

**THE EFFECT OF MONEY SUPPLY ON THE GROSS DOMESTIC  
PRODUCT IN KENYA**

**KIPKIRUI WINNIE CHEPKEMOI**

**A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE  
IN FINANCE, SCHOOL OF BUSINESS, UNIVERSITY OF NAIROBI**

**OCTOBER 2014**

**DECLARATION**

I, the undersigned, declare that this research project is my own work and has never been presented in any other university or college for a degree or any other award.

**Signed:** \_\_\_\_\_

**Date** \_\_\_\_\_

**KIPKIRUI WINNIE CHEPKEMOI**

**REG NO: D63/68215/2011**

This research project report has been submitted for examination with my approval as the University Supervisor.

Signature:.....

Date:.....

**DR. JOSIAH ADUDA**

Dean/Senior Lecturer

Department of Business Administration

School of Business

University of Nairobi

## **DEDICATION**

The research is dedicated first to my dear parents, who were a great source of inspiration to my education and without their foresight, sacrifice and support I would not have gone this far. Secondly, to my role model David who stood by me all times and my friends whose encouragement kept me going up to the end.

## **ACKNOWLEDGEMENT**

It has been an exciting and instructive study period in the University of Nairobi and I feel privileged to have had the opportunity to carry out this study as a demonstration of knowledge gained during the period studying for my master's degree. With these acknowledgments, it would be impossible not to remember those who in one way or another, directly or indirectly, have played a role in the realization of this research project. Let me, therefore, thank them all equally. First, I am indebted to the all-powerful GOD for all the blessings he showered on me and for being with me throughout the study. I am deeply obliged to my supervisor for his exemplary guidance and support without whose help; this project would not have been a success. Finally, yet importantly, I take this opportunity to express my deep gratitude to my loving family, and friends who are a constant source of motivation and for their never ending support and encouragement during this project.

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>iii</b>
<b>DEDICATION</b> .....	<b>iv</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>v</b>
<b>LIST OF TABLES</b> .....	<b>ix</b>
<b>LIST OF FIGURES</b> .....	<b>x</b>
<b>ABBREVIATIONS AND ACRONYMS</b> .....	<b>xi</b>
<b>ABSTRACT</b> .....	<b>xii</b>
<b>LIST OF ABBREVIATIONS</b> .....	<b>ii</b>
<b>CHAPTER ONE: INTRODUCTION</b> .....	<b>1</b>
<b>1.1 Background of the Study</b> .....	<b>1</b>
1.1.1 Money Supply.....	2
1.1.2 Gross Domestic Product.....	2
1.1.3 Money Supply and Gross Domestic Product .....	3
1.1.4 Money Supply and GDP in Kenya.....	4
1.2 Problem Statement .....	5
1.3 Research Objective .....	6
<b>CHAPTER TWO</b> .....	<b>8</b>
<b>LITERATURE REVIEW</b> .....	<b>8</b>
2.1 Introduction.....	8
2.2 Theoretical Review .....	8
2.2.1 Overlapping Generations (OLG) Model .....	8
2.2.2 Debt Laffer Curve .....	9
2.2.3 Traditional and Ricardian Equivalence View .....	14
2.2.4 Keynesian Theory .....	18
2.3 Determinants of Gross Domestic Product growth.....	19
2.3.1 Labour Force (LF) .....	20
2.3.2 Government Investment (INV).....	21
2.3.3 Domestic Credit (DC).....	21
2.3.4 Nominal Money Supply (MS) .....	21

2.3.5 Interest Rate (INT).....	22
2.3.6 Money supply Outstanding (DDO).....	22
<b>2.4 Empirical review .....</b>	<b>22</b>
<b>2.5 Summary of the Literature Review.....</b>	<b>26</b>
<b>CHAPTER THREE .....</b>	<b>29</b>
<b>RESEARCH METHODOLOGY .....</b>	<b>29</b>
3.1 Introduction.....	29
3.2 Research Design .....	29
3.3 Specification of the Model.....	29
3.4 Definition and Measurement of Variables.....	31
3.5 Time Series Properties .....	33
3.5.1 Correlation Analysis.....	33
3.5.2 Error Correction Model (ECM) .....	33
3.5.3 Stationarity Testing for Co-integration .....	34
3.6 Data Type and Source.....	34
3.7 Data Analysis.....	34
<b>CHAPTER FOUR.....</b>	<b>36</b>
<b>DATA ANALYSIS AND INTERPRETATION.....</b>	<b>36</b>
4.1 Introduction.....	36
4.2 Response rate .....	36
4.3 Descriptive Statistics.....	36
4.4 Correlation of Analysis.....	38
4.4.1 Time Series Property of Data.....	39
4.4.2 Cointegration Analysis Results.....	40
4.4.3 Diagnostic Tests.....	41
4.4.4 Error Correction Model Results.....	42
4.5 Size of Money supply .....	44
4.6 Nature of Money supply .....	45
4.7 Reforms in Money supply.....	47
4.8 Summary of the Findings and interpretations.....	50

<b>CHAPTER FIVE .....</b>	<b>53</b>
<b>SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS.....</b>	<b>53</b>
5.1 Summary.....	53
5.2 Conclusion .....	54
5.3 Policy Recommendations .....	55
5.4 Limitations of the Study .....	56
5.5 Suggestions for Further Research.....	56
<b>REFERENCES.....</b>	<b>58</b>
<b>APPENDICES .....</b>	<b>63</b>
APPENDIX 1: Time Series Plot at Levels .....	63
Appendix II: Time Series Plots at Differences .....	64
Appendix III: Cointegration Test.....	65
Appendix IV: Stationarity Analysis.....	67
Appendix V: Rank Test - Johansen Cointegration Test.....	68
Appendix VI: Actual Versus Fitted Plot Graph.....	69
Appendix VII: Money supply.....	70
Appendix VIII: Public Debt in Kenya .....	71
Appendix VIII: Public Debt in Kenya .....	71
Appendix VIII: Tenor Structure and Volume of Treasury Bonds .....	75

## LIST OF TABLES

Table 4.1: Descriptive Statistics Results.....	37
Table 4.2: Correlation Matrix .....	38
Table 4.3: Diagnostic Tests.....	41
Table 4.4: Error Correction Model Results.....	43



## LIST OF FIGURES

Figure 4.1: CUSUM Test.....	42
Figure 4.2: Domestic and External Debt to Total Debt Ratio.....	45
Figure 4.3: Treasury Bills to Total Money supply.....	46
Figure 4.4: Domestic Instruments - Government Stocks, Overdraft .....	47
Figure 4.5: Average Tenor .....	49

## **ABBREVIATIONS AND ACRONYMS**

ADF	Augmented Dickey Fuller
AFRODAD	African Forum and Network on Debt and Development
CBK	Central Bank of Kenya
CRDW	Co-integrated Regression Durbin Watson
DDO	Money supply Outstanding
DC	Domestic Credit
DF	Dickey Fuller
EG	Engle and Granger
ECM	Error Correction Model
GDP	Gross Domestic Product
HIPC	Heavily Indebted Poor Countries
INT	Interest Rate
IMF	International Monetary Funds
KNBS	Kenya National Bureau of Statistics
LDC'S	Less Developed Countries
MDRI	Multilateral Debt Relief Initiative
MPC	Marginal Propensity to Consume
MPS	Marginal Propensity to Save
OLS	Ordinary Least Squares
OD	Overdraft

## ABSTRACT

There are a number of theories illustrating the relationship between money supply and gross domestic product. Money supply can be defined as the total stock of money circulating in the economy. The circulating money involves the currency, printed notes, money in the deposit accounts and in the form of other liquid assets. Valuation of the money supply helps analysts and policy makers to frame the policy or to alter the existing policy of increasing or reducing the supply of money. The valuation is important as it ultimately affects the business cycles and thereby affects the economy. This study sought to provide answers to the question, what are the effect of money supply on the gross domestic product in Kenya.

The study undertook a causal research design. This study used time series data from the period 1970 to 2012 to critically investigate the relationship between public money supply and economic growth by establishing an empirical relationship that exists between them. Macroeconomic data included labour force, government investment, domestic credit, nominal money supply, interest rate, money supply outstanding and economic growth. The study employed the Engle and Granger Co-integration test and the Granger causality test under the error correction framework.

The results indicate the existence of a significant long-run relationship between money supply and economic growth as measured by GDP. Additionally, all the variables except investment were insignificant in the short run. Therefore, current public money supply is sustainable. The study further reveals that all the variables used except economic growth, were significant determinants of money supply in Kenya. The findings also reveal that money supply in the country has been increasing significantly over the period under review. Correlation analysis of economic growth rate and money supply at 5 percent level of significance reveals that money supply negatively influence economic growth. This also indicates mopping of excess money from the economy leads to economic growth. Regression analysis show that money supply lead to 0.1839 ( $p = 0.0465$ ) increase in economic growth.

## **LIST OF ABBREVIATIONS**

ADF	Augmented Dickey Fuller
CBK	Central Bank of Kenya
GDP	Gross Domestic Product
GT	Granger Test
KIPPRA	Kenya Institute of Public Policy Research Analysis
KNBS	Kenya National Bureau of Statistics
MS	Money Supply
OECD	Organization for Economic Co-operation and Development
OMO	Open Market Operations
SPSS	Statistical Package for Social Sciences

## CHAPTER ONE: INTRODUCTION

### 1.1 Background of the Study

There is growing interest in money supply and its relationship to GDP. Over the past few years, modeling the relationship between money supply and income levels have been one of the main controversial issues of interest for economists, researchers and policy makers. Swamy (1994) noted that the public sector in the 1980's was becoming over-extended and increasingly suffered from economic mismanagement. According to Ryan (2001), Structural Adjustment Programme (SAP) of the 1980's under the tutelage of the World Bank and the International Monetary Fund was aimed at improving the resource allocation and Microeconomic stabilization. The reforms therein included liberalization of the foreign exchange market, credit market and agricultural commodity market as well as privatization of the parastatals. However, the implementation of the reforms was slow and erratic, and at times impetus was reversed as the government lacked commitment.

