2007). The results of the tests are as follows;

5.6.3.1 Impulse Response Functions (IRF)

The IRF helps to show the behavior of the series in response to the shocks in the economic system for further inferences. The IRF shows how a variable is affected by the response of the one standard deviation shock (Duasa 2007). In this case, the magnitude of trade balance as the response variable can be observed by the variation in real exchange rate, money supply, exchange rate regime and domestic and foreign income which are the response variables. It was observed that a shock on the real exchange rate initially increases deficit by -2.1e+07 and further shocks increases deficit with time. Also, the exchange rate regime could lead to the deterioration in trade balance as it is shown in the IRF table, the shock in the regime at first decreases trade balance by -1.2e+07 and further shocks leads to more decrease. In addition, the shock in the money supply tends to have little effect on the trade balance in the long run even though it tends to increase trade balance in the long run. The shock in the domestic income leads to continuous improvement in the trade balances and this ranges from 1.0e+07 to 9.5e+07 in the long run. Besides, a shock in the foreign income leads to continuous small reduction in the trade balance. The study by Guechari (2012) adopted IRF to establish the effects of external shocks in the series in Algeria. The graphical representation of the IRF table (appendix 6) is shown in the IRF graph (appendix 5). The shocks in summary have permanent effect on trade balance and therefore the government needs to put in place measures that could limit occurrence of shocks in the economy. However, some shocks are external like the 2008 financial crisis which affected the economy at global level and the impact was highly felt in the Kenyan economy (Republic of Kenya 2012).

5.6.3.2 Forecasting with the VECM

The forecast on each of the variables at levels seem to diverge given the 95 percent confidence interval as it is portrayed in the (appendix 7). It can be observed that trade balance in Kenya is projected to be in continuous deterioration for a longer time. Also, the real exchange rate will continue to depreciate. This adjustment may lead to uncertainty in the economy. Also, domestic income (economic growth) is forecasted to improve level though with slight increase. On the foreign income and money supply, the trend will continue to rise in the long run. The forecast on the exchange rate regime is that there is no change in the regime and hence flexible exchange rate regime is still projected to be operational. The study by Duasa (2007) in Japan adopted the forecast in the series in Japan. In this study, the forecast shows continuity in trade deficit and therefore necessary policies by the government would be essential to reduce the deficit in future. Such policies would include favourable exchange rate policies and the export promotion policies in the foreign market.

5.7 Granger Causality Test

The granger causality test helps in the establishing of the endogenous and exogenous variables in the model including their causal relationship. It was noted that, "…Cointegration is concerned with the long run equilibrium, whereas the granger causality in mean is concerned with short-run forecasability" (Granger 1988: 203, Guechari 2012). The result of the test is shown in the appendix 8. To test for the granger causality, the null hypothesis is stated that the lagged real exchange rate does not granger cause trade balance. Hence, the results show that there is need to reject the null hypothesis at 5 percent significance level in favour of the alternative hypothesis. Therefore, it is concluded that the real exchange rate granger cause the trade balance. To support this causality, Guechari (2012) in Algeria established that the real exchange rate granger cause the trade balance. However, the causality may fail to exist and in this case, Granger (1988: 204) noted that, "On some occasions, causality could be present but would not be detected by the testing procedures used. This problem only arises when the series are integrated of order 1, I (1) and cointegrated…" Therefore, the failure of the causal relationship with some other variables like foreign income, money supply and domestic income between exchange rate and trade balance would be there but may not be detected. On the other hand, other studies failed to establish causality between the trade balance and the real and in this case Wang et al. (2012: 302) established no causality of the real exchange rate to the trade between in Japan and Malaysia and Thailand and the United States; but the real exchange rate causal granger caused trade balance in the study between Malaysia and the USA and Thailand and Japan. In summary, exchange rate policies that would enhance competitive real exchange rate should be considered in the improvement of the trade balance.

In conclusion, real exchange rate has positive long run relationship with the trade balance and according to the impulse response analysis; any shock in the RER deteriorates the trade balance. Besides, the real exchange rate had positive and significant effect on trade balance in both the short

run adjustment to equilibrium and the long run. Thus, both the short run and long run exchange rate policies that aim to effectively the manage exchange rate should be considered to avoid shocks from affecting the RER. The shocks have undesirable effects on trade balance which was established also to effect trade balance basing on the granger causality. Nevertheless, the Kenyan currency is regulated by the forces of supply and demand in the foreign exchange rate market and hence the currency is prone to the external shocks.

Chapter 6
Conclusions and Policy Implications

The objective of this study was to establish the relationship and effect of the real exchange rate on trade the trade balance in Kenya. Also, other factors like the broad money supply (M2), exchange rate regime, domestic and foreign income were adopted in finding out their relationship and effects on the trade balance. The study adopted the two country imperfect substitute model of Rose and Yellen (1989) which links the real exchange rate and trade balance. The approach stipulates that devaluation/depreciation of the real exchange rate would improve trade balance. The cointegration analysis and the vector error correction model were used to establish the relationship and the effect of the real exchange rate and other factors on the trade balance using the annual time series data from 1963 to 2013 in Kenya. Therefore, the study established that the long run relationship existed between the real exchange rate and the trade balance. This relationship also comprised of the money supply, the exchange rate regime, domestic and foreign income on trade balance. In addition, the study found out that the real exchange rate had positive and significant effect on trade balance. Therefore, depreciation of the Kenyan currency leads to improvement in trade balance. It was also observed that the exchange rate regime has no effect in the long run and hence change of the regime may not affect levels of exports and imports. Thus the government needs to continue maintaining flexible exchange rate but undertake necessary intervention controls through the Central Bank of Kenya to stabilize the currency. As it was observed through the impulse response analysis, any shock on the real exchange rate was observed to adversely affect the trade balance. Besides, the domestic income had negative but insignificant effects on the trade balance; thus the absorption approach may not hold in Kenya but the government needs to enhance the income of the country so that there is significant improvement in the trade balance. Moreover, money supply had positive effect, contrary to the expected sign according to the model, but it was not significant; meaning that even if government increases supply of money through the expansionary policy, there would be no significant effects on the trade balance. However, sometime both monetary and exchange rate policies needs to be implemented together to enhance better position of trade balance. Furthermore, foreign income had positive and significant effect and hence increased foreign income improves trade balance in the long run.

The policy implication is that Kenya's trade deficit may be reduced by the depreciation of the real exchange rate in both short and long-run periods. Thus, the government needs to formulate policies that make the currency competitive in the international market to improve on exports. Also, formulation and implementation of such policies would improve the confidence of investors hence improve investment in the productive sectors. In addition, the government should improve exports of goods and services among the trading major trading partners and other countries by manufacturing high quality of goods that are competitive and satisfactorily fulfils

the needs of the foreign economies. also, The government needs to enhance import-substitution industries by improving infrastructural facilities, formulate good trading policies and ensure political stability that are essential in enhancing export oriented investment hence favourable trade balance. Also, there is need for the government to have better fiscal policies and monetary policies that targets improvement in the domestic income (economic growth) and money supply respectively that would significantly improve trade balance.

The study was limited by data availability and therefore for further research in this area, the study recommends that the weighted real exchange rate could be calculated by considering the major trading partners. Also, the data on the foreign income could be disaggregated and make analysis in consideration of every country. This would enhance the provision of more information on the relative importance of each of the trading partner in the fluctuations of the real exchange rate and the trade balance among other factors.

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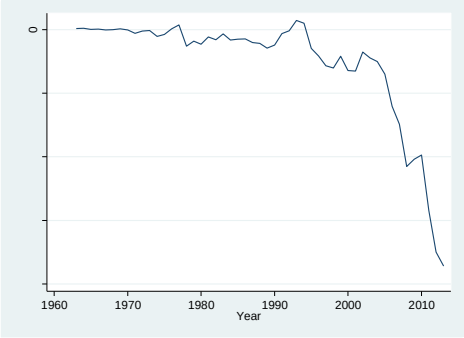
Appendix

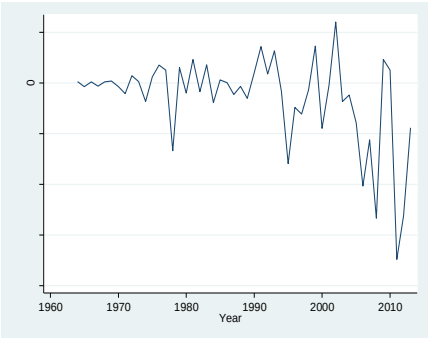
Appendix 1: Raw Data

Year	DY (GDP)	M2 (% GDP)	ERRG	TB($)	FY ($)	RER
1963	8.77834	4.442095	0	28447989	6.12E+11	0.40105
1964	4.964467	4.28932	0	41720001	6.57E+11	0.395476
1965	2.009094	5.373178	0	6999997	7.12E+11	0.402906
1966	14.72857	22.6617	0	17919993	7.81E+11	0.410822
1967	3.361232	23.69378	0	-1.1E+07	8.25E+11	0.406759
1968	7.98269	23.96963	0	1399999	9.01E+11	0.391728
1969	7.959225	26.37602	0	20999992	9.73E+11	0.370969
1970	-4.65545	30.60656	0	-1.3E+07	1.08E+12	0.357984
1971	22.17389	29.6744	0	-1.17E+08	1.17E+12	0.356351
1972	17.08243	28.53554	0	-4.5E+07	1.28E+12	0.365064
1973	5.89658	30.49112	0	-3.2E+07	1.43E+12	0.369272
1974	4.065617	25.71029	0	-2.15E+08	1.55E+12	0.397942
1975	0.882203	27.39467	0	-1.53E+08	1.69E+12	0.447157
1976	2.153965	28.18176	0	24142285	1.88E+12	0.537451
1977	9.453798	32.79569	0	1.51E+08	2.09E+12	0.573285
1978	6.912494	34.52913	0	-5.17E+08	2.36E+12	0.581365
1979	7.615226	34.3548	0	-3.65E+08	2.63E+12	0.545945
1980	5.591976	29.9314	0	-4.64E+08	2.86E+12	0.54323
1981	3.773544	29.4702	0	-2.30E+08	3.21E+12	0.670298
1982	1.506478	30.42047	1	-3.15E+08	3.35E+12	0.919318
1983	1.30905	28.17589	1	-1.35E+08	3.64E+12	1.209388
1984	1.755217	28.34209	1	-3.28E+08	4.04E+12	1.38423
1985	4.300562	26.68185	1	-2.97E+08	4.35E+12	1.722221
1986	7.177555	30.38808	1	-2.93E+08	4.59E+12	1.712539
1987	5.937107	30.24395	1	-4.06E+08	4.87E+12	1.817685
1988	6.203184	28.90107	1	-4.37E+08	5.25E+12	2.117015
1989	4.690349	28.39891	1	-5.87E+08	5.66E+12	2.663104
1990	4.192051	29.57702	1	-4.83E+08	5.98E+12	3.314553
1991	1.438347	30.98193	1	-1.23E+08	6.17E+12	4.585261
1992	-0.79949	36.5178	1	-3.4E+07	6.54E+12	6.637111
1993	0.353197	37.06523	1	2.85E+08	6.88E+12	16.94097
1994	2.632785	38.01601	1	2.01E+08	7.31E+12	20.55282
1995	4.406217	42.23227	1	-5.94E+08	7.66E+12	18.62922
1996	4.146839	35.79169	1	-8.33E+08	8.1E+12	21.87902
1997	0.474902	38.42265	1	-1.14E+09	8.61E+12	24.48367
1998	3.290214	35.80718	1	-1.21E+09	9.09E+12	26.44867
1999	2.305389	35.7708	1	-8.42E+08	9.67E+12	31.88385
2000	0.599695	35.16473	1	-1.29E+09	1.03E+13	36.7419
2001	3.779907	35.24074	1	-1.31E+09	1.06E+13	38.96296

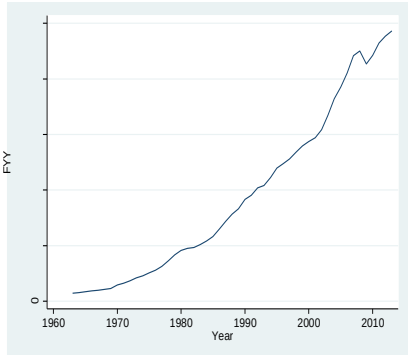
Year	DY (GDP)	M2 (% GDP)	ERRG	TB($)	FY ($)	RER
2002	0.54686	38.15891	1	-7.07E+08	1.1E+13	39.20148
2003	2.932476	39.02316	1	-8.88E+08	1.15E+13	40.59179
2004	5.1043	39.32703	1	-1.01E+09	1.23E+13	45.98829
2005	5.906666	38.90672	1	-1.40E+09	1.31E+13	46.84049
2006	6.330633	39.7084	1	-2.41E+09	1.39E+13	49.56365
2007	6.993285	42.31659	1	-2.97E+09	1.45E+13	49.38513
2008	1.526949	42.54033	1	-4.31E+09	1.47E+13	61.69758
2009	2.735286	43.94261	1	-4.08E+09	1.44E+13	75.62286
2010	5.802908	49.70303	1	-3.95E+09	1.5E+13	79.23
2011	4.420654	49.95117	1	-5.69E+09	1.55E+13	98.16367
2012	4.552554	51.1612	1	-7.00E+09	1.62E+13	100.1235
2013	4.687291	51.54	1	-7.44E+09	1.68E+13	106.5051

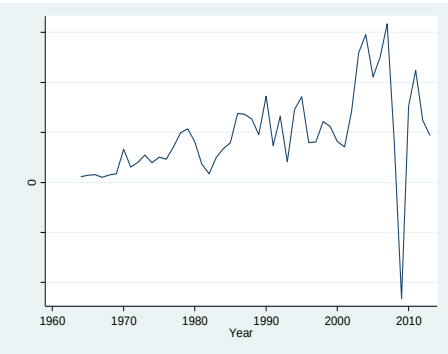
Appendix 2: Trend of the variables in both levels and first difference



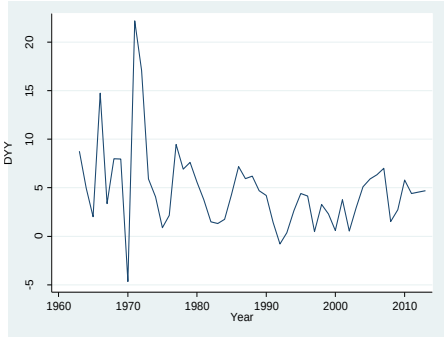


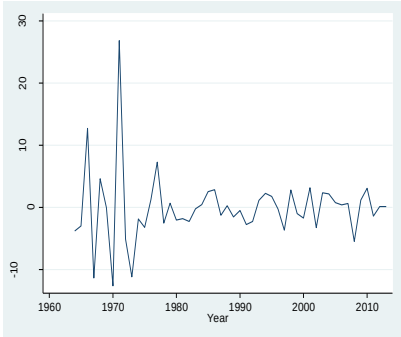
a) i. Trade balance in (level) ii. Trade balance (first difference)



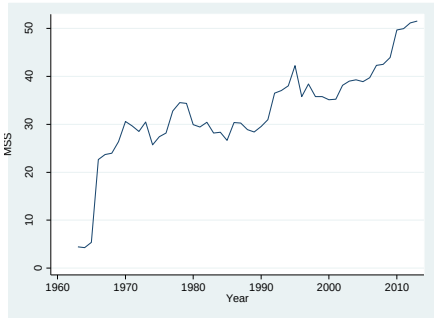


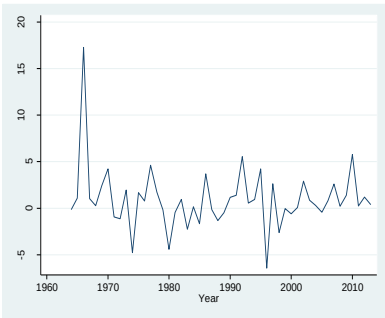
b) i. Foreign income (level) ii. Foreign income (first difference)



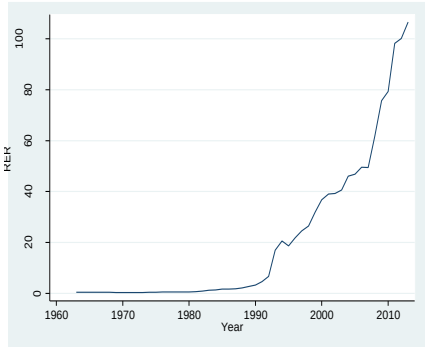


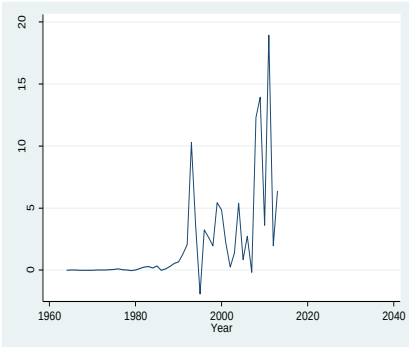
c) i. Domestic income (level) ii. Domestic income (first difference)





d) i. Money supply (level) ii. Money supply (first difference)





e) RER (level) ii. RER (first difference)

Appendix 3: Maximum Lag selection for ADF test

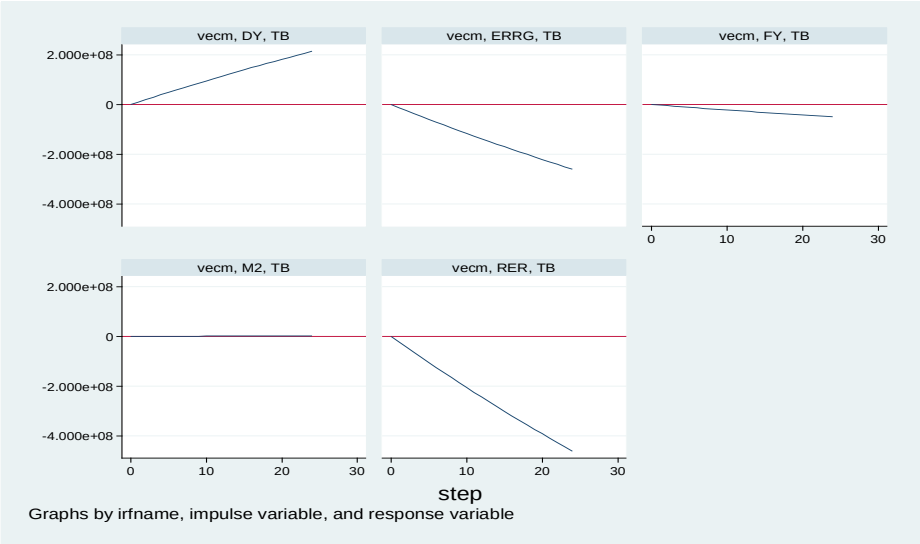
Variable	Number of lags	AIC	BIC
TB	0	2124.841	2128.665
	1	2085.392	2091.067
	2	2041.05	2048.535
	3	2001.681	2010.931
	4	1959.448*	1970.42*
RER	0	262.4652	266.5892
	1	259.4849	265.1604
	2	257.1634	264.6482
	3	254.672	263.9227
	4	246.4284*	257.4002*
MS	0	260.1574	263.9815
	1	255.8528	261.5283
	2	251.7683	259.2531
	3	224.8497	234.1005
	4	222.6881*	233.66*
DY	0	290.9629	294.7869
	1	288.1717	293.8472
	2	284.3314	291.8162
	3	271.6279	280.8787
	4	259.1822*	270.154*
FY	0	2816.05	2819.874
	1	2757.52	2763.196
	2	2699.506	2706.99
	3	2644.435	2653.686
	4	2590.946*	2601.918*

Note: *means is the lag with the lowest AIC and BIC

Appendix 4: Langrangian Multiplier test

Lag	Chi2	df	Prob
1	**50.8908**	36	**0.05105**

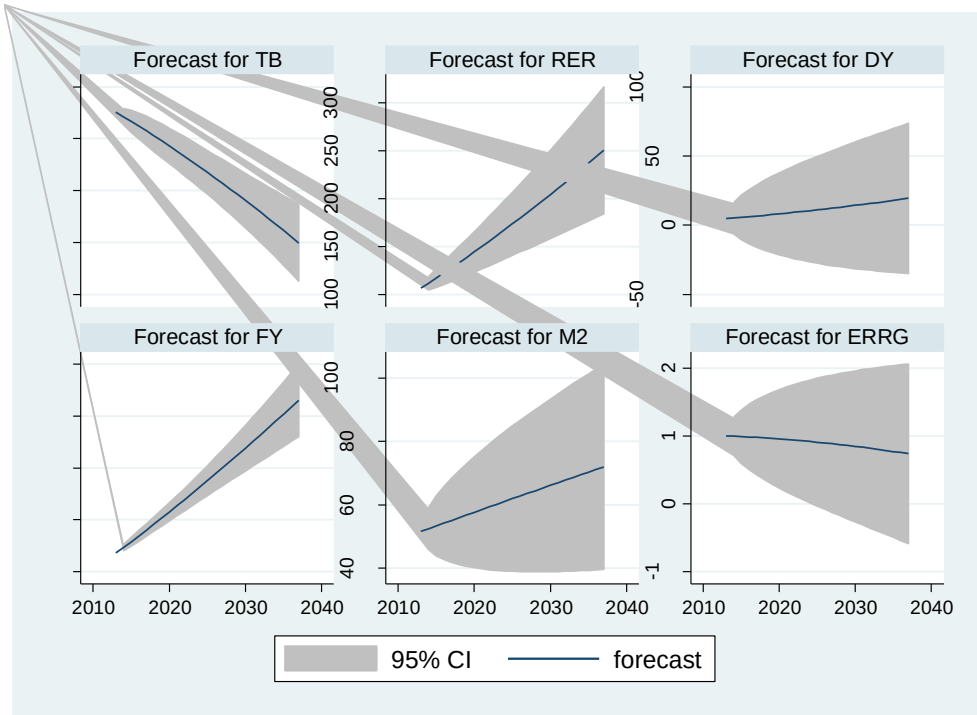
Appendix 5: Impulse response functions (graph)



Appendix 6: Impulse response functions (table)

Step	Impulse of RER on TB	Impulse of domestic income on TB	Impulse of foreign income on TB	Impulse of M2 on TB	Impulse of exchange rate regime on TB
0	0	0	0	0	0
1	-2.1e+07	1.0e+07	-2.3e+06	81337.9	-1.2e+07
2	-4.3e+07	2.0e+07	-4.6e+06	161866	-2.4e+07
3	-6.4e+07	3.0e+07	-6.8e+06	241593	-3.6e+07
4	-8.5e+07	3.9e+07	-9.0e+06	320525	-4.8e+07
5	-1.1e+08	4.9e+07	-1.1e+07	398672	-5.9e+07
6	-1.3e+08	5.8e+07	-1.3e+07	476041	-7.1e+07
7	-1.5e+08	6.8e+07	-1.6e+07	552640	-8.2e+07
8	-1.7e+08	7.7e+07	-1.8e+07	628475	-9.3e+07
9	-1.9e+08	8.6e+07	-2.0e+07	703556	-1.0e+08
10	-2.1e+08	9.5e+07	-2.2e+07	777890	-1.2e+08

Appendix 7: Forecast of variables



Appendix 8: The Granger Causality test

Dependent variables	TB	RER	DY	FY	M2	ERRG
TB	-	3.9103*	2.1909	0.1785	0.879	0.0163
RER	2.9019	-	0.2392	-	0.0746	1.4545
DY	0.1594	0.8847	-	-	0.106	0.5047
FY	18.17*	10.445*	0.3418	-	3.8112	5.4553*
M2	0.2076	0.7697	0.8582	-	-	0.1956
ERRG	-	2.6452	0.8543	-	0.0817	-

Note: * shows that there was the rejection of the null hypothesis