

**AN ANALYSIS ON THE EFFECT OF EXTERNAL
PUBLIC DEBT ON EXCHANGE RATE VOLATILITY IN
KENYA**

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DECLARATION

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

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DEDICATION

To husband, Edison Odhiambo, son Harmon Finley and parents, Elly and Margaret Odera who have all contributed to the success of this research project.

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ABSTRACT

Kenya has faced a rising trend in external public debt and experienced changes in exchange rates in the past decades. The changes in exchange rate have been seen to exhibit an appreciating and volatile trend which is detrimental to an economy as it affects economic growth. This study empirically investigated the effects of external public debt on real effective exchange rate (REER) volatility under the complete float regime for period 1993 to 2013 using quarterly data. REER index was constructed using US Dollar and British Sterling Pound. The REER volatility was measured using the standard deviation of the second order of the moving average. A linear model was developed and exchange rate volatility was regressed against inflation, interest rates, and GDP growth rate, money supply to GDP ratio and external debt to GDP ratio using Ordinary Least Square technique. The results showed that external debt to GDP ratio had negative and significant effect on REER volatility while interest rates had positive and significant effect. Inflation, GDP growth rate and money supply to GDP ratio were found not to have any significant effect. High and unsustainable external public debt was evidenced to lead to high REER volatility in Kenya. Monetary authorities should ensure debt sustainability indicators such as external debt to GDP ratio are at low levels and pursue strategies that reduce excessive accumulation of external public debt.

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ACRONYMS AND ABBREVIATIONS

ADB	African Development Bank
ADF	Augmented Dickey Fuller Test
AIDS	Acquired Immunodeficiency Syndrome
ARDL	Autoregressive Distributed Lag
BOP	Balance of Payment
CONC	Concession Loan
CONC/EDT	Concession Loan to Total External Debt Ratio
CPI	Consumer Price Index
DTC	Debt Trap Countries
EDT	Total External Debt Stock
EDT/GNP	Total External Debt to Gross National Product Ratio
EDT/XGS	Total External Debt to Export Ratio
EIB	European Investment Bank
EXC	Exchange Rates
GDP	Gross Domestic Product
GDPGR	Gross Domestic Product Growth Rate
GNP	Gross National Product
GOK	Government of Kenya
HIV	Human Immunodeficiency Virus
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IMF	International Monetary Fund
MENA	Middle East and North Africa
MUL	Multilateral Debt
MUL/EDT	Multilateral Debt to External Debt Ratio
NEER	Nominal Effective Exchange Rates
NDTC	Non Debt Trap Countries
PB	Portfolio Balance
PKR	Pakistani Rupee
PPP	Purchasing Power Parity

REER	Real Effective Exchange Rates
SDR	Special Drawing Rights
TDS	Total Debt Service
TDS/XGS	Total Debt Service to Exports Ratio
USA	United States of America
USD	United States of America Dollar
UK	United Kingdom
XGS	Exports

CHAPTER ONE: INTRODUCTION

1.1 Background

External debt can greatly contribute to the economic growth of country if it used finance investment expected to yield an adequate rate of return or smooth consumption in the face of uneven aggregate supply since it can provide a level of economic welfare that could not otherwise be attained. It can also bridge the gap between domestic savings and investment and between exports and imports of goods and services. Unfortunately, most developing countries, Kenya included, have faced acute external debt problems. The debt problems stem from the inefficient use and control of borrowed funds, low returns to investments, inadequate policy framework for debt management and international developments in interest rates, terms of trade and trade policies. The debt problem has been made worse by failure of these countries to plan on how to repay these funds before receiving and the limits that such debt impose on the future economic policy.

Kenya's debt problems are largely due to government actions especially accumulation of external debt for development projects. Since independence Kenya has undertaken public projects in an attempt to strengthen her economy, frequently with donor support and external debt financing in the form of concession loans. Most of these development projects were designed to improve domestic infrastructure rather than investing in projects that will yield higher rate of return. The assumption was that Gross Domestic Product (GDP) growth rate would increase over time and commensurate increases in export production thus meet her debt service obligation.

1.2 Kenya's Economic Performance

Kenya's first decade after independence in 1963 was one of remarkable growth and structural change with real GDP growth rate averaging more than 6.5% a year with inflation at 3%. The balance of payment position was healthy and exchange rate fixed. Exports grew at a rate of 13% per annum and the debt servicing ratio was negligible to cause concern. After the 1973 oil crisis, the GDP growth rate decelerated to an average of 5.4% over 1973-80 and inflation rate began to rise. The increase in inflation was accompanied by depreciation and changes in the exchange

rates. The balance of payment crises and expansionary fiscal and monetary policies led to economic crises in the mid 1970. The government opted to heavy external borrowing in an attempt to sort out the balance of payment crisis. As a result external debt stock grew by 45% in 1973 (World Debt Tables 1994). Policy makers in Kenya also chose instruments of control rather than liberalise the economy. This resulted to major distortions and discretionary powers which gave room to corruption activities in the public sector. Moreover, policy makers were unable to formulate and adopt stabilisation and adjustment measures that could reorient the economy in the phase of severe internal and external shock.

The coffee boom of 1976-77 eased some of the economic difficulties experienced in the early 1970's and postponed pressure for adjustment. Export earnings soared and consequently there was a temporary decrease in the debt service to export ratio from 21% in 1977 to 14% in 1978 (World Bank, Appendix II). GDP growth rate was 9.5% and the external debt stock grew by 11.1% in 1977 from the previous period (Economic survey 1978 and World Debt Tables 1994). However, the boom led to the expansion of domestic credit, money supply and Non-bank financial institutions, exchange rate appreciation and fiscal expansion. Consequently, there was negative development on the stabilisation front with erosion of fiscal discipline after the coffee boom and subsequently deterioration in the external terms of trade due to the second oil shock. Kenya's export earnings almost stagnated and the debt service to export ratio began to rise.

Annual GDP growth rate decreased to an average of 3% over 1980-85 in response to these stabilisation problems and political uncertainty resulting from an attempted coup in 1982 and severe drought in 1984. Drought conditions led to food imports due to the availability of external debt funding. Increase in interest rates on international loans during this period raised the debt service charges. Growth in the 1986-90 was impressive at 5.6% on average. However, the improvement in macroeconomic stability was short lived, as fiscal discipline weakened once again in the wake of a modest 1986 coffee boom and Kenya began to face renewed macroeconomic imbalances. Expanded public sector employment pushed up the budget deficit and monetary expansion fuelled inflation to an average of 12.5% during 1987-90 from 5.7% in 1986. The current deficit remain high mainly expansion in public sector employment,

unfavourable terms of trade and slow pace of growth in non-traditional exports (Economic Survey 1990, 1993).

The period 1991-1992 was marked by a sharp decline in all major macroeconomic performance indicators. Real GDP growth rate fell to 2.3% in 1991 and 0.5% in 1992. External imbalances worsened as a consequence of the Persian Gulf crisis during 1990-91 and arrears began to accumulate on external debt. The external debt indicators, debt to GDP and debt to export ratios, began to rise during this period (Appendix II) coinciding with the decline in real GDP growth rate. The growth in the external debt exceeded the growth of GDP. In 1992 there relaxation of controls in foreign exchange transactions in the midst of excess money supply in circulation, severe shortage of foreign exchange, price decontrol in the presence of inadequate supply of essential commodities and increasing spending (electoral greasing) in the run up to 1992 elections. These excessive growth in monetary aggregates fuelled inflation, which accelerated sharply from 19.6% in 1991 to around 100% (on an annualised basis) in the second quarter of 1993(Economic Survey 1994).

The beginning of 1990s, focus shifted away from the real economy to trade in financial assets. The domestic demand was depressed as producers resorted to their good because of the shilling depreciation. This led to the abolishment of the official exchange rate by the end of 1993. As result of these efforts, together with a shadow program negotiated by World Bank and International Monetary Fund (IMF), a favourable environment for market driven policy and traders had confidence in the economy. Monetary policy was effectively tightened and the economy began to stabilise. Annual inflation fell to 55% in the third quarter of 1993 from 100% level in the previous quarter.