Ryan (2001) further pointed out that the economic mismanagement in the period 1990 to 2000 had negative impact on growth through high inflation and interest rates, and due to reduced aid flows as donors' suspended disbursements due to frustrations with widespread corruption. The government then resorted to occasional debt rescheduling and expensive money supply borrowing to finance its expenditure. This relationship has been extensively investigated in both, theoretical and empirical literature by researchers of both developed and developing countries over different sample periods and provided the conflicting evidences on this issue. Aliason *et al.* (2003) reveals three theoretical reasons often advanced for government money supply namely: first, if the government is unable to meet its expenditure commitments from domestically raised

revenue, such as taxes, duties and externally sourced grants and borrowings, then it may resort to deficit financing where it borrows domestically.

### **1.1.1 Money Supply**

Money supply can be defined as the total stock of money circulating in the economy. The circulating money involves the currency, printed notes, money in the deposit accounts and in the form of other liquid assets. Valuation of the money supply helps analysts and policy makers to frame the policy or to alter the existing policy of increasing or reducing the supply of money. The valuation is important as it ultimately affects the business cycles and thereby affects the economy (OECD, 2014).

There are several standard measures of the money supply, including the monetary base, M1 and M2. The monetary base defines the sum of currency in circulation and reserve balances (deposits held by banks and other depository institutions such as micro-financing institutions in a given country. M1 is defined as the sum of currency held by the public and transaction deposits at the depository institutions), financial institutions which obtain their funds mainly through deposits from the public, such as commercial banks, savings and loans associations, savings unions and credit unions (Jamie, 2005).

M2 refers to M1 plus deposits issued in amounts less than \$ 100,000 standard currency and retail market money. Data on monetary aggregates are reported in the Federal Reserve's statistical release. In Kenya, this is done by the Central Bank of Kenya through its bi-annual monetary policy reports issued under the Central Bank of Kenya Act, CAP 491 (Ndung'u, 2014).

### **1.1.2 Gross Domestic Product**

Gross domestic product (GDP) is defined by OECD as "an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in

production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs. In its analysis, the Central Bank of Kenya Monetary Policy Committee identifies that during the six months to April 2014, the month-on-month overall inflation rate remained within the 7.5 percent upper bound of the Government medium term target of 5 percent for the Fiscal Year 2013/14. The decline in overall inflation was supported by the decline in prices of food as well as some energy items and the stable exchange rate.

However, overall inflation remained in the upper bound of the medium-term target. The 12-month non-food-non-fuel inflation, which measures the impact of monetary policy, remained stable around the 5 percent target during the period indicating that there were no adverse demand pressures in the economy in the period. Although these developments supported a low and stable outlook for inflation, volatility in international crude oil prices, patchy rainfall conditions which could affect food production and hydro-electricity generation, and spillover effects of instability in some global currency markets due to the impact of the commencement of the tapering of the economic stimulus programme in the United States, remain the main risks to the inflation. The private sector credit growth through April 2014 was mainly directed towards financing demand from business services, transport and communication, private households, domestic trade and manufacturing (Ndung'u, 2014).

### **1.1.3 Money Supply and Gross Domestic Product**

There are a number of theories illustrating the relationship between money supply and gross domestic product. Accordance to the Quantity Theory of Money (QTM), It is claimed that QTM relationship requires that there exist proportional relationships between the growth rates of money supply and price level and that money must be neutral which is resulted from stationary velocity of money and unaffected real output level in the long-run following the permanent changes in the growth rate of money supply. In a more elaborate way, real output and velocity

changes must be orthogonal to the growth rate of the money stock considered (Grauwe and Polan, 2005).

#### **1.1.4 Money Supply and GDP in Kenya**

The Kenyan economy performed modestly in 2011 and realized growth in gross domestic product (GDP) of 4.4 percent compared with expansion of 5.8 percent in 2010 and 2.7 percent in 2009. This was hugely contributed to by agriculture and forestry, electricity and water supply, mining and quarrying, financial intermediation, wholesale and retail trade, repairs, and transport and communication. In the first three months of 2012 the economy performed sluggishly registering real growth of 3.5 percent, or 140 basis points below 4.9 percent growth in the corresponding period in 2011. Real GDP growth is projected to stabilize at 5.2 percent in 2012. Monetary policy focused on achieving and maintaining low inflation (Central Bank of Kenya, 2013).

The twelve month inflation rate slowed down from 18.31 percent in January 2012 to 10.1 percent in June 2012 on account of reduced food inflation and fuel inflation in the year to June 2012 and prudent monetary policy stance. The annual average inflation, however, rose to 16.0 percent in June 2012 from 15.1 percent in January 2012 and 6.9 percent in June 2011. Monetary policy tightening started in March 2011 and was sustained through June 2012 to contain domestic inflation. Money supply, M3, growth decelerated to 15.5 percent from 19.3 percent in September 2011, and reserve money grew by 17.6 percent in the year to June 2012; against target growths of 18.7 percent and 14.2 percent, respectively. The Kenyan econometric parameters are thus intertwined such that an improvement in money supply results in an improvement in the gross domestic product and vice versa as indicated by inflation rate changes (Central Bank of Kenya, 2013).



## 1.2 Problem Statement

The Central Bank of Kenya capped the real growth rate of Kenya at 4.4% in 2011 and 4.6% in 2012. This was the annual measure of GDP growth adjusted for inflation and expressed as percentage. The Kenyan Growth rate is relatively slow compared to other developing nations. The following benefits accrue to improving GDP. Kenya stands to improve the living standards of her citizens. Economic growth is vital to a country in bringing about an improvement in the living standards of its people. It also helps to reduce the rates of poverty for people of low incomes.

This is principally true for underdeveloped and developing countries where growth is considered a principal method of reducing poverty among the populace such as the case of Kenya. Economic growth results in bringing a high rate of employment. When firms and businesses produce more outputs, their internal requirement for people gradually increases. They bring in more people to work, thus increasing the rate of employment. Economic growth brings in higher tax revenues for the government, making it stronger. Along with this, the government spends less amount of money as unemployment benefits. Government finances are usually of a cyclical nature. As the country's economy boosts up, more tax revenues flow into the Government Treasury. This provides the government with additional money, which can be used for financing other projects that might lead to further development.

Two theories uniquely present money supply. According to Keynesian structural model approach, in the money market, when there is an increase in money supply from MS1 to MS2 with a constant price level  $P_1$  which leads to a drop in interest rate from  $r_1$  to  $r_2$ , LM curve shifts downward from LM1 to LM2. According to the Quantity Theory of Money (QTM), it is claimed that QTM relationship requires that there exist proportional relationships between the growth

rates of money supply and price level and that money must be neutral which is resulted from stationary velocity of money and unaffected real output level in the long-run following the permanent changes in the growth rate of money supply (Jamie, 2005).

A number of Global empirical studies that have illustrated the effect of money supply on the gross domestic product. Before 2005-2006 monetary policy was biased towards supporting growth because inflation was at low level but with the rising inflation from 2005-2006 monetary actions are towards the containment of inflation (State Bank of Pakistan, 2006). High rates of inflation cause problems, not just for some individuals, but for aggregate economic performance. Not only sustained high rates of inflation can adversely affect the real economic growth in long run but also even moderate level of inflation damage the real economic growth. For each one percent point increase in inflation, in USA, annual growth rate has reduced by 0.223% (Smyth, 1992). At low rates of inflation this relationship is negative but insignificant; however higher rates of inflation have a significantly negative effect on growth. In the Kenyan perspective, much of the studies have been done by the Kenya Institute of Public Policy Research Analysis (KIPPRA). One of the studies aimed to examine whether exchange rates overshoot in Kenya, and its impact on output when monetary policy contracts. This study sought to provide answers to the question, what are the effect of money supply on the gross domestic product in Kenya?

### **1.3 Research Objective**

To establish the effect of money supply on the gross domestic product in Kenya

### **1.4 Value of the Study**

The study will contribute to the body of knowledge by establishing new models and theories for money supply in Kenya and its effects on the GDP. The study will provide clear comparative analysis to help in the advancement of policy making on money supply and GDP responses.

Apart from providing clear comparative analysis for advancement in policy making in the country, the study will help other researchers in carrying out more detailed studies on the effects of money supply on the Kenyan GDP.

More specifically, the findings of the study are expected to benefit the Government of Kenya through the CBK and the National Bureau of Statistics in identifying the relationship between overall money supply and its effects on the GDP so that the right policies are enacted to ensure regulated money supply to both national government and county government functions.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents literature review. Literature review is examining already existing studies and using them to improve on the study being undertaken. It focuses on the theories and literature and empirical works.

#### **2.2 Theoretical Review**

##### **2.2.1 Overlapping Generations (OLG) Model**

The model is associated with Samuelson (1958). It assumes an economy consisting of one individual per generation who lives in two periods by consuming one perishable commodity. This assumption depicts a highly stylized economy, which doesn't exist in real world. Society, at any point in time is composed of the young and the old, and all trades involve individuals of different successive generations. Diamond (1965) worked out an extension of the OLG model, and notes that highest unsustainable debt can be dangerous rather than degenerative as in cases where public debt has gradually increased for longer periods of time. Governments are obliged to monitor their debt level. Also, for a small closed economy, as the limit approaches, consumption may be reduced close to zero levels and at this point the maximum sustainable public debt becomes degenerative.

The OLG models have three distinct possibilities. First, multiple equilibria exists. Secondly, competitive equilibria may fail to be Pareto efficient, and thirdly, the Pareto efficient competitive equilibria may fail to be the optimal allocation for the economy. The above possibilities indicate that the coordination function of the government is critical as the uncoordinated competitive interaction of the perfect markets may be inadequate to yield efficient outcomes. Additionally,

the functioning of the markets may be insufficient to bring about efficient outcomes, and all consumers may not exhibit rational behavior consistent with a competitive environment (Cass, Okuno and Zilcha, 1979). According to Burke (1987) such intergenerational transfers of welfare can also be achieved by using taxes and pensions, public debt and other forms of public interventions that may be deemed appropriate by the governments.

Aghion and Bolton (1990) postulates that as public debt increases, incentives in relation to the increased debts also escalates leading to a potential existence of a critical debt level above which the government may willingly choose to default. In reality, such a situation is reached as an economy becomes more indebted. This phenomenon is devastating to most developing economies where they fail to service their debts which in turn lower their credit rating. The effect of this to the economic growth has largely become negative if not positive.

If assuming further that the current households possess the entire stock of commodities when young and nothing when they become old, it is wiser for individual households to lend part of the stock of commodities they possess to another consumer to be repaid in the second period making the consumer better off. Inevitably, since the demographic composition of the population does not allow any trade, the efficient allocation of the existing resources cannot be achieved by the market (Esteben, 1991). The government therefore injects token fiat money or deficit financing to attain a positive market price and move the economy into a superior Pareto allocation so that the individual households achieve a higher utility (Esteben, 1991).

### **2.2.2 Debt Laffer Curve**

Named after Laffer (1981), the curve posits that reduced tax rates eventually lead to increased tax revenues. In relation to public debt, it increases the probability and willingness of economies to service their debts and in turn improves the business environment, thus attracting more investment and growth. Sachs (1989) applies this concept to an indebted firm and comes to the

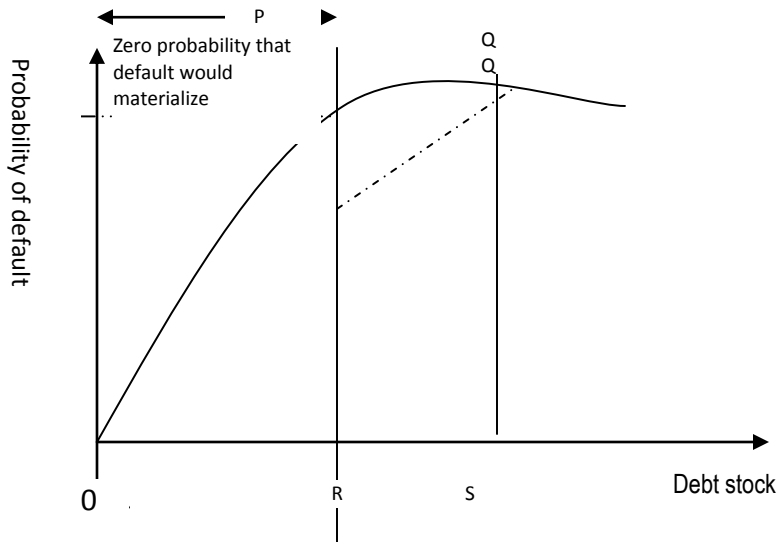
same conclusion. Cohen (1989) suggests that a stock debt incurred by an economy in the current period has to be repaid in the next period. This implies that the investment decisions taken in the current period will lead to the future. As a result, the debtor economy's gains become limited, resulting in further increased debt. Repayment obligations accumulate as new investments are to be financed from additional loans.

Krugman (1988, 1989) and Sachs (1989) hypothesized that as sovereign economies service their debt by taxing households and firms, increased debt levels have an implication of increasing the private sector's expected future tax burden. If the expected debt burden is so high that it becomes a disincentive to current investment, then investors may postulate that returns on any new project will be taxed away to service the pre-existing debt, a debt overhang situation then occurs. The implication is that the increasing costs associated with the debt discourage debt servicing and discourage domestic and foreign investment, thereby harming growth. Potential investors will fear that the more a country produces, the more it will be "taxed" by government to repay the external debt and thus they may not be willing to incur costs today for the sake of increased output in the future (Sachs, 1989). Large debt stocks are associated with lower possibilities of debt repayment.

Worse still, they further argued that investors may become uncertain as to whether respective governments will seize profits on private investments. Those lending to investors may also be uncertain as to whether their arguments would be reduced by the taxing power of their governments. The overall result is: lower levels of current investment, resulting in lower growth of output. The tax revenue accrued by the governments at the going tax rate reduces the resulting lower ability to pay and lower expected value of the debt. Although the debt overhang models

do not analyze the effect of growth explicitly, the implication is that a large debt stock lowers growth by reducing investment. The incentive effects associated with a large debt stock tend to reduce the benefits to be expected from policy reforms that would enhance efficiency and growth. The government will be less willing to incur current cost if it perceives that the future benefit in terms of higher output could majorly benefit foreign lenders.

Agénor (2000) explains this situation as the difference between the present value of an economy's contractual debt commitments and the anticipated resource transfers that are needed to repay it. As debt overhang worsens, the impact on the gross domestic product also worsens. Studies show that international investment decision making largely depends on creditworthiness. As a country's public debt escalates, the larger is the negative impact on perceived creditworthiness, hence less attractiveness to attract creditors and investors. A clear illustration of the relationship between the expected debt servicing and debt stock is shown in the figure that follows.



**Figure 2.1: Debt Laffer curve**

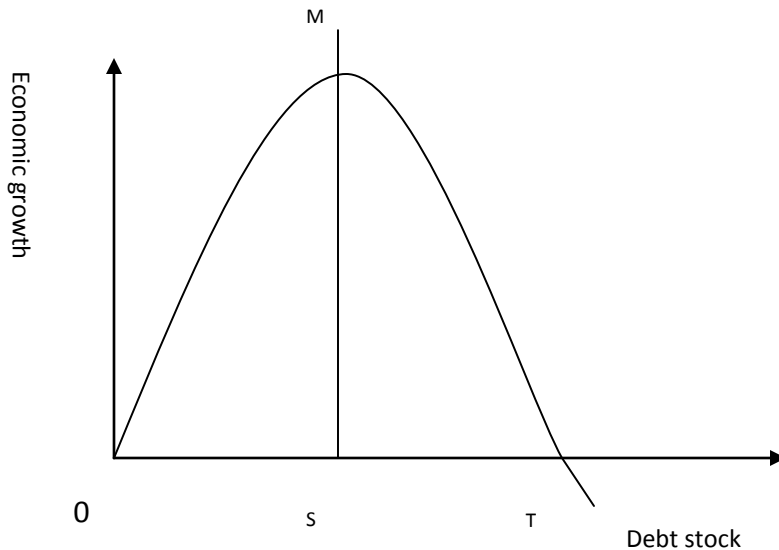
**Source: Agénor (2000)**

The debt Laffer curve indicates that large debt stock tends to be associated with lower probabilities of debt repayment. On the upward sloping or “good” section of the curve increase in the face value are associated with increases in expected debt repayment while increase in debt reduces expected debt repayment on the downward sloping or “bad” section of curve. Therefore, as debt increases from point O, the probability of default also increases. However, there is a zero probability of default from point O to point R. As the debt stock further increases from point R to point S, the likelihood that default would materialize increases, beyond point S the debt becomes unsustainable (Agénor, 2000).



### 2.2.2.1 An Extension of Debt Laffer Curve

The linkage between debt and economic growth can also be depicted from a debt Laffer curve assumed to take an inverted U shape. As countries open up to foreign capital and start borrowing, the impact on growth is likely to be positive (Agénor, 2000).



**Figure 2.2: Linkage between Debt and Economic Growth**

**Source: Agénor (2000)**

Referring to Figure 2.5, as debt ratio increases beyond an optimal point of economic growth (M), an increase in any additional debt ultimately reduces growth despite a positive contribution to growth of the overall debt levels. The positive contribution of debt levels to growth diminishes to a point (T) where the stock of debt eventually leads to a negative growth. At this point, an economy is better off without incurring further debt, higher otherwise worse off.

### **2.2.3 Traditional and Ricardian Equivalence View**

In the traditional view an increase in government debt is a burden to the economy. In the short run, in view of the increase in debt, households' consider themselves' wealthier and therefore resort to higher spending. The increase in demand for goods and services, in view of sticky prices in the short run, raise output and employment. Marginal Propensity to Consume (MPC) is therefore higher than the Marginal Propensity to Save (MPS), thus the increased private savings fall short of government dissaving. Real interest rate rises in the economy leading to increased capital inflow from abroad (Meltzer, 1951).

In the long run, the higher interest rate discourages investment leading to crowding out of private investment, low domestic savings and a smaller capital stock. Additionally, the inflow of capital from abroad or foreign countries results in greater foreign debt and higher aggregate demand. This, further, results into higher price levels which adjust over time as the economy returns to a natural state of output. Therefore, the overall impact when considering the long run period, would be a smaller total output and eventually lower consumption and reduced economic welfare, also called the burden of public debt, as each generation burdens the next by leaving behind a smaller aggregate stock of capital (Meltzer 1951, Modigliani 1961 and Ferguson 1964).

Nurske (1953) observed that increasing savings can break the vicious circle of poverty. Lewis (1954) further emphasized on the role of increased savings in facilitating capital accumulation. Buchanan (1958) suggested that a situation of recurring money supply result in postponement in tax liability from the future current generation and this shift from current to future taxation could imply a shift in tax burden from the current generation to the future to future generation.

Cherney and Bruno (1962) in their two-gap theory suggested that growth is limited by two constraints: the savings gap constraint based on the country's ability to save and invest, and secondly, the foreign exchange gap accruing from limited export reserves and the targeted growth rate of the economy causes exports to exceed the economy's ability to finance them. To explain the theory, they adopt the Harrods growth equations of the type:

$$P = sk \dots\dots\dots (2.1)$$

Where ( $p$ ) is the real growth rate of national income, ( $s$ ) is the ratio of savings to national income, while ( $k$ ) is the incremental capital output ratio.

If gross domestic investment is taken into consideration, the savings is seen as extremely large, driven in most cases by aid. The equation may be written as:

$$P = (s + a)k \dots\dots\dots (2.2)$$

Where  $a$  is the ratio of aid to national income, it implies that:

$$\frac{P}{k} = s + a \dots\dots\dots (2.3)$$

And letting  $s + a = c$ , where  $c$  is the Marginal Propensity to Consume, the saving gap is given by equation below.

$$a = c - s \dots\dots\dots (2.4)$$

This analogy implies that aid inflow has the following potential effects: supplementing domestic savings and capital accumulation and hence increases the proportion of income saved. If this is

achieved, then aid may subsequently reduce the amount of aid contracted. For this to hold, the assumption is that the increase in aid should be greater than the increase in consumption.

On the foreign exchange gap, the assumption made by Cherney and Bruno (1962) is that the value and the volume of exports is determined exogenously, while the demand for export largely depends on the targeted rate of economic growth. An input of capital goods depends on the level of investment and the intermediate goods and derived demand of capacity utilization rate. Since domestic input is an imperfect substitute for imported internet goods, the latter increase or decrease with an increase or decrease in production. The cost of financing such imports in most cases exceeds the earnings of foreign exchange derived from exports. The size of the foreign gap is derived below:

Given that  $M = mY$ ..... (2.5), where  $m$  is the marginal propensity to import and  $Y$  is the national income. The size of the foreign gap is then

denoted by:  $mY = X$ ..... (2.6), Where  $X$  is the volume of exports which is presumed to be exogenous. When aid is introduced, the equation becomes:

$$a = m - \left( \frac{X}{Y} \right) \dots\dots\dots (2.7)$$

According to Barro (1974), considering that consumers are rational and forward looking, the discounted sum of future taxes is equivalent to current deficit and thus the shift between taxes and deficit does not generate aggregate wealth effects. The increase in the government debt does not affect consumption. The rational consumer facing current debt saves for the future rise in taxes and therefore total savings in the economy are not affected and thus a decrease in

government dissaving is matched by an increase in private savings. In view of unchanged total savings, investment and interest rates are also unaffected leading to no changes in national income

Barro (1978) suggests that a shift from current to future taxation implied by the debt issue does not involve burden on later generation due to phenomenon of operative intergenerational transfer. The assumption of infinite lives and other assumption like the timing of taxation, public debt and capitalized future taxes are perfect substitutes and the imperfection in the capital market. Additional foreign exchange when availed through financial aid would raise the level of investment and increases domestic saving thus raising the level of economic growth. In the two gap approach developed by Cherney (1979) and other scholars, they underline the need for foreign aid to developing countries. According to Cherney, the World Bank Model (RMSM) differs from the two- gap model, in that, the model concentrates on the foreign exchange gap only.

Defege (1992) in addition to the import and domestic savings constraint, developing countries also are further constrained by the supply of skills and organizational ability. In the Ricardian view, it is considered equivalent to future taxes. In the World Bank model, a developing country is expected to mobilize domestic resources by means of appropriate policies to overcome the savings constraints, while foreign resource supplied by it are meant to cover external shortcomings. Kenya faces an external resource crunch as a result; the government is experiencing an increasing deficit leading to heavy domestic borrowing and high cost of borrowing.

Degefe (1992) also noted that the level of savings in developing countries is usually too low due to low income, and as a result, there is need of external resource to compliment domestic resource. This shifts the focus as to whether foreign resources are useful to developing countries or as to how adequate they are assisting these economies realize their growth potential. Degefe concluded that in “the short run, effectiveness of external resource depends on their use to relieve their skills, savings and imported commodities” while the long run fate of the nation depends on the use that is made the initial increase in the output. Models developed by Mckinon (1964) and Venex (1967) also support the two- gap approach. Lancaster and Wangwe (2000) postulated that foreign aid crowds out investments. This can occur if recipient governments in coming up with counterpart funds to match aid inflows by borrowing from the banking system, making credit scarce.

#### **2.2.4 Keynesian Theory**

According to Keynes (1936), the economy as unstable and subject to fluctuations. Aggregate supply and demand do not balance out at an equilibrium that delivers full employment. The solution is to use budget deficits to increase overall investments by way of public investment. Public investment would comprise of public works. This would in turn create jobs thus creating increased purchasing power leading to increased economic growth.

According to Borensztein (1989) a country would benefit more from access to more lending than reducing an existing obligation in terms of the impact on investment to GDP ratio. This suggests that in order to maximize on productive investment, debt reduction plan needs not be accompanied by additional foreign lending.

### 2.3 Determinants of Gross Domestic Product growth

According to Gurley and Shaw (1956), mounting volume of public debt is a necessary feature of a strong and healthy financial structure of an economy. Therefore some secular increase in the public debt should be planned by every government of a market oriented economy. However, it appears that as government plans a long term increase in debt, the volume of public debt has tended to increase in response to compulsions of the moment.

According to the study, the key is the cost of debt servicing which includes the repayment of principal and interest due on the loan. Thus, borrowing arising from increased government expenditure on development programmes is justified without generally an additional income to finance. Barro (1980a) formulated the following equation to establish the relationship between the unanticipated component of money supply and growth using annual US data for the period 1949-77.

$$\text{Log}(Y_t) = \alpha_0 + \alpha_1 t + \alpha_2 \text{DMR}_t + \alpha_3 \text{DMR}_{t-1} + \alpha_4 \text{Log}(G_t) + \alpha_5 \text{DBR}_{t-1} \dots\dots\dots 2.8$$

Where, Y is output, t is the time trend, G is real federal purchases, DMR and DBR are unanticipated components of money and debt growth. The coefficient of variable of unanticipated growth money supply was held insignificant in the above equation. The study findings reveal that unanticipated component of money supply, or the debt shock affects growth.

Gurley and Shaw's contention undermines the view that additional borrowing is inimical to welfare. Their contention is supported and clarified by Queientin (1984) who posits that indebtedness amounts to a problem, if a country couldn't afford to repay its debt.

Kormendi (1984) investigated the relationship between money supply and growth. Kormendi estimated the following equation to explore evidence from cross-section of 34 countries, about the relationship between debt and growth.

$$MY_j = \alpha_0 + \alpha_1 YI_j + \alpha_2 SY_j + \alpha_3 SM_j + \alpha_4 MDY_j + \alpha_5 MEY_j + \alpha_6 MRY_j + \epsilon_j \dots \dots \dots 2.9$$

Where, MY is the mean growth of per capita real gross domestic product, YI is initial per capita real gross domestic product, SY is the standard deviation of the growth of real domestic products is the standard deviation of the money supply growth, MDY is the mean ratio of deficits to income (gross domestic product), MEY is the mean ratio of government expenditure to income, MRY is the mean ratio of change in reserve money to income and the subscript ‘j’ refers to country j.

Kormendi hypothesized that from Ricardian equivalence proposition to hold, the coefficient on the variable MDY should be insignificant ( $\alpha_4=0$ ).on the basis of the cross country analysis for 34 countries, including developed and underdeveloped for the period 1957-77. Kormendi concluded that Ricardian Equivalence holds and that debt and growth are not related.

**2.3.1 Labour Force (LF)**

Labour force is actual number of people available for work and includes both, the employed and the unemployed but looking for a job. Studies have found that an economy endowed with a skilled work force experiences higher growth rate than those endowed with an unskilled work force as postulated in neoclassical growth models (Romer, 1986), Lucas, 1988), and Rebelo, 1991). In this study it is proxied by population above 18 years. In Kenya it’s assumed that an individual 18 years of age is eligible to be a workforce.



### **2.3.2 Government Investment (INV)**

Investment is the accumulation of newly produced physical entities, such as factories, machinery, houses, and goods inventories. This includes putting money into an asset with the expectation of capital appreciation, dividends, and/or interest earnings. In this study, investment is government investment in development projects and it is measured in million Kenya shillings.

### **2.3.3 Domestic Credit (DC)**

Domestic credit refers to lending or credit that a country or territory's central bank makes available to borrowers within the same territory including commercial banks and the government itself. Availability of domestic credit from banks and other financial institutions may increase private investment impacting positively on the gross domestic product. However, there is possibility that government money supply might crowd out bank credit to private sector raising concern regarding the impact of the increased government money supply on the gross domestic product (King and Levine, 1993). Domestic credit measured in Kenya million shillings.

### **2.3.4 Nominal Money Supply (MS)**

Money supply is the total amount of monetary assets (entire stock of currency and other liquid instruments) available in an economy at a specific time. Increasing money supply may have inflationary tendencies in the economy which impacts negatively on the gross domestic product. Monetary economists argue that the increases in money supply should be absorbed in government's development projects. In this study, is real money supply measured in million Kenya shillings.

### **2.3.5 Interest Rate (INT)**

Interest rate is the rate at which interest is paid by a borrower (debtor) for the use of money that they borrow from a lender (creditor). High interest rate crowds out private investment leading to reduced economic growth. On the contrary, it may attract foreign capital inflows which may result into increased debts. It is measured in percentages but will be converted to decimal points for easier analysis.

### **2.3.6 Money supply Outstanding (DDO)**

Money supply Outstanding is the debt owed by a central government to its citizens. It covers data on long-term bonds and notes, commercial paper and other short-term notes. It is measured in million Kenya shillings. Economic growth is the increase in the market value of the goods and services produced by an economy over time. In this study it is measured as the percent rate of increase in real gross domestic product, or real GDP.

## **2.4 Empirical review**

A cross sectional study comprising 24 developing countries in the period 1971 -1979 was done by Khan and Blejer (1984) using neoclassical growth model which was modified to show the effects of crowding out and distinguish between private and public investments. This formulation was justified on the grounds that the government plays a key role in investment in the developing countries. It was established that public investment in developing countries had an overwhelming impact on private investment.

Borensztein (1990) empirically tested the debt overhang effect using data for the Philippines. The study found out that debt overhang had an adverse effect on private investment and the effect was strongest when private debt rather than total debt was used as a measure of the debt

overhang. The government could change the private investment by changing the public policy tools used for stabilization policy. This implies that tight monetary policy tools will have adverse effects on private investment and consequently growth. Government budget deficit financing can crowd out the private sector and so government should use foreign borrowing to finance the budget deficit more than using the domestically borrowed resource. They also found exchange rate and high interest to adversely affect investment and consequently growth.

Based on the above results this study took domestic borrowing as a determinant of the long run economic growth to determine the extent of their influence on long-term economic growth. Khan and Reinhert (1990) studied private investment and economic growth on 24 developing countries for a period 1970-1979. They were careful to distinguish public from the private investment. Most of the earlier studies used total investment. The strategy was aimed at finding which of the two promoted more economic growth than the other and the interdependence between them by using neo classical model. In addition to capital and labour they used exports and imports as variables. Their findings indicated that public investment played a larger role by 43% towards promoting economic growth than the public sector which contributed negatively. They however, cautioned that these were just direct effects but that public investment effect could even be higher than was reported. Labour force growth and exports had positive impact on growth. On removing the public investment from the regression; both exports and imports were found to positively influence growth.

King and Levine (1993), Levine and Zerros (1998), and Levine, Loyaza and Beck (2000) found out empirically in their respective studies that bank credit to private sector is an important factor in economic growth. Thus the possibility that government money supply might crowd out bank

credit to private sector could thus raise concern regarding the impact of the increased government money supply on the gross domestic product.

Christensen (2004) employed a cross country survey of the role of money supply market in sub-Saharan African based on a new data set of 27 sub-Saharan African countries during the 20 years period (1980-2000), the study findings reveals that money supply markets in these countries are generally small, highly short term and often have a narrow investor base. Also in those countries' interest rate payment presents a significant burden to the budget, despite much smaller money supply than foreign indebtedness. Further still, it was revealed that the use of money supply is also found to have significant crowding out effect on private investment.

A study by Oshadami (2006) carried out a study and found out that the growth of money supply has affected negatively the growth of the economy. This situation is premise on the fact that majority of the market participant are unwilling to hold longer maturity and as a result the government has been able to issue more short term debt instruments. This has affected the proper conduct of monetary policy and affected other macro-economic variables like inflation, which makes proper prediction in the economy difficult.

Abbas and Christensen (2007) in their recent study analysed optimal money supply levels in the low income countries (including 40 sub-Saharan African Countries Kenya included) and emerging market between 1975 and 2004. They found out that moderate levels of marketable money supply as a percentage of GDP have significant positive effects on the gross domestic product. The study also provided evidence that the debt levels exceeding 35 percent of total bank deposits have negative impact on the gross domestic product. However, the relevance of this conclusion to Kenya doubtful since a lot of development has overtime been witnessed in the

management of money supply. The country has witnessed an accelerated economic growth between 2005 and 2007 which was not captured in the study.

Hanson (2007) conducted a simple regression analysis using 1994-2004 data on selected 17 developing countries, with large financial systems. The analysis revealed that there seems to be a negative relationship between growth of the government debt and the growth of private sector credit. Hagist, Moog, Raffelhuschen, and Vatter (2009) estimated the net present value of future government liabilities and revenues and use the difference between the net present value of future liabilities and revenues to build a measure of implicit government debt. Their calculations suggest that the total debt-to-GDP ratio is often twice as large as gross debt and, in some cases, more than five times the level of the explicit debt-to-GDP ratio.

Moki (2012) investigated the relationship between national debt and the economic growth of African countries. The causal research design targeted all the 53 African countries for a 30 year period (1980 – 2010). Using multiple linear regression, the study results shows that public debt had a significant positive relationship on the gross domestic product. Monetary policy had a negative relationship with GDP. Baum, Checherita-Westphal, and Rother (2012) sought to establish the relationship between economic growth and public debt using generalized method of moment least-squares regression. They applied this to 12 euro-area countries over the period 1990-2010, and found a positive correlation between debt and growth when the debt-to-GDP ratio is below 67 percent, no significant correlation when debt is between 67 and 95 percent of GDP, and a negative correlation when debt surpasses 95 percent of GDP. According to the authors, the negative correlation between debt and growth is related to the specificity of the 2008-2010 financial crisis.

Herndon, Ash and Pollin (2013) researched on the relationship between public debt and GDP growth and sought to establish how the relationship varies significantly by time period and country. Using empirical and secondary document analysis, the study established significant errors in reached by Reinhart and Rogoff in concluding that countries facing public debt to GDP ratios above 90 percent experience a major decline in GDP growth. These errors transform the reality of modestly diminished average GDP growth rates for countries carrying high levels of public debt into a false image that high public debt ratios inevitably entail sharp declines in GDP growth. The findings showed a wide range of GDP growth performances at every level of public debt among 20 advanced economies.

Panizza and Presbitero (2013) studied the relationship between public debt and economic growth in advanced economies. They established that high levels of public debt have a negative effect on the gross domestic product and fiscal consolidation is necessary to anchor expectations and restore confidence in the economy. They however, noted that the way public debt affects growth may depend on institutional quality, on the dimension of the public sector, on how and why debt has been accumulated, and on the structure and composition of public debt.

## **2.5 Summary of the Literature Review**

The literature review on the effect of public debt on the gross domestic product show mixed results. This can be attributed to different approaches used by various researchers in their analysis on the relationship between the two variables. Also, by using various countries, different explanatory variables and time period, varying study findings have emanated.

The review indicates that studies conducted on Kenya's public indebtedness have concentrated on the effects of external debt on the gross domestic product and very little has been done to

understand the effects of increasing level of money supply on the gross domestic product. Most studies haven't covered a period long enough to capture all the development in fiscal and monetary policies that have been used in Kenya over time. Additionally, such studies apply different methodologies and explanatory variables with different econometric methods thus leading to variations in study findings, conclusions and policy implications. The scenario makes it difficult to establish consistent relationship from such studies prompting this study. This study shall use data for 1970-2012. The time span is long enough and captures Kenya's different experiences in an attempt to stimulate its growth of output. Expansionary monetary policy refers to any policy initiative by a country's central bank to raise its money supply. This can be accomplished with open market purchases of government bonds, with a decrease in the reserve requirement, or with an announced decrease in the discount rate. In most growing economies the money supply is expanded regularly to keep up with the expansion of gross domestic product (GDP).

In this dynamic context, expansionary monetary policy can mean an increase in the rate of growth of the money supply, rather than a mere increase in money. However, the money market model is a non-dynamic (or static) model, so we cannot easily incorporate money supply growth rates. Nonetheless, we can project the results from this static model to the dynamic world without much loss of relevance.

With real money supply  $M/p$  and interest rate  $r'$  when the money supply increases, *ceteris paribus*. The *ceteris paribus* assumption means we assume that all other exogenous variables in the model remain fixed at their original levels. In this exercise, it means that real GDP ( $Y$ ) and the price level ( $P$ ) remain fixed. An increase in the money supply ( $M$ ) causes an increase in the real money supply ( $M/P$ ) since  $P$  remains constant.

Analyzing the impact on the economy to the real macroeconomics variables, there will be a shift from M/P to marking an increment M/P. At the original interest rate, real money supply has risen above real money demand. This means that money supply exceeds money demand, and the actual interest rate is higher than the equilibrium rate. Adjustment to the lower interest rate will follow the “interest rate too high” equilibrium story. There is need therefore for Kenya to consider the Monetary and fiscal policy formulation and revision of monetary policy objective. However, its implementation need to be well coordinated.



**CHAPTER THREE**  
**RESEARCH METHODOLOGY**

**3.1 Introduction**

This chapter provides the theoretical and methodological framework used to analyze the data and provide direction in achieving the study objectives. It gives an outline of empirical models to be used and various tests performed to ascertain the validity of data and robustness of the model. These include stationarity tests, co integration analysis and error correction modeling.

**3.2 Research Design**

The study builds on existing research studies and methodologies and uses a causal research design. Gay and Airasian (2003) note that causal research designs are used to determine the causal relationship between one variable and others; in this case, the cause and effect relationship between economic growth and public money supply. Thus, the causal research design was, therefore, consistent with the study's objective.

**3.3 Specification of the Model**

The study adopts a neoclassical analytical framework developed by Solow (1956). This analysis has been adopted by studies such as Cunningham (1993) who also introduced public debt burden into a growth equation. The analysis is based on the aggregate production function that relates factor inputs and a variable of total factor productivity to output.

$$B = Cf(D, E, F) \dots \dots \dots (3.1)$$

Where:  $B$ = the level of potential output,  $C$  = an exogenous measure of factor productivity usually assumed to be constant,  $D$ = the stock of physical capital,  $E$  = the labour force used in the production process, while  $F$ = a vector of other factors that affect growth.

Assuming that all partial derivatives of  $B$  with respect to their derivatives and that of factor productivity  $C$  is  $> 0$ , Then the above aggregate production function expressed in growth terms becomes:

$$\frac{db}{b} = \left( C \cdot \frac{\partial b}{\partial d} \right) \frac{\partial d}{b} + \left( C \cdot \frac{\partial b}{\partial e} \cdot \frac{E}{B} \right) \frac{dE}{E} + \left( C \cdot \frac{\partial b}{\partial f} \cdot \frac{F}{B} \right) \frac{dF}{F} + \frac{dC}{C} \dots\dots\dots (3.2)$$

Equation (3.2) is then rearranged to obtain the coefficients of the regressors with respect to the output which gives the impact of their unit contribution to changes in output:

$$\frac{\Delta b}{b} = n_0 + n_1 \frac{\Delta D}{D} + n_2 \frac{\Delta E}{E} + n_3 \frac{\Delta F}{F} \dots\dots\dots(3.3)$$

Writing the coefficients in terms of their regressors from equation (3.3) the equation becomes:

$$n_0 = \frac{dC}{C}, n_1 = C \cdot \frac{\partial b}{\partial d} \cdot \frac{D}{b}, n_2 = \frac{\partial b}{\partial E} \cdot \frac{E}{b}, n_3 = C \cdot \frac{\partial b}{\partial F} \cdot \frac{F}{b} \dots\dots\dots(3.4)$$

The study introduce investment which is impacted greatly by public debt in the model by noting that  $dk = investment$  and the coefficients above are: constant term (C) growth of factor productivity, ( $n_1$ ) is the marginal productivity of capital;  $n_2$  gives the elasticity of output with respect to labor input, while  $n_3$  is the elasticity of output with respect to other factors a part from capital and labour to which debt belongs.

To bring out robust statistical analysis the above variables were taken into consideration due to their linkages with money supply and further impact on the gross domestic product. The model that was estimated was specified as follows:

$$EG_t = f(DDO, DC, INT, MS, INV, LF) \dots\dots\dots (3.5)$$

Where; EG = Real Gross Domestic Product, DDO = Money supply Outstanding, DC = Domestic Credit, INT = Interest Rate, MS = Broad Money Supply (M3), INV = Total Investment, LF = Labour Force proxied by population (POP) above the age of 18 years

### **3.4 Definition and Measurement of Variables**

**Labour Force (LF):** Labour force is actual number of people available for work and includes both, the employed and the unemployed but looking for a job. Studies have found that an economy endowed with a skilled work force experiences higher growth rate than those endowed with an unskilled work force as postulated in neoclassical growth models (Romer, 1986, Lucas, 1988, and Rebelo, 1991). In this study it is proxied by population above 18 years. In Kenya it's assumed that an individual 18 years of age is eligible to be a workforce.

**Government Investment (INV):** Investment is the accumulation of newly produced physical entities, such as factories, machinery, houses, and goods inventories. This includes putting money into an asset with the expectation of capital appreciation, dividends, and/or interest earnings. In this study, investment is government investment in development projects and it is measured in million Kenya shillings.

**Domestic Credit (DC):** Domestic credit refers to lending or credit that a country or territory's central bank makes available to borrowers within the same territory including commercial banks and the government itself. Availability of domestic credit from banks and other financial institutions may increase private investment impacting positively on the gross domestic product. However, there is possibility that government money supply might crowd out bank credit to private sector raising concern regarding the impact of the increased government money supply

on the gross domestic product (King and Levine, 1993). Domestic credit measured in Kenya million shillings.

**Nominal Money Supply (MS):** Money supply is the total amount of monetary assets (entire stock of currency and other liquid instruments) available in an economy at a specific time. Increasing money supply may have inflationary tendencies in the economy which impacts negatively on the gross domestic product. Monetary economists argue that the increases in money supply should be absorbed in government's development projects. In this study, is real money supply measured in million Kenya shillings.

**Interest Rate (INT):** Interest rate is the rate at which interest is paid by a borrower (debtor) for the use of money that they borrow from a lender (creditor). High interest rate crowds out private investment leading to reduced economic growth. On the contrary, it may attract foreign capital inflows which may result into increased debts. It is measured in percentages but will be converted to decimal points for easier analysis.

**Money Supply Outstanding (DDO):** Money supply Outstanding is the debt owed by a central government to its citizens. It covers data on long-term bonds and notes, commercial paper and other short-term notes. It is measured in million Kenya shillings.

**Economic Growth (EG):** Economic growth is the increase in the market value of the goods and services produced by an economy over time. In this study it is measured as the percent rate of increase in real gross domestic product, or real GDP.

### 3.5 Time Series Properties

#### 3.5.1 Correlation Analysis

The study sought to establish the relationship between the money supply outstanding, domestic credit, interest rate, broad money supply, total investment, labour force, and economic growth. Values of the correlation coefficient are always between -1 and +1. A correlation coefficient of +1 indicates that two variables are perfectly related in a positive linear association, a correlation coefficient of -1 indicates that two variables are perfectly related in a negative linear sense, and a correlation coefficient of 0 indicates that there is no linear relationship between the two variables. Pearson Correlation analysis was used to achieve this end at 95% confidence level ( $\alpha = 0.05$ ).

#### 3.5.2 Error Correction Model (ECM)

Using the long-run model, the study then proceeded to construct an error correction term which is used together with the stationary variables in co-integrating relationships to construct the error correction model (ECM) which integrates short run and long run dynamics of the model. The coefficient of error correction term (ECT) which represents the speed of adjustment to the long run equilibrium ought to be negative and significant if the disequilibrium is to be corrected in the subsequent period and long-run restored. If insignificant, then correction term is otherwise ignored.

The error correction model is constructed by replacing the coefficient with the estimated coefficient from the equation in the first step and can be shown as;

$$\Delta \ln EG_t = \alpha_0 + \gamma_0 \Delta \ln MS_t + \delta (\ln EG_{t-1} - \beta \ln MS_{t-1}) + \mu_t \dots \dots \dots (3.6)$$

### 3.5.3 Stationarity Testing for Co-integration

Regression on non-stationary series generates a spurious regression. Engle and Granger (1997) identified a situation when such a regression would not yield spurious relationship by conducting a two-step procedure.

The Engle and Granger test is a two-step procedure in which the first step involves estimating the regression equation by ordinary least squares procedure and the residuals from the regression again tested for stationarity. The procedure involved testing whether the regression residuals of the following long-run regressions were stationary:

$$\ln(EG) = a_0 + a_1 \ln(MS) + u_1 \dots \dots \dots (3.7)$$

$$\ln(MS) = b_0 + b_1 \ln(EG) + u_2 \dots \dots \dots (3.8)$$

Where  $u_1$  and  $u_2$  are error terms assumed to be uncorrelated, with zero mean and constant variance.

### 3.6 Data Type and Source

The study used time series data in the period 1970 to 2012. Data on money supply outstanding, domestic credit, interest rate and broad money supply was obtained from the Central Bank of Kenya, while that of economic growth, investment and labour force proxied by population was obtained from various publications of economic surveys, Kenya National Bureau of Statistics and the ministry of labour.

### 3.7 Data Analysis

The process of data analysis was started with cleaning of data. This is a process by which data is checked for consistency in measurement. STATA software was used for the data analysis. Descriptive statistics were then carried out and linear relationships between the explanatory

variables using the correlation matrix were conducted. Autocorrelation test between the dependent variables and the residuals was carried out using Durbin Watson d-statistic and this was then followed by unit root tests to appraise the effect of shock and to avoid spurious regression related to non-stationary variables by using Augmented Dickey Fuller test (ADF) statistics.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND INTERPRETATION**

#### **4.1 Introduction**

The chapter presents findings of data analysis and their interpretations. It commences with the trending of the variables and the descriptive statistics. The chapter further provides a time series analysis such as correlation analysis, unit root tests among other tests upon which regression analysis was carried out to give reliable estimates.

#### **4.2 Response rate**

The study used time series data in the period 1970 to 2012. Data on money supply outstanding, domestic credit, interest rate and broad money supply was obtained from the Central Bank of Kenya, while that of economic growth, investment and labour force proxied by population was obtained from various publications of economic surveys, Kenya National Bureau of Statistics and the ministry of labour.

#### **4.3 Descriptive Statistics**

Table 4.2 gives the summary statistics of the main variables that have been included in the model including: minimum, maximum, mean, standard deviation, coefficient of variance, skewness, kurtosis and percentile values. Mean is used to locate the center of the relative frequency distribution. Additionally, standard deviation gives the spread or dispersion in a series, whereas skewness is a measure of negative or positive symmetry of a distribution of a series around its mean, and kurtosis is the peakedness of the distribution.



**Table 4.1: Descriptive Statistics Results**

Variable	Money Supply (Ksh)	Economic Growth (Ksh)	Labour Force	Interest Rate	Money Supply Outstanding (Ksh)	Investment (Ksh)	Domestic Credit (Ksh)
Mean	2.96E+11	8.26E+11	50.164	16.1781	1.29E+11	1.24E+11	3.02E+11
Median	6.95E+10	8.22E+11	48.7728	14.395	2.68E+10	4.27E+10	8.66E+10
Minimum	3.51E+09	2.54E+11	46.9983	9	1.16E+09	4.01E+08	3.10E+09
Maximum	1.74E+12	1.61E+12	54.9903	31.11	7.87E+11	7.01E+11	1.77E+12
Std. Dev.	4.29E+11	3.55E+11	3.19624	6.0548	1.86E+11	1.79E+11	4.22E+11
C.V.	1.44794	0.430114	0.063716	0.374259	1.44264	1.43549	1.39803
Skewness	1.87928	0.436739	0.385404	0.951922	1.8053	1.76863	1.92518
Ex. Kurtosis	2.90735	-0.63687	-1.57615	0.048466	2.93461	2.24834	3.34431
5% Perc.	3.87E+09	3.21E+11	47.0014	9	1.56E+09	6.03E+08	4.09E+09
95% Perc.	1.47E+12	1.53E+12	54.8794	29.509	6.07E+11	5.91E+11	1.48E+12

**Source: Research Findings**

The results showed that economic growth as measured by GDP has a mean of Ksh826,000,000,000 with a minimum of Ksh254,000,000,000 and maximum of Ksh1,610,000,000,000, skewness of 0.4367 and kurtosis of -0.6369. Points at positively skewed and flat peaked distribution owing to the time series nature of GDP with its incremental growth; more than half of the annual GDP data exceeded Ksh826,000,000,000. Comparatively, money supply outstanding has a mean of Ksh129,000,000,000, minimum of Ksh1,160,000,000, maximum of Ksh787,000,000,000 and kurtosis of +2.934. However, money supply has a mean of Ksh296,000,000,000 with a minimum of Ksh3,510,000,000 and maximum of Ksh1,740,000,000,000, skewness of 1.879 and kurtosis of +2.907. This portray that the Kenyan Government borrowed a lot of money from the market, domestic debt, in its open market operations in order to fund its project and stabilize inflation.

Analysis of skewness shows that all the regressors are positively skewed; only labour force and economic growth had near normal distribution with skewness values of 0.385 and 0.437

respectively. Additionally, domestic credit was highly peaked (leptokurtic distribution) given a kurtosis value of 3.344. Money supply, investment, economic growth, labour force, interest rates and domestic outstanding debt had flatter peakedness.

The graphs in Appendix I show that none of the series looks stationary in levels; their general trend is upward apart from interest rate that trends upward before trending downwards from 1998. The differences of interest rates, economic growth and domestic outstanding debt do look stationary in their first order (Appendix II). There are no trends in the differences and all are centered about zero. Domestic credit, investment and money supply become stationary at second order differencing while labour force become stationary at third order differencing.

#### 4.4 Correlation of Analysis

Though the descriptive analysis on which equation was more able to yield better results and highlighted on possible problems to encounter, there was need to enhance statistic with a more insightful quantitative analysis such as the correlation matrix. Correlation matrix is an important indicator of a linear association of the explanatory variables and helped in determining the strengths of association in the model, that is, which variable best explained the relationship between economic growth and its determinants. It also helped in deciding which variable(s) to drop from the equation.

**Table 4.2: Correlation Matrix**

<b>Economic</b>	<b>Money Supply</b>	<b>Labour Force</b>	<b>Interest Rate</b>	<b>Money supply</b>	<b>Investment</b>	<b>Domestic Credit</b>	
1.0000	0.8959	0.9245	0.3552	0.8870	0.9045	0.8967	Economic
	1.0000	0.8285	0.1125	0.9840	0.9952	0.9972	Money
		1.0000	0.3573	0.8378	0.8301	0.8305	Labour
			1.0000	0.0946	0.0970	0.1650	Interest
				1.0000	0.9725	0.9816	Domestic
					1.0000	0.9882	Investment

						1.0000	Domestic Credit
--	--	--	--	--	--	--------	-----------------

**Source: Research Findings**

From the Table 4.2, it can be deduced that there was a positive correlation between the regressors and economic growth. Domestic outstanding debt has a Pearson correlation coefficient of 0.8870 ( $p < 0.001$ ) pointing to a good linear association between money supply and economic growth. Similarly, other explanatory variables had good linear relationship with economic growth: money supply (0.896), labour force (0.925), investment (0.905) and domestic credit (0.897). Interest rate had a low linear relationship with economic growth given a Pearson linear coefficient value of 0.355. However, apart from interest rate, other regressors had a good linear relationship among themselves pointing to multicollinearity among themselves.

#### **4.4.1 Time Series Property of Data**

The study sought to determine the time series property of the data in order to establish if it is autocorrelated or its autoregressive property. This was done in order to change the variables to stationary as a key assumption in multiple linear regression analysis and other inferential statistics. Besides, working with highly collinear variables would yield spurious results from which further inference is insignificant. Thus, unit root tests were done using Augmented Dickey Fuller tests. The time series plots of individual variables at levels and when differenced were also conducted. KPSS tests were also done to test the null hypothesis that the variables were stationary around a deterministic trend. The results appended in Appendix I to V.

Table A-1 in the appendix shows that none of the variables were stationary at levels. The study, thus, accepted the unit root null hypothesis indicating the presence of a unit root at levels and then proceeded to employ differentiation approach to establish the order of integration of the

variables using the KPSS tests. All the variables were differenced to arrive at a stationary level as shown in Table A-2. From the Table, stationarity was achieved after differencing money supply, money supply outstanding, investment and domestic credit. Thus, the variables of the model are integrated to higher order to achieve stationarity.

The study proceeded to estimate the number of the co-integrated equations using Johansson and Julius (1992) procedure involving eigenvalue and trace test. This provides evidence for the long run stability of the system and further validates its efficiency for prediction, forecast and policy recommendations. The result of the co-integration test is presented in Appendix V.

The co-integration result using Johansen Rank Test for the effect of money supply on the Kenyan economic growth as shown in Appendix V reveal a six co-integrating equations in the system and variable of concerned depicts a common trend characteristics. Hence there is a long-run stability relation between money supply and economic growth. Consequently the study went further to conduct an ordinary least square estimation to determine the extent of the relationship between money supply and economic growth.

#### **4.4.2 Cointegration Analysis Results**

The concept of cointegration implies that if there was a long run relationship between two or more non-stationary variables, deviation from this long path were stationary. Engel-Granger (1987) two step procedure was used to test for cointegration. The first step is to estimate a long run equation using Ordinary Least Square Method (OLS) with variables in their level. The second step is to generate residuals from the long run equation and testing for their stationary using the Augmented Dickey fuller test (ADF). The results of the tests are as shown in Appendix III and IV.

From appendix III, testing the unit root for the individual variables, show p-values that were greater than 0.05. Therefore, the study could not reject the unit-root hypothesis for the individual variables. This means that the variables were cointegrated. A p-value of 0.7645 was established in step 9 which tests the unit root for OLS regression residuals in in uhat. Thus, unit-root hypothesis is not rejected for the residuals (uhat) from the cointegrating regression.

#### 4.4.3 Diagnostic Tests

Diagnostic tests determine the goodness of the error correction model. Thus, the regression model was preceded by diagnostic tests presented in Table 4.3. The diagnostic tests included: Durbin Watson (DW) test Autoregressive Conditional Heteroscedasticity (ARCH), Breusch-Pagan test for heteroskedasticity and White Heteroskedasticity Test (LM) for constant variance of residual over time, and cumulative sum control chart (CUSUM) test for parameter stability. CUSUM test was important in detecting changes the model which is time series which might be occasioned by change in exigencies such as governmental policy.

**Table 4.3: Diagnostic Tests**

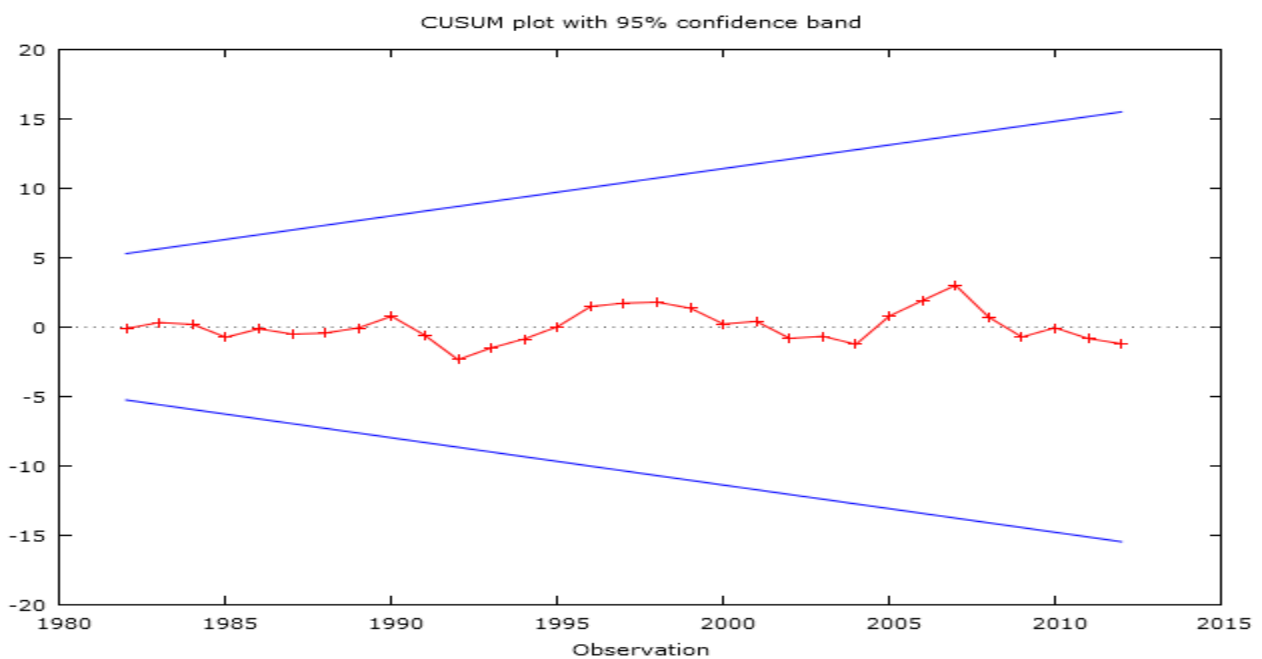
Type of Test	Co-efficient	Probability
Ramsey RESET Test:	F(1, 30) = 0.196061	
F-Statistics	0.196061	0.661095
White Heteroskedasticity Test (LM):		
F-statistics	38.5528	0.311994
ARCH Test:		
F-statistics	8.76552	0.11879
Breusch-Pagan Test for Heteroskedasticity LM Test:		
F-Statistics	9.38326	0.226298
CUSUM test for parameter stability		

T-Statistics	-0.221477	0.82622

**Source: Research Findings**

Table 4.3 shows that the parameters of the regression analysis were stable and the model can be used for forecasting. CUSUM test presented in Figure 4.6 shows that there was no structural breaks in the relationship within the 42 year period.

**Figure 4.1: CUSUM Test**



**Source: Research Findings**

#### 4.4.4 Error Correction Model Results

The estimation procedure in this study draws on the recent development in co-integration analysis and the error correction model (ECM) that have been used to explore several economic phenomena. Central to this approach is the determination of the time series properties of the variables. At this stage, the idea is basically to ascertain the number of times a particular variable has to be differenced to arrive at stationary, and to determine the order of integration of the series

to be used. The purpose is to overcome the problem of spurious estimates often associated with non-stationary macroeconomic time series data and to generate a possible feedback effect as well as valuable long-run relationship between the regressed and explanatory variables simultaneously.

**Table 4.4: Error Correction Model Results**

Variables	Coefficients	Standard error	T statistics	P-value
Money supply outstanding	0.0792775	0.103760	0.7641	0.0451**
Domestic Credit	-0.0540747	0.117172	-0.4615	0.6477
Interest Rate	-4.49903e+08	1.57640e+09	-0.2854	0.7772
Money supply	0.183928	0.248822	0.7392	0.0465**
Investment	0.275135	0.305303	0.9012	0.0374**
Labour force	-4.30059e+010	2.04424e+010	-2.104	0.0436**
ECM (-1)	1.33015e-02	4.62161e-03	0.0878	0.072
Constants	5.86777e+09	8.37610e+09	0.7005	0.4888
Number of observations = 39 F(7, 31)= 3.734875 Probability>F = 0.004812 R-squared = 0.4575 Adjusted R –square = 0.3350 Log-likelihood = -973.5041 Akaike criterion = 1963.008 Schwarz criterion = 1976.317 Hannan-Quinn = 1967.783 rho = 0.291350 Durbin-Watson = 1.416170				

**Source: Research Findings**

The equations in Table 4.4 represents the over parameterized model for money supply and economic growth in Kenya. An R-square coefficient of 45.8% was established. The adjusted R-square result explains over 33.5% systemic changes in the model. Thus, the explanatory power of the model shows that over 33.5% of the total changes in economic growth rate are explained by the included exogenous variables. Durbin-Watson value of 1.4162 was established. The Durbin Watson statistics, thus, indicates insignificant autocorrelation in the regression model.

Apart from domestic credit, interest rate and labour force other variables indicates a positive relationship with economic growth.

Holding other factors constant while increasing: money supply outstanding by one unit would lead to a 0.07928 ( $p = 0.0451$ ) increase in economic growth; money supply by a unit would lead to 0.1839 ( $p = 0.0465$ ) increase in economic growth; investment by a unit would lead to 0.2751 ( $p = 0.0374$ ) increase in economic growth; and, labour force by one unit would lead to a 43 billion ( $p = 0.0436$ ) decrease in economic growth. The result of the error correction term implies a significant mechanism of adjusting the system back on in equilibrium part at an adjustment of speed of 1.3 percent within on annual bases in periods of disequilibrium. Thus, this is a moderate speed of adjustment.

#### **4.5 Size of Money supply**

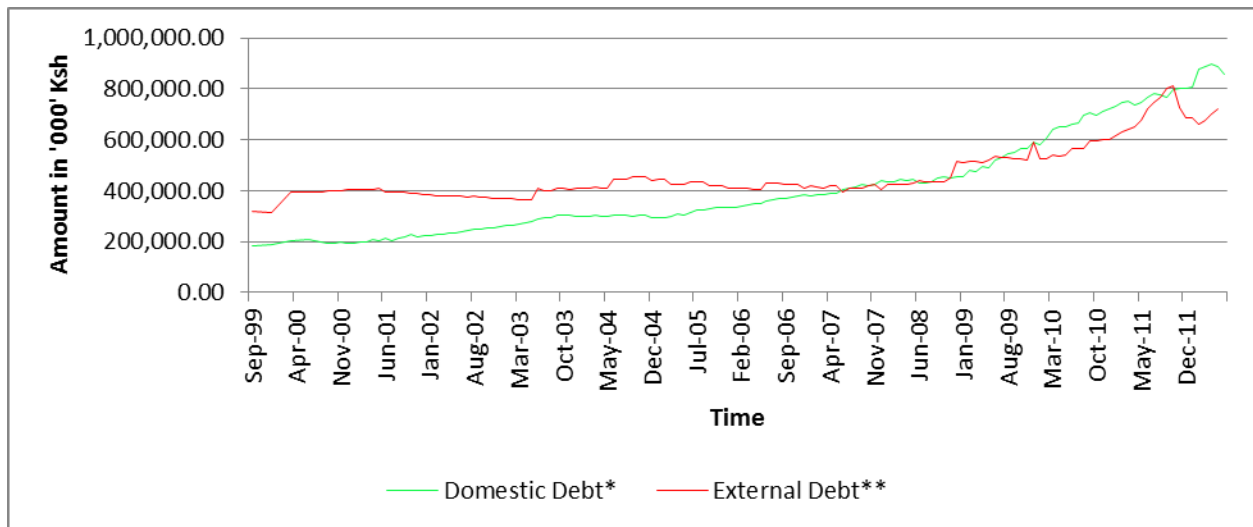
Kenya's money supply has been increasing significantly over the period under review. Data presented in Appendix VII shows that the period between 1990 and 1999 saw a significant increase in public debt from 121.5 billion in 1990 to 564.3 billion in 1999. Additionally, from 2000, money supply has been on the increase rising to Ksh800 billion in 2012 from Ksh206 billion in 2000. The figure further shows that generally, money supply incline has assumed a gradient of Ksh10 billion over the years.

Figure 4.7 which related domestic to external debt shows an increase in the preference of money supply to external debt in financing government programmes. Increase in money supply preference is more evident from the start of 2002, probably owing to change of regime; from dictatorial Moi to a more democratic Kibaki government that had the trust of the people. This could also owe to reforms in the financial market whereby CBK relaxed reserve requirements that restricted commercial banks' ability to expand bank credit and engage in treasury bonds and



bills activities including lending money to citizens. External debts (from sources as bilateral and multilateral or supranational organizations, foreign commercial banks such as concessional loans, and export credit), however, stagnated from 2000 to 2009 and increasing at the same gradient as money supply thereafter owing to infrastructure investment.

**Figure 4.2: Domestic and External Debt to Total Debt Ratio**



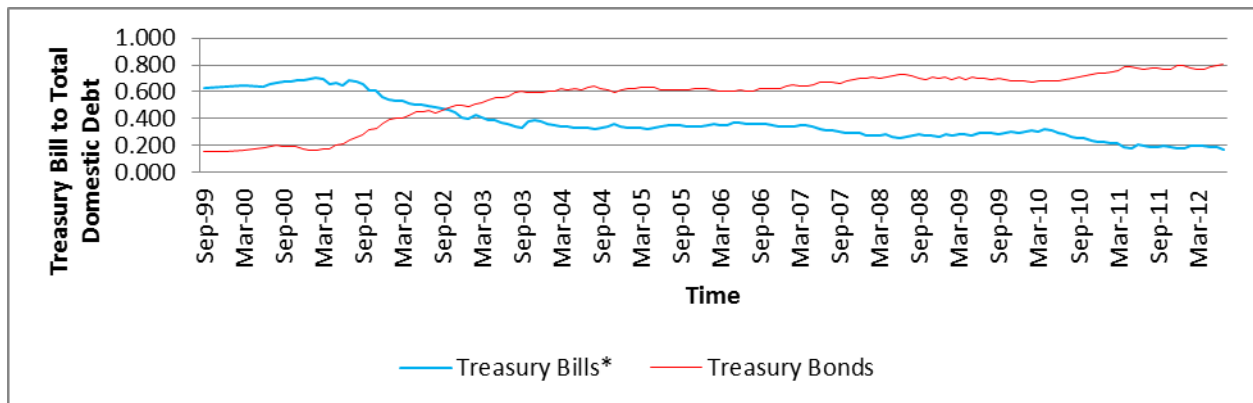
**Source: Research Findings**

#### 4.6 Nature of Money supply

As presented in Appendix VIII, the Government borrows from the domestic market using treasury bills and bonds, government stocks, overdraft at CBK and advances from commercial banks, securities, overdrafts at the Central Bank of Kenya and advances from commercial banks. Securitised public money supply comprises of all government borrowings through treasury bonds, treasury bills held for fiscal and monetary policy purposes, and government long-term stocks. Appendix VIII further shows that the greatest portion of Kenya's money supply market is in form of short-term and long-term instruments; Treasury Bills and Bonds respectively. Initially, before 2002 as shown by Figure 4.8, the greatest portion of money supply in Kenya was highly

short term which made it expensive to service. However, since 2002, the proportion of Treasury Bonds to Bills has been increasing quadrupling by 2012; from a ratio of 19: 70 in 2000 to 80: 16 in 2012.

**Figure 4.3: Treasury Bills to Total Money supply**



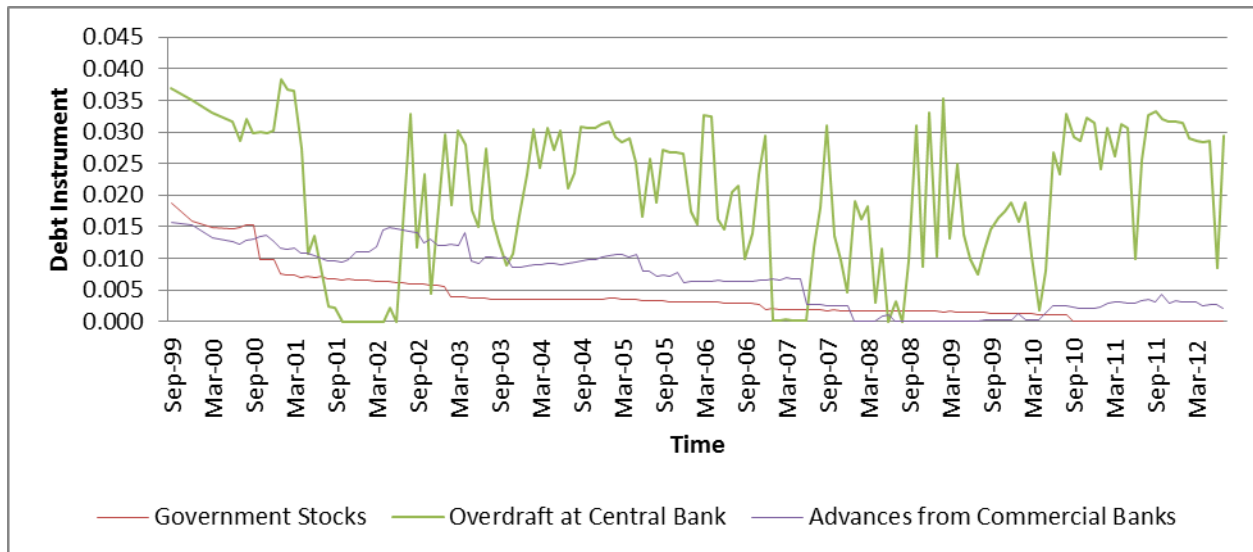
**Source: Research Findings**

Figure 4.3 shows that among the money supply instruments, Government borrowing through overdraft at CBK has been the most erratic. The reduction and fluctuations in utilisation of the overdraft facility was not only due to improved fiscal