In the mid 1990s the real GDP growth rate accelerated. In the period 1994-96 the real GDP growth rate average accelerated to 4.1% from 1.2% in 1993 (Economic Survey 1997) as a result of economic reforms introduced in 1992. However the growth was short lived and in 1997 the real GDP growth rate dropped to 2.4 % due to political instability and it continued with the downward trend up to 2002 falling to a low of -0.2% in 2000 (Economic Survey 2003). The decline in the late 1990s and early 2000 was as result of the El nino induced floods in late 1997,

two successive years of severe drought (1999 and 2000), downturn in tourism and HIV/AIDS pandemic that was taking a toll on Kenya's economically active population and rising economic burden on both the state and civil society. The total external debt stock reduced in late 1990s due to aid freeze and hence there was no new lending.

In the period 2003-2007, there was an impressive real GDP growth rate of an average of 5.4%, the highest in several years. This was mainly driven by public and private sector investment and sound economic management. Inflation maintained an upward trend as a result of high world oil prices and inadequate supply of some staple foods especially maize because drought. However, major decline in growth of 0.2% was recorded 2008 due to postelection violence. To curb this decline, the government put measures to stimulate growth by creating conducive environment for investment for domestic and focused on achieving and maintaining price stability within a single digit inflation rate of 5.0%. GDP growth rate rose to 3.3% in 2009 as a result of increased activities in the tourism sector, vibrant construction industry and an enabling environment for investment. However, due to global economic recession and by unfavorable weather condition economic performance was constrained.

Between 2010 and 2014 economic growth was satisfactory with an average growth rate of 5.9% and the main macroeconomic indicators remained relatively stable with single-digit inflation. The country in addition ushered reforms introduced in 1990 following the promulgation of the Constitution in 2010. Devolved governments (47 Counties) were introduced in 2013 to address differences in access to economic, political and social services.

1.3 Structure, Size and Magnitude of Kenya's External debt

Total External debt is the sum of public and publicly guaranteed long-term debt, private non-guaranteed long-term debt, use of IMF credit and short-term debt (World Bank). Long-term debt¹ consists of public, publicly guaranteed and private non-guaranteed debt and has the highest proportion of total external debt stock in Kenya with an average of 82% since 1970. Most of the long term debt is the hands of the public sector and thus has a profound effect in the socio-

¹ Long term debt has an original or extended maturity of more than one year and is owed to nonresident and repayable in foreign currency of goods and services (World Bank)

economic development of the country. Private non-guaranteed debt, short term debt and private debt have remained significantly low over the years. The highest proportion of private debt to total debt since independence is 28.5%, incurred between 1974 and 1978. This is because of high debt service payments.

Kenya's greater proportion of external debt are consists of official debts (multilateral and bilateral). In 1970s bilateral sources had the greater proportion of official debt with United Kingdom (UK) being the largest creditor. From early 1980s to date multilateral debt has had the highest percentage of total external debt stock. In 1989, this was 36.7% compared to bilateral debt, which was only 18% (Global Development Finance 1998). The share of multilateral debt increased moderately in 1980s mainly as a result of large disbursements of adjustment lending from the World Bank (O'Brien and Ryan, 1999). The multilateral debt is mostly in the form of concessional loans. The proportion of concessional debt has been rising since the early 1990s from 34% in 1990 to 63% in 1999 and to 77% in 2008, respectively (World Bank, Appendix II). This has given Kenya the advantage of contracting loans on soft terms.

The main lender is the World Bank Group which accounted for almost 80% of total loans in 1970-1996 (Global Development Finance, 1998) and is mainly concerned with project lending. Other major multilateral creditors are the International Monetary Fund (IMF), European Investment Bank (EIB), the African Development Bank (ADB) and its soft lending arm the African Development Fund (ADF). IMF is mainly concerned with policy based lending (budgetary support). In the bilateral category, USA and Japan are leading creditors. There has been a notable decline in the share of U.K. in 1990s.

Kenya's external indebtedness corresponds to the periods 1973-74, 1978-1980, 1985-1987, 1990 – 1993, 1999-2000 and 2004 in which increased borrowing was made. The increased borrowing in the first and second periods coincided world oil crises while the third period with the funding of structural adjustment programmes. The decline in growth of external debt in 1988 (-3%) and 1989 (1%) is partly due to debt write - offs and a decline in bilateral and private debt (Global Development Finance 1998). In 1989, Kenya external debt amounting to US \$ 463 million was

written off. The decline in the 1990s was attributed to the two-year 'aid freeze', heavy domestic borrowing in relation to external borrowing and a relatively tight fiscal stance.

1.4 Exchange rate regimes in Kenya (1963 to 2014)

The relation between a currency and other foreign currencies is overseen using an exchange rate regime. There are two types of exchange rate regimes: Fixed and floating exchange rates. The fixed exchange rate dictates that the domestic currency is dependent on other currency/currencies, while the floating exchange rate relies on the market that deals with demand and supply of currencies. Between these two, there are intermediate regimes with various deviations of currency pegs. These regimes range from single currency, to crawling currencies, to free-floating currencies. Depending on the regime the role of the monetary authority ranges from full control, to minimal control, to no control of the exchange rate.

Kenya has undergone various exchange rate regime shifts mostly driven by economic events, especially balance of payment crises. The shifts can be divided into two phases: the fixed exchange rate period before 1982 and the flexible exchange regime rate after 1982. According to Ndungu (1999), a fixed exchange rate regime was maintained in the 1960s and 1970s with the currency overvalued. This resulted in a balance of payment crisis of 1971/1972. From 1964 to 1967 the Kenyan Shillings was pegged to the sterling pound against at Kshs. 20 per pound. However in 1967 the shift changed to dollar due devaluation of the pound by 14.3% and there was no point in devaluing the Kenya shilling.

The pegging to dollar was not effective, as the appreciation of the U.S. dollar had adverse effects on Kenya's internal sector. One main change was the exchange rate policy moving from a fixed to a crawling peg, in order to deal with the upward trend of the real exchange rate. This led to the changing the peg to Special Drawing Rights (SDR) in 1975 since it was the most stable of the currencies during that time. The shillings was re-aligned to the special drawing rate (SDR) and devalued by 10.8%.

However, between 1974 and 1981, the movement in the nominal exchange rate in relation to the U.S. dollar was quite erratic; in general the nominal exchange rate depreciated by about 14% and

this depreciation accelerated in 1981/82 with further discrete devaluations. Between 1980 and 1982, the Kenya shilling was devalued by about 20% in real terms measured against the SDR.

After these devaluations, the exchange rate regime was changed to a flexible exchange rate regime, with crawling peg up to 1990 and to dual and floating rate in the 1990s. The crawling peg mostly associated with inflationary accommodation started by the end of 1982. However, the crawling peg period did not lead to higher inflation rate compared to the fixed period. One contradiction in the crawling peg regime was the presence of controls on foreign exchange transactions and imports. This regime lasted until 1990 when a dual exchange rate system was adopted that lasted till October 1993 when, after a series of devaluations, the official exchange rate was abolished (Ndungu 1999) and the shilling was put into a complete float. This is the regime that is still in place.

1.5 External debt and exchange rates

Kenya's external debt stock is denominated in foreign currency of US dollar, British Pound and Japanese Yen with dollar having the highest percentage. The Kenya shillings depreciation against these currencies especially the US dollar corresponds with external indebtedness. The shilling depreciated by 13.9% against the US dollar from 14.4% in 1984 to 16.4% in 1985 and averaged 16.4% during the period 1985-1987 while the debt indicators debt to GNP ratio and debt to exports ratio rose over the same period. Similar trends were repeated during the 1990-1993 when the Kenya shillings depreciated by 150% from Kshs. 22.9 in 1990 to Kshs. 58.0 in 1993 and 1999-2000 where the shilling also depreciated by 26.1% from Kshs. 61.9 in 1998 to Kshs.78 in 1999 (see Appendix II). The debt indicators declined between 2005 and 2008 and the Kenya shillings against the dollar also appreciated during the same period. Similar trend is noted between 2009 to 2013 when the debt indicators rose the Shilling depreciated against the dollar. These trends show that when Kenya experienced high levels of external indebtedness the shilling depreciated against the major currencies implying that there is a relationship between the level of indebtedness and changes in exchange rate.

1.6 Problem statement

External debt management is one facet of macroeconomic policy and in particular, balance of payment policy. Foreign borrowing is one of the means of bridging the gap between government expenditure and revenue especially in most developing countries. It is useful in developing world because these countries do not have enough savings to raise the necessary capital for local development and therefore they fund their internal budget with money borrowed from donors in form of loans. Kenya like most developing countries cannot borrow in her own currency in the international capital market, but instead have to borrow in one of the major currencies.

Empirical evidence for instance, Cavallo et al. (2005) showed that the size of the foreign currency denominated debt of a country contributed to the occurrence of exchange rate fluctuations, sudden stop of capital flow and output drop in the domestic market. The exposure to foreign liabilities was also seen to magnify the cost of exchange rate depreciation especially in the situation where the foreign debt is in the public sector.

A volatile exchange rate affects economic activities through domestic price determination, trade flows and international competitiveness of domestic industries. It has further been seen to hinder economic growth if the financial market is underdeveloped (Basirat et al. 2014). Kenya's financial market is still underdeveloped though over years it has made tremendous gains. The cumulative impact of these effects has consequences on economic growth. It negatively affects economic growth by increasing uncertainty and risks and thus discourages trade and investment yet economic growth is one of the main objectives of economic policy and decision making.

1.7 Objective of the study

1.7.1 General objective

The main objective of this study is to analyze the effect of external public debt on exchange rate volatility in Kenya.

1.7.2 Specific Objectives

1. To empirically investigate the relationship between the external public debt and exchange rate volatility.
2. To establish whether external public debt has any significant effect on exchange volatility in Kenya.
3. To suggest policy measures in debt management in line with the findings of the study.

1.7.3 Research questions

1. Is there a relationship between external public debt and exchange rate volatility?
2. What is the nature of the relationship between external public debt and exchange rate volatility?
3. What are relevant policy interventions in debt management required based on the study findings?

1.8 Justification of the study

Foreign borrowing is important in any economy especially developing countries. Developing countries resort to foreign financing to foster internal growth and increase resources available for investment. This is because saving in these countries is low. Most of these countries do not borrow in their own currencies in the international capital markets, but instead borrow in one of the major currencies and thus affect the exchange rate.

In the past decades developing countries have experienced changes in exchange rates, interest rates and commodity prices. A study by Musyoki et al. (2012) on the volatility in the Real Effective Rate (RER) found out that Kenya's RER exhibited an appreciating and volatility trend in the period 1993 to 2009. Currently, Kenya has diversified its foreign borrowing to finance government expenditure.

Excessive exchange rate variability makes it hard for economic agents and decision makers to reliably predict future exchange rate price and therefore pricing of goods and services becomes difficult. This can result to enormous losses or profit for importers, exporters and foreign market participants. Therefore it is crucial to investigate whether the foreign currency composition of the

external public debt has an effect on the exchange rate volatility. This will help policy makers at the National Treasury to coming up with policies on external public debt management that will ensure stability in exchange rates thereby spur economic growth in the country.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter outlines the literature review on external debt and exchange rate. Theoretical and empirical literature reviews have been discussed and summary of the review given.

2.2 Theoretical Literature

Each country has a currency in which the prices of goods and services are quoted. In this regards exchange rates play a central role in international trade because it compares the prices of goods and services produced in different countries. With the move to a system of floating exchange rates the research turned to the determination of exchange rates (explaining and forecasting exchange rate levels) and not their volatility. There are structural models proposed in literature that have captured the pattern of exchange rate such as the asset market (stock) models of exchange rate determination.

In the asset market models, the asset market is commonly assumed to be efficient implying that expectations are rational, and thus the asset prices will reflect available information. However, within asset theory there is no consensus about the relevant assets for exchange rate determination. The flexible price monetary model of exchange rates assumes the validity of the purchasing power parity (PPP) and uncovered interest parity (UIP) hypotheses all times; thus, it is usually described as a long run model since these hypotheses are likely to hold in the long run. The Sticky Price model by Dornbusch (1976) assumes that prices are sticky in the short term, and PPP is likely to hold only in the long run. Another asset market theory-based approach is the portfolio balance approach. In this model the assumption of perfect substitutability is relaxed allowing for current account imbalances to have a feedback effect on wealth and, subsequently, on long run equilibrium. Although the latter approach may be considered as a richer view of exchange rate determination, researchers have concentrated on the monetary approach in their empirical investigations of the asset view (MacDonald, 1984) due to its empirical appeal and simplicity.

There are several studies that have been conducted to theoretically investigate the relationships between external debt with exchange rate policy and regimes. Cook and Devereux (2005)

explored the linkage between fixed exchange rate regimes and capital inflows in an environment of endogenous fiscal policy. The study investigated whether government incentive in the capital market through implicit and explicit borrowing guarantees and subsidies depended on the exchange rate policy. The result was in the face of fixed exchange rate the economy engaged in high external borrowing. To eliminate the borrowing, they suggested that the monetary authority must follow a flexible exchange rate rule in which capital inflows led to exchange rate appreciation.

In finding out the role of the exchange rate policy in developing countries, Gressani and Faini (1998) developed a macroeconomic model estimated for Philippines prior to the implementation of two restructuring operations that resulted in significant reduction of external debt burden. They showed through theoretical analysis and counterfactual simulation, that an overvalued exchange rate brought some short run benefit in the form of lower inflation and improved budgetary performance. However in the presence of high external debt exchange rate held at overvalued levels was very costly. The results indicated that reducing the external debt burden had significant effects through the impact on the fiscal and external balances.

2.3 Empirical Literature

There are several studies that have been conducted to empirically investigate the relationships between external debt with exchange rate policy and regimes. Neaime (2009) examined the sustainability of Middle East and North Africa's (MENA's) external debt policies, and established the links between foreign debt and exchange rate policies. The study empirically evaluated the sustainability of exchange rate and external public debt policies in 5 MENA countries (Egypt, Jordan, Morocco, Tunisia and Turkey) using time series econometric models. The result obtained indicated a positive relationship between external public debt with budget deficit, current account deficit and exchange rate depreciation.

Trudel (2005) studied the role of the exchange rate regime in influencing a country's propensity to participate in International Monetary Fund (IMF) lending activities. The study looked how the different exchange rate regimes conferred different levels of importance on economic variables which were useful predictors of participation in IMF agreements. He investigated theoretically

and empirically whether the significance of international reserves in predicting IMF participation depended on the exchange rate regime. To test the hypothesis he used a dynamic univariate probit regression.

The empirical evidence showed that the level of reserves had a negative and statistically significant effect on the probability of entry in countries that maintained a fixed exchange rate regime and no significant effect in other countries. The results indicated that dependence of the reserves on the exchange rate regime should be considered in a model of selection into the IMF programs. Thus a country that maintains a fixed exchange rate was be more likely to enter an IMF program when its level of reserves decreases but there was no reason to expect a relationship between the reserves and IMF participation for countries that do not maintain a fixed exchange rate.

A few studies have documented the impact of external debt and world oil price on exchange rate on developing economies. Ajayi (1992) studied whether the size of external debt and world oil price of oil were factors in exchange rate determination in the context of developing economies using Nigeria as case study for the period 1975-1986 when the country was in an era of generalized floating among the major currencies of the world. Using a two-stage least squares simultaneous equation model, key monetary and real variables in the Nigerian economy over the period were estimated. The results showed that the exchange rate of the naira was significantly and positively related to changes in the real price of world oil while the size of the external debt had a negative but statistically insignificant impact on the external value of the naira.

Ezirim and Muoghalu (2006) investigated the relationship between exchange rate conditions, foreign investment crisis and external debt burden of a less developing economies using Nigeria as a test case. The paper addressed the question of how, in the midst of international oil prices, exchange rate conditions between the Naira (Nigeria's currency) and the dollar (US) over time were affected by the country's external debt levels and foreign direct investment burden. Four (4) exchange rate models were specified to investigate the nature of association existing between exchange rate crisis, on one hand, and the explanatory measures of external debt and foreign investment crisis. The results indicated that current exchange rate crisis was a positive and

significant function of previous exchange rate conditions, the foreign investment crisis variables and international oil prices but negative function of external debt burden and international oil prices of Nigeria. Evidence showed that the cost of external debt (debt service-to-export ratio) did put negative pressures on exchange rate crisis instead of aggravating it. The findings further indicated that foreign investment burden was more important than the over emphasized debt burden variable in bringing about currency crisis.

These studies by Ajayi (1992) and Ezirim and Muoghalu (2006) were limited to oil producing developing countries in the case of Nigeria. Further they sought to investigate the relationship between external debt and exchange rate and not exchange rate fluctuations. Hence these findings may not be applicable to Kenya.

In comparing non-oil producing nations to oil producing nations, a study by Draz and Ahmad (2015) focused on the impact of external debt and world oil prices on Pakistani Rupee's (PKR) exchange rate and compared the results with studies done on oil-producing nation. In this case Nigeria. Least Square Regression model with lag variables and Granger Causality Test was used to analyze the data of PKR exchange rate with USD, the external debt and world oil prices from 1965 to 2009. The results indicated that PKR's exchange rate was significantly influenced by the external debt while no such evidence was found for the world oil prices. On the other hand, the results obtained from studies and for Nigeria were entirely opposite. The impact of world oil prices and external debts was not the same on both nations' exchange rates.

Some studies have investigated the relationships between the level of external indebtedness and exchange rates, fiscal deficit, terms of trade and budget deficit. Dornbusch (1984) explored the role of disequilibrium exchange rates and budget deficits in promoting external indebtedness and current debt crisis. Since details of disequilibrium differ between countries, he looked at three different episodes: Argentina, Chile and Brazil. This was because in one case capital flight played a key role in the growth in debt, in the other cases the level and composition of spending assumed primary importance. He investigated these determinants over the period 1978-1982 which coincided with major changes in the world economy and with disequilibrium real exchange rates policies in several countries. He used the balance of payment accounts to provide

a link between the increase in gross external debt and portfolio and spending decision of the economy.

Episodes of the current accounts deficits were analyzed. The findings were that only in Chile did investment play a significant part in current account deterioration and imports of consumer goods played the least significant role. In Argentina and Brazil increased investment played absolutely no role in debt increase. In case of Brazil the budget deficit and lack of adjustment of the public sector to external shocks were behind the debt growth. The failure to adjust the real exchange rate, in this case, explained the long term debt difficulties. In case of Argentina currency overvaluation in conjunction with prospects of political instability and international capital mobility explained the crisis of debt.

Awan et al. (2011) investigated the impact of fiscal deficit, depreciation and deterioration of terms of trade on the rising level of external debt for the period 1974-2008 given the massive debt burden of Pakistan. A log linear form model was specified to analyze this relationship using Johansen approach. The study found significant long-run relationship between external debt and exchange rate and deterioration of terms of trade. It was evidenced that these factors significantly were responsible for external debt burden in Pakistan. Further the results showed positive but insignificant relationship between foreign debt and fiscal deficit in the context of Pakistan economy. The two studies, Dornbusch (1984) and Awan et al. (2011) analyzed the impact of exchange rate on external debt and not the converse.

Using debt trap and non-debt trap countries, Alam and Taib (2013) investigated the relationship between external public debt with budget deficit, current account deficit, and exchange rate depreciation for a period of thirty years (1971 to 2000). An empirical analysis using ecology of dichotomy was undertaken.

The findings showed that external public debt (EPD) was positively related to budget deficit (BD), current account deficit (CAD) and exchange rate depreciation (ERD) in the panels of six DTC and eight NDTC. However, the strength of relationship varied in DTC and NDTC. The

study focused on the relationship between external debt and exchange rate and not impact of the external debt on exchange rate fluctuations.

Very few studies have been undertaken on external debt and exchange rate fluctuations. Cavallo et al. (2005) sought to establish why countries entering a currency crisis with high levels of foreign debt tended to experience large real exchange rate overshooting and large output contraction. A model of small open economy showing a relationship between net debt, real exchange rate overshooting and the output contraction was developed to empirically explain this evidence. The evidence showed countries with high levels of foreign debt after currency crises experienced real exchange rate overshooting.

A more comprehensive study was conducted by Siregar and Pontines (2005). They evaluated whether the rapid accumulation of external debts especially around 1995 and 1996, contributed to the overshooting of the four East Asian Currencies, that is, the Indonesian rupiah, Philippines peso, Thai baht and Korean won, starting late 1997. To capture exchange rate overshooting as an implication of a rise on external debt, they adopted and modified the basic framework of the Dornbusch (1976) model.

To estimate the size of overshooting experienced by the four East Asian currencies, they constructed the long-run nominal and real effective equilibrium exchange rates and used autoregressive distributed lag regressions to test for external debt implication on exchange rate overshooting on currencies of the four East Asian economies. The results showed that the accumulation of external debts in the four economies were partly responsible for the increasing and severity of exchange rate overshooting of the local currency.

Devereux and Lane (2003) developed an empirical model of bilateral exchange rate volatility. They examined the determinants of bilateral exchange trade in broad cross section of countries using optimal currency area (OCA) variables such as trade dependence, differences in economic shocks and country size. In addition a set of financial variables were added: One representing internal finance, capturing the degree of financial depth within the countries and the other set of external financial factors, capturing foreign currency liabilities and bilateral portfolio liabilities

between countries. Their empirical results indicated that financial variables played a significant role in explaining exchange rate volatility in addition to the standard OCA set of variables. Bilateral trade was seen to reduce bilateral exchange rate volatility while economic size increased volatility. This held for both developed and developing countries. Further the results indicated that developing countries bilateral exchange rate volatility was strongly negatively affected by the external stock debt. For developed countries, however, OCA variables were important than external debt in explaining bilateral exchange rate volatility.

Asonuma (2013) sought to explore exchange rate depreciations during both pre- and post-default debt periods using a standard dynamic sovereign debt model. Quantitative analysis was done to replicate the link between exchange rate depreciation and debt default probability before and after defaults using data of Argentina, Russia and Uruguay. The results indicated that in the pre-default periods exchange rate depreciation from lower traded goods income and a huge foreign currency denominated debt triggers default choice of emerging economies. In addition in the post-default periods exchange rate depreciated further due to output costs of defaulting and loss of market access.

External debt has also been investigated with other variables such as economic growth and foreign direct investment. For instance Were (2001) and Babu, et al. (2014) sought to find out the impact of external debt on economic growth. The results on both studies suggested that accumulation of external debt had negative impact on economic growth.

In Kenya few studies have attempted to show relationship external debt and exchange rates. Masuku (2012) investigated the effects of Kenya's external debt on exchange rate fluctuations against the USD from 1971 to 2012. The study revealed that external debt had positive and significant effects on exchange rate. However the study combined the different exchange rate regimes Kenya has undergone since 1971 moving from fixed to floating regimes. In addition the study did not investigate the relationship between external debt and exchange rate volatility.

2.4 Overview of the literature

External debt management and exchange rate policy are an integral part in macroeconomic policy. The existing literature on exchange rate has concentrated on determination of exchange rate rather than volatility. Studies on exchange rate policy and regimes [Cook and Devereux (2005) and Neaime (2009)] have showed that exchange rate behave differently depending on the regime in place.

There exist a relationship between external debt and the exchange rate based on the literature reviewed. Some studies (Ajayi 1992; Alam and Taib 2013) have showed that external debt should be included as variable in exchange rate determination. Draz and Ahmad (2015) also indicated that exchange rate was significantly influenced by the external debt. Therefore in addition to the traditional variables the size of external debt should be included as one of the determinants in the determination of exchange rate.

Cavallo et al. (2005), Ezirim and Muoghalu (2006) and Siregar and Pontines (2005) found that exchange rate overshooting was severe in countries with high levels of foreign debt. External indebtedness was found to negative pressures on the exchange rate by increasing the severity of the exchange rate overshooting. Gressani and Faini (1998) showed that it was costly to hold exchange rate at overvalued levels in the presence of the high external debt. Awan et al. (2011) and Bunescu (2014) pointed out that depreciation of domestic currency was a significant factor responsible for foreign indebtedness. Indeed there is evidence on the relationship between external debt and exchange rate but the argument is to what extent. On one hand Ajayi (1992) Ezirim and Muoghalu (2006) found external debt to be less significant while Cavallo et al. (2005), Draz and Ahmad (2015) and Siregar and Pontines (2005) showed it was significant. On exchange rate volatility, Devereux and Lane (2003) found out that developing countries' bilateral exchange rate volatility was strongly negatively affected by the external stock debt.

It can be noted from the above reviews that the effect of external debt on exchange rates has been looked into by various researchers for various countries but the issue of the impact of external public debt on exchange rate volatility has not resolved. However, it is more relevant to study the relationship between exchange rate volatility and macroeconomic fundamentals, rather than the

determinants of exchange rate levels as most previous researches have done. This study will analyze the effect of external public debt on exchange rate volatility focusing on floating exchange rate regime period. The results from the study are intended to influence policy decisions in the management of external public debt.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter provides the theoretical and methodological framework used to estimate the variables in attempt to meet the set objectives. It sets out the empirical model to be used and various tests conducted to ascertain the validity and reliability of the data.

3.2 Theoretical framework

To analyze the effect of external public debt on exchange rate fluctuations in Kenya, this study adopts and modifies the Devereux & Lane (2003) exchange rate volatility model. Devereux & Lane (2003) developed an empirical model of bilateral exchange rate volatility. Their study focused on identifying the main determinants of bilateral exchange volatility between country pairs for both developed and developing countries.

Devereux & Lane (2003) model is based on the set of optimal currency area (OCA) factors and financial variables. The OCA factors included in the model were trade interdependence, differences in economic shocks and country size. The financial variables included factors on internal finance capturing financial depth within the countries and external finance capturing importance of foreign currency liabilities and bilateral portfolio debt liabilities between countries.

Devereux and Lane form their bilateral exchange rate volatility model as below:

$$VOL_{ij} = \alpha + \beta_1 trade_{ij} + \beta_2 cycle_{ij} + \beta_3 size_{ij} + \gamma fin_j + \sigma extfin_{ij} + \rho[fin_j \times extfin_{ij}] + \varepsilon_{ij} \quad \mathbf{1}$$

VOL_{ij} Nominal bilateral exchange rate between the debtor country j and creditor country i measured as the standard deviation of the log first difference of the bilateral exchange rate

$trade_{ij}$ Is the sum of exports and imports between i and j expressed as a ratio to country j 's GDP. It was included because floating nominal exchange rate is inversely related to the level of trade with a given country.

<i>cycle_{ij}</i>	Is the degree of business cycle asymmetric approximated by the standard deviation of growth differential between the two countries. This indicator was included to proxy asymmetrical shocks
<i>size_{ij}</i>	log of the product of GDPs of <i>i</i> and <i>j</i> . The variable intended to proxy for the microeconomic benefits of exchange rate stability since smaller countries are prone to fluctuations in the nominal exchange rate.
<i>fin</i>	size of domestic financial sector measured as the ratio of liquid liabilities to GDP. This is proxy for financial development since financial frictions are less significant the more developed the domestic financial sector is.
<i>extfin</i>	finance dependence of country <i>j</i> on country <i>i</i> . It is measures as the sum of the own-currency bank and portfolio debt claims of country <i>i</i> on country <i>j</i> . It measures the debt liabilities owed by country <i>j</i> on country <i>i</i> .
<i>fin_jext_{ij}</i>	this variable was added because it was expected that external financial dependence would be less relevant for exchange rate policy when the finance sector is more developed.

This study adopts the Devereux and Lane model but modifies it to analyze the effect of external public debt on exchange rate. The variables chosen are: trade openness as measure of trade; GDP growth rate to measure size; money supply to GDP ratio as measure for size of domestic financial sector; and external debt stock as measure of debt liability (financial dependence). In addition inflation and interest rate are included as there are important determinants in exchange rate determination

Therefore, model is stated as: Exchange rate volatility is a function of trade openness, inflation, interest rate, GDP growth rate, money supply to GDP ratio and external debt. Mathematically it is expressed as follows:

$$V = f(\text{TRADE}, \text{INF}, \text{GDP}, \text{I}, \text{MS}, \text{EXD}) \quad 2$$

3.3 Model Estimation

Econometrically the above equation can be stated as:

$$v = \beta_0 + \beta_1 trade + \beta_2 inf + \beta_3 i + \beta_4 gdprt + \beta_5 msgdp + \beta_6 extgdp + \varepsilon \quad 3$$

Where:

- v* Exchange rate volatility – It is dependent variable and will be calculated as the standard deviation of the moving average of the logarithm of real effective exchange rate
- trade* Trade openness – It is measured as the total sum Kenya’s exports and imports as percentage of GDP. It is expected to have a negative effect on exchange rate volatility
- inf* Inflation rate – It is expected to have a negative effect on exchange rate volatility
- i* Interest rate – Lending rate will be used. It is expected to have a negative effect on exchange rate volatility
- gdprt* Gross Domestic Product growth rate and is expected to a positive effect on exchange rate volatility
- msgdp* money supply as percentage of GDP – Broad Money Supply M3T will be used to calculate the ratio. It is expected to have a positive effect on exchange rate volatility
- extgdp* external debt as percentage of GDP – Public and publicly guaranteed debt category of debt will used. It is expected to have a negative effect on exchange rate volatility
- β_0 Constant term
- ε Error term – The error term is included because there are a large number of independent variables that influence exchange rate volatility. If these variables are not included even one then the independent variables will not completely predict exchange rate volatility, hence model misspecification.

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 coefficient of the independent variables.

3.3.1 Estimation of Exchange rate volatility

Exchange rate volatility in most empirical studies is measured as the standard deviation of the moving average of the logarithm of real effective exchange rate as represented the equation below:

$$V_t = \left[m^{-1} \sum_{i=1}^m (\ln R_{t+i-1} - \ln R_{t+i-2})^2 \right]^{1/2} \quad 4$$

where: R_t is the real effective exchange rate at time t , i is the number of observation and m is the order of the moving average.

The main criticism for the application of the this measure is that it fails to capture the potential effects of high and low peak values of the exchange rate. However, although the standard deviation of exchange rate movements as a measure for uncertainty in the international markets mathematically may be seen as an inappropriate measure, economically it seems to be more relevant than other methods of estimating exchange rate volatility. Furthermore, when the standard deviation is used to calculate exchange rate variability over a floating period, the distortion it causes may be less pronounced.

3.3.2 Estimation of Real Effective Exchange rate

Given the Kenya's economy is with multiple trading partners, the real effective exchange rate (REER) index will be used to estimate exchange rate volatility. First the nominal effective exchange rate is constructed as the trade weighted sum of the nominal exchange rate of the local currency against the major foreign currencies between 1993 and 2013. These include the US Dollar and British Sterling Pound. The NEER is generated by the following equation.

$$NEER_t = \sum_{i=1}^n e_i \omega_i \quad 5$$

where: $NEER_t$ is the nominal effective exchange rate at time t , e_i is the bilateral nominal exchange rate of domestic currency against the trading partner (i) and ω_i is trade-weight,

calculated as the share ratio of the trade of each partner country (i) with the domestic economy (Total export and imports of country i over total export and imports of domestic country).

The real effective exchange rate (REER) is generated:

$$REER_t = \sum_{i=1}^n NEER_t \left[\frac{p}{p_i} \right] \quad 6$$

where: p is the price level of home country. p_i is the price of the trading partner country (i). The price level for the relevant countries is the consumer price index.

3.4 Estimation procedures

This study applies Ordinary Least Squares (OLS) method to analyze the data using STATA. Diagnostic tests on multicollinearity, unit root and model specification is undertaken to test for violation of OLS assumptions.

3.4.1 Multicollinearity

This test is done to determine whether there exists any relationship between the explanatory variables. The pair wise method is used. In this study multicollinearity is severe if the correlation coefficient is greater than 0.8.

3.4.2 Stationarity test

Time series data covering the period 1993 to 2013 will be used for estimation purpose. Prior to testing for a causal relationship between the time series, the first step is to check the stationarity of the variables used as regressors in the model to be estimated. The aim is to verify whether the series have a stationary trend, and, if non-stationary, to establish orders of integration. This is because regression with non-stationary variables increases the chances of spurious regression. Augmented Dickey Fuller (ADF) will be used to test for stationarity of the data variables.

3.4.3 Model Specification Test

A model misspecification occurs relevant variables are omitted or irrelevant variables are included in the model. This significantly affects the estimation of regression coefficients. To test for model specification the link test will be used.

3.4.4 Data source

The study will use quarterly time-series data for the period 1993 to 2013, with a total of 84 observations for each variable. The data on GDP, money supply, interest rates, inflation, Public and publicly guaranteed debt, bilateral exchange rates, imports and exports and Kenya's CPI will be obtained from Central Bank of Kenya monthly Statistical Bulletin and Economic Surveys for different years. In addition CPI data for USA and UK will be gotten from Economic Research Federal Reserve Bank of St. Louis and Office for national statistics websites respectively.

CHAPTER FOUR: DATA ANALYSIS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of data analysis and their discussions. The findings of data analysis are presented using both descriptive and inferential statistics. The results of the findings are also discussed in detailed.

4.2 Descriptive Statistics

The summary statistics of the different variables are presented in Table 1 below.

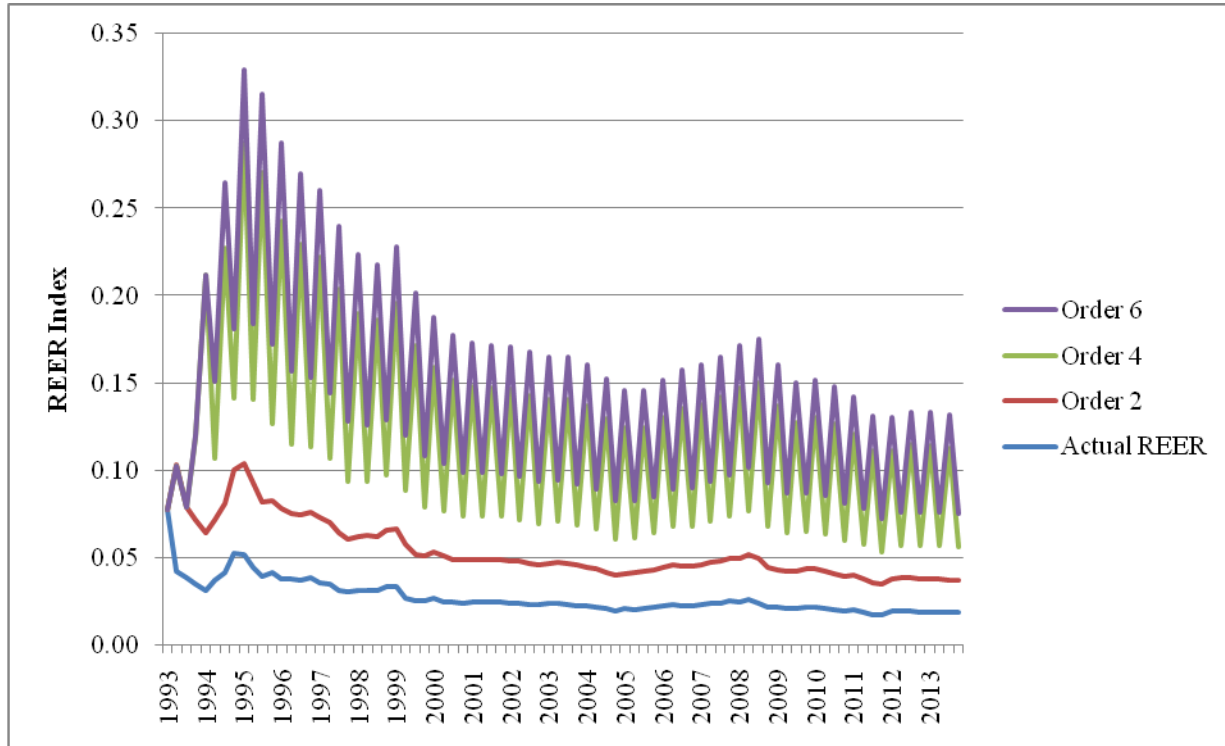
Table 1: Summary of descriptive statistics

Variables	n	Mean	SD	Median (IQR)	Min - Max
Exchange rate volatility	82	0.028	0.010	0.024 (0.022 – 0.031)	0.017 - 0.078
Trade openness	82	64.82	25.50	55.60 (44.41 – 80.18)	35.67 – 124.46
Inflation	82	10.63	10.93	7.98 (4.37 – 12.97)	-1.79 - 56.52
Interest rate	82	19.72	6.16	18.43 (13.96 - 24.62)	12.2 - 31.91
GDP growth rate	82	2.28	5.93	0.5 (-1.23 – 3.64)	-7.59 – 23.71
Money supply to GDP ratio	82	66.69	28.71	57.68 (45.46 – 77.00)	31.08- 147.61
External debt to GDP ratio	82	50.63	23.14	40.58 (36.87 – 52.13)	30.52 - 128.85

The data used for analysis had eighty two (82) observations on quarterly basis from 1993 to 2013. The average exchange rate volatility during the period was 0.028 (SD: 0.010) ranging from 0.017 to 0.078. The ratio of total trade to GDP (Trade openness) on average was 64.82 percent with half of the period falling between 44.41 and 80.18 percent. The rate of Inflation averaged at 10.63 with a highest rate of 56.62 recorded in 1994 first quarter. The GDP growth rate was low (or negligible) given that average growth rate was 2.28 percent with a range of -7.59 to 23.71. The highest growth rate of 23.71 percent was recorded in 2000 first quarter. In terms of the size of domestic financial sector (money supply to GDP ratio), the average was 66.69 percent. The average debt burden indicator (external debt to GDP ratio) was 50.63 percent with a maximum value of 128.85 percent and half of the period falling between 36.87 to 52.13 percent.

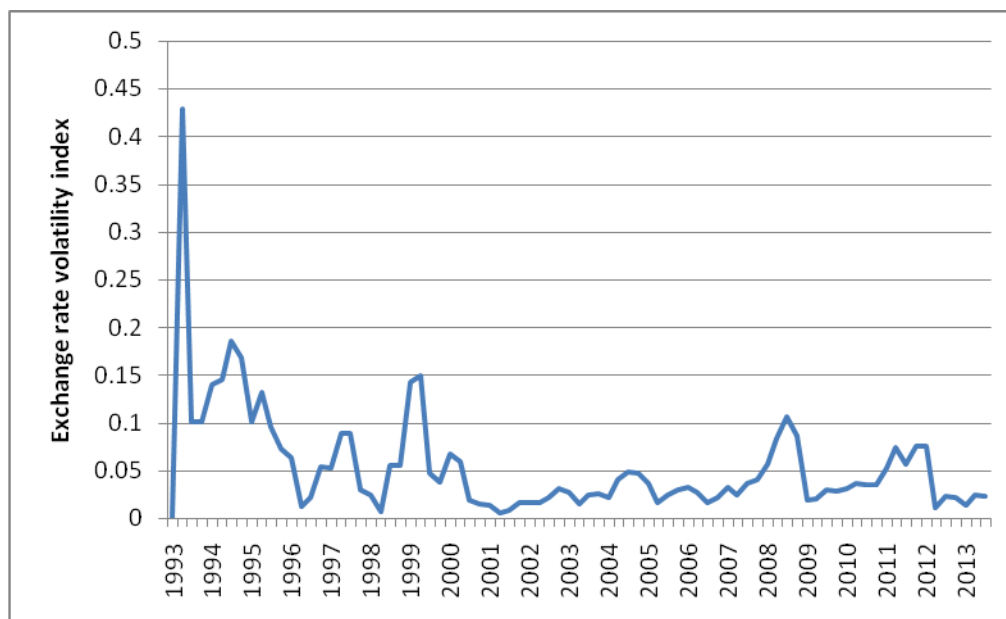
Exchange rate volatility was calculated using the moving average of the logarithm of real effective exchange rate. The second (2nd) order of moving average was used this study to smoothen the data as shown in Figure 1 below.

Figure 1: Distribution of REER with its orders of moving average



The trend of exchange rate volatility in the period under study showed that the exchange rate was volatile between 1993 and 2000 then it stabilized for seven (7) years between 2001 to mid 2007 before short variability noted in late 2007 to early 2009. The trend in exchange rate volatility is as shown Figure 2 below:

Figure 2: Trend in Exchange rate volatility



4.3 Diagnostic Tests

4.3.1 Multicollinearity Test

Table 2: Correlation matrix

Variable	Trade openness	Inflation rate	Interest rate	GDP growth rate	Money supply to GDP ratio	External Debt to GDP ratio
Trade Openness	1					
Inflation	0.0474	1				
Interest rate	-0.3593	0.3168	1			
GDP growth rate	-0.1242	0.1241	0.2166	1		
Money supply to GDP ratio	0.9044	-0.1403	-0.3802	-0.0656	1	
External Debt to GDP ratio	-0.1121	0.6253	0.7098	0.1057	-0.2896	1

Table 2 presents the results of Multicollinearity test using the pair wise correlation method. The correlation matrix shows the relationships between explanatory variable: Trade openness, inflation, interest rate, and GDP growth rate, money supply to GDP ratio and

external debt to GDP ratio. The results presented shows that inflation, interest rates, GDP growth rate and external debt to GDP have a correlation coefficient of less than 0.8 (absolute values). However, Trade openness and money supply to GDP ratio were highly correlated ($r = 0.9072$).

4.3.2 Unit root Testing

Table 3: Unit root test

Variable	Intercept	Intercept and trend
Exchange rate volatility	- 6.410 (0.0001)	- 8.743 (0.0001)
Trade Openness	- 0.684(0.08508)	- 2.005 (0.5786)
Inflation	- 3.058(0.0298)	- 2.807 (0.1943)
Interest Rate	- 1.078 (0.7237)	- 1.664 (0.7663)
GDP growth rate	- 10.621 (0.0001)	- 11.010 (0.0001)
Money supply to GDP ratio	1.244 (0.0963)	- 0.621 (0.9779)
External debt to GDP ratio	- 3.500 (0.0080)	- 2.268 (0.4519)

Values in parenthesis are P values

Table 3 presents the results of unit root test conducted for all the variables using the Augmented Dickey Fuller (ADF) test. From the results, exchange rate volatility and GDP growth rate were stationary at both at intercept and intercept and trend. Inflation and external debt to GDP ratio were stationary at only intercept level while trade openness, interest rate and money supply to GDP ratio were not stationary.

The first difference of non stationary variables trade openness, interest rate and money supply to GDP ratio was undertaken in attempt to make them stationary as presented in Table 4 below.

Table 4: First Difference Unit Root Testing

Variable	Intercept	Intercept and trend
First Difference Inflation rate	- 5.315 (0.0001)	-5.422 (0.0001)
First Difference Trade Openness	- 11.380(0.0001)	- 11.736 (0.5786)
First Difference Interest Rate	- 5.456 (0.0001)	- 5.438 (0.0001)
First Difference Money supply to GDP ratio	-8.469 (0.0001)	- 8.798 (0.0001)

Values in parenthesis are P values

After undertaking the first difference the variables inflation rate, trade openness, interest rates and money supply to GDP ratio were found to stationary.

4.3.3 Model Specification

The linktest method was used to test for model specification. A model is correctly specified if predicted variable \hat{y} is significant and variable \hat{y}^2 was not significant.

Table 5: Linktest results

Exchange rate volatility	Coef.	se	t	P>t	95% Conf. Interval	
					Lower	Upper
\hat{y}	1.670	0.666	2.55	0.013	0.3740	3.0252
\hat{y}^2	-11.023	10.42	-1.06	0.293	-31.76	9.71
\hat{y}_{cons}	-0.0104	0.101	-1.03	0.305	-0.0304	0.010

From the results presented Table 5 above the variable \hat{y} has P value of 0.013 which is statistical significant while \hat{y}^2 has P Value is 0.293 which not statistical significant implying that the model is correctly specified.

4.4 Regression Model

Various diagnostic tests were conducted to ascertain non violation of OLS assumptions and stationarity. The variables first difference of inflation, first difference of interest rate, GDP growth rate, first difference money supply to GDP ratio, external debt to GDP ratio were regress on exchange rate volatility and the results are presented in Table 6 below.

The results show that regression model fits the data ($F = 28.52$, $P = 0.0001$) and jointly the independent variables inflation, interest rate, GDP growth rate, Money supply to GDP ratio and external debt to GDP explain 63 percent of the exchange rate volatility. The results indicate that interest rate reduces exchange rate volatility significantly by 0.0016 ($p = 0.0001$) while external debt to GDP ratio increased it significantly by 0.0003 ($P = 0.0001$). Inflation and GDP growth rate increases exchange rate volatility by 0.0002 ($p = 0.077$) and 0.0001 ($p = 0.271$) while Money supply to GDP ratio increases exchange rate volatility by 0.0001 ($p = 0.1450$). However the effect of inflation, GDP growth rate and money supply to GDP ratio are insignificant in determining the exchange rate volatility.

Table 6: Regression results

Exchange rate volatility	β	se	t	P>t	95% Confidence Lower	Interval Upper
1 st Difference inflation	0.0002	0.00013	1.79	0.077	-0.00003	0.00049
1 st Difference interest rate	-0.0016	0.00041	-3.76	0.000	-0.00238	-0.00073
GDP growth rate	0.0001	0.00009	1.11	0.271	-0.00008	0.00028
1 st Difference Money supply to GDP ratio	-0.0001	0.000010	-1.47	0.145	-0.00034	0.000052
External debt to GDP ratio	0.0003	0.00030	11.43	0.000	0.00025	0.00036
_cons	0.0119	0.00143	8.34	0.000	0.009	0.0146

$F(5, 75) = 28.52$, $Prob > F = 0.0001$, $R-squared = 0.6553$, $Adj R-squared = 0.63$ and $Root MSE = 0.00482$

4.5 Discussion of results

During the period 1993 to 2013, the real effective exchange was found to be volatile especially between 1993 and 2000 which was consistent with the findings of Musyoki et al (2012). In their paper, Kenya's RER exhibited an appreciating and volatility trend in the period 1993 to 2009. In addition Kenya also experienced high level of external public debt with average 50.63 percent (External debt to GDP ratio) and maximum value of 128.8 percent given that the minimum ratio set by IMF is between 25% and 30%. However Kenya was not severely indebted since three quarters of the period external debt to GDP ratio was less than 80 percent.

The results of the multicollinearity test showed that there was low correlation between the independent variables except for Trade openness and money supply to GDP ratio which showed high correlation ($r = 0.9072$). Trade openness was dropped to increase the robustness of the regression model since regressing variables that are highly correlated makes estimates of the coefficients unstable and standard errors for the coefficients highly inflated.

The regression results in Table 6, showed there was a positive significant relationship between exchange rate volatility and external debt to GDP ratio (measure of external debt burden). This

implies an increase in Kenya's external public debt burden will increase exchange rate volatility. External debt to GDP ratio had a coefficient of 0.0003 implying one percentage change would increase and negatively influence exchange rate volatility by 0.03%. Similar findings by Cavallo et al (2005) and Siregar & Pontines (2005) showed that high levels of external debt had negative effect on exchange rate causing it to overshoot. These findings show that high accumulation of external debt by public sector has negative and aggravating effect to the exchange rate causing it to be volatile.

On the other hand, the results also showed there was a negative significant relationship between exchange rate volatility and interest rate. The coefficient of interest rate is -0.0016 indicating that that one percent increase in the interest rate in Kenya will reduce exchange rate volatility with 0.2%.

Inflation and GDP growth rate had a positive relationship with exchange rate volatility while money supply to GDP ratio had negative relationship. However, these variables were not statistically significant in affecting exchange rate volatility. Therefore, inflation, GDP growth rate and money supply to GDP ratio (measure for size of domestic financial sector) cannot influence exchange rate volatility in Kenya. Edwards (2005) in his study analyzed whether the adoption of inflation targeting (IT) policies had an impact on exchange rate volatility. The study found out that the adoption of IT monetary policy procedures did not result in an increase in either nominal or real exchange rate volatility. This study finding is consistent with Edwards (2005) of inflation not affecting exchange rate volatility.

Most studies have looked at the impact of exchange rate volatility and economic growth and not vice versa. For instance Schnabl (2007) investigated the impact of exchange rate volatility on growth in Emerging Europe and East Asia. The results indicated a negative impact of exchange rate volatility on growth both in Emerging Europe and East Asia. There is no empirical evidence that economic growth affects exchange rate volatility.

4.6 Summary of findings

The results have shown that external public debt and interest rates are significant in influencing the real effective exchange rate volatility in Kenya. Using the debt burden indicator, external debt to GDP ratio the findings have indicated that increase in external public debt will result in an increase in real effective exchange rate volatility and thus external public debt has a negative effect on exchange rate volatility. On the other interest rate was found to have positive significant relationship with exchange rate volatility. An increase in interest rates would decrease exchange rate volatility in Kenya. However, the study found out that Inflation, GDP growth rate and money supply to GDP do not have a significant relationship with external rate volatility and therefore should not considered as underlying variables that affect exchange rate volatility.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Introduction

This chapter gives a summary of the study, limitations of the study and suggests policy measures and further areas of research.

5.2 Conclusion

The exchange rate is one of the most important macroeconomic variables in the emerging and transition countries. It affects exports, imports and economic activity. The ability to manage exchange rate volatility by monetary authority can greatly benefit an economy as exchange rate volatility affects economic growth by increasing uncertainty and risks and thus discourages trade and investment. This study empirically analyzed the relationship between real effective exchange rate volatility and external public debt burden given that foreign borrowing can immensely contribute to economic growth if the funds are used efficiently. The findings indicated external public debt had a negative and significant effect on exchange rate volatility and was seen to partly be responsible in aggravating the real effective exchange rate thus exhibit volatility trend.

5.3 Policy recommendations

The findings of this study have significant policy implication in the management of external public debt. Lack of prudent debt management strategies as evidenced in this study, will partly lead to increase exchange rate volatility. Policy makers need to ensure that both the level and rate of growth of external public debt is sustainable, that is, the debt sustainability indicator external debt to GDP ratio is at low levels and pursues strategies that will reduce excessive accumulation of external public debt. In addition policy makers should ensure that borrowed funds are put in projects/ investments with higher rate of returns.

Debt management needs to be linked to a clear macroeconomic framework, under which the Kenya Government will seek to ensure external public debt is sustainable. Prudent debt management strategy will greatly benefit Kenya by contributing to economic growth which one of the main objectives of economic policy and decision making.

5.4 Limitation of the Study

The major limitation of this study is that estimation of the real effective exchange rate was done using two countries that is USA and UK currencies. These two countries only account for only eleven percent (11%) of Kenya's total trade. This was as a result of lack of quarterly data for other countries that Kenya trades with especially developing countries.

Secondly, the study focused mainly on the relationship between exchange rates volatility and external public debt. Other determinants of exchange rate were also incorporated into the study as control variables. These variables may not have exhaustively explained exchange rate volatility.

5.5 Suggestions for areas further research

This study provided empirical evidence on the effect of external public debt on REER volatility. It would be important for comprehensive research to be undertaken using daily, weekly or monthly data. In addition other debt sustainability indicators such as external debt to exports ratio and debt service to export ratio need to be included as explanatory variables in determining exchange rate volatility.

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APPENDICES

Appendix I

Year	GDPGR	Inflat	EDT(US\$ million)	PPG (US\$ million)	COMP PPG USD	COMP PPG \$ Sterling	COMP PPG Yen
1970	-4.6	2.2	478	321	16	75	0.2
1971	22.2	3.8	498	345	18	68	0.6
1972	17.1	5.8	581	390	24	57	0.5
1973	5.9	9.3	845	517	25	50	0.7
1974	4.1	17.8	1,153	596	25	46	0.7
1975	0.9	19.1	1,290	631	27	37	1.5
1976	2.2	11.4	1,493	764	25	26	3
1977	9.5	14.8	1,659	1,021	27	23	4
1978	6.9	16.9	2,174	1,243	25	16	6
1979	7.6	8.0	2,721	1,666	28	16	4
1980	5.6	13.9	3,387	2,056	39	11	5
1981	3.8	11.6	3,228	2,133	37	9	4
1982	1.5	20.7	3,368	2,250	35	9	4
1983	1.3	11.4	3,628	2,258	36	7	5
1984	1.8	10.2	3,512	2,287	30	8	4
1985	4.3	13.0	4,181	2,671	25	7	5
1986	7.2	2.5	4,604	3,310	22	8	6
1987	5.9	8.6	5,784	4,198	25	7	6
1988	6.2	12.3	5,810	4,172	31	8	8
1989	4.7	13.8	5,889	4,194	31	9	8
1990	4.2	17.8	7,056	4,759	30	7	8
1991	1.4	20.1	7,454	5,266	32	6	11
1992	-0.8	27.3	6,898	5,149	36	5	13
1993	0.4	46.0	7,112	5,246	35	5	15
1994	2.6	28.8	7,124	5,513	36	4	16
1995	4.4	1.6	7,309	5,857	40	4	19
1996	4.1	8.9	6,814	5,574	42	4	18
1997	0.5	11.4	6,465	5,093	44	4	17
1998	3.3	6.7	6,824	5,513	47	3	18
1999	2.3	5.7	6,526	5,344	50	3	20
2000	0.6	10.0	6,189	5,041	52	2	20
2001	3.8	5.7	5,566	4,710	50	1	19
2002	0.5	2.0	6,177	5,244	50	1	22
2003	2.9	9.8	6,923	5,823	51	1	20
2004	5.1	11.6	6,977	6,071	51	1	20
2005	5.9	10.3	6,483	5,772	49	1	19
2006	6.3	14.5	6,681	5,870	49	1	19
2007	7.0	9.8	7,523	6,231	48	1	17
2008	0.2	26.2	7,607	6,388	47	4	20

Year	GDPGR	Inflat	EDT(US\$ million)	PPG (US\$ million)	COMP PPG USD	COMP PPG \$ Sterling	COMP PPG Yen
2009	3.3	9.2	8,589	6,720	45	0.4	18
2010	8.4	4.0	8,801	6,979	44	0.4	18
2011	6.1	14.0	10,287	7,566	42	0.3	17
2012	4.5	9.4	11,569	8,834	45	0.3	13
2013	5.7	5.7	13,471	9,647	45	0.2	10

Source: World bank website and series of Economic surveys

Appendix II

Year	EDT/XG S	EDT/GNP	TDS/XGS	CONC/EDT (%)	MUL/EDT (%)	EXC KSH/US\$
1970	63	30	5	36	8	7.1
1971	94	28	10	36	10	7.1
1972	100	28	8	34	14	7.1
1973	111	35	9	31	14	7.0
1974	119	40	10	28	12	7.1
1975	128	41	15	25	15	7.3
1976	131	45	15	25	18	8.4
1977	104	38	21	25	21	8.3
1978	141	42	14	20	19	7.7
1979	167	45	18	20	18	7.5
1980	164	48	21	20	18	7.4
1981	179	49	27	24	22	9.0
1982	207	55	30	27	26	10.9
1983	238	63	34	26	27	13.3
1984	211	59	35	31	31	14.4
1985	260	71	39	30	32	16.4
1986	242	66	36	34	34	16.2
1987	333	75	40	32	34	16.5
1988	307	72	39	35	33	17.7
1989	304	73	37	34	37	20.6
1990	316	86	35	34	35	22.9
1991	338	96	33	36	35	27.5
1992	320	89	31	40	36	32.2
1993	192	132	17	43	37	58.0
1994	166	105	21	48	39	44.8
1995	204	84	25	53	40	55.9
1996	182	58	22	58	43	55.0
1997	153	50	16	58	44	62.7
1998	153	49	15	60	44	61.9
1999	149	51	16	63	45	72.9

Year	EDT/XG S	EDT/GNP	TDS/XGS	CONC/EDT (%)	MUL/EDT (%)	EXC KSH/US\$
2000	219	49	21	66	46	78.0
2001	183	43	16	73	50	77.1
2002	190	47	16	75	48	76.1
2003	189	47	16	73	47	76.1
2004	161	44	8	77	50	77.3
2005	120	35	10	76	53	75.6
2006	111	30	7	77	52	72.1
2007	104	28	6	75	48	67.3
2008	90	25	5	77	49	69.2
2009	114	28	5	71	46	77.3
2010	96	27	4	73	47	79.2
2011	102	30	4	68	43	88.8
2012	103	29	5	66	43	84.5
2013	124	31	6	63	42	86.1

Source: World bank website and series of Economic Surveys

Appendix III: Definition of Terms

Exchange rate volatility is defined as the likelihood of a variable fluctuating overtime by swinging around a mean or trend or following a random walk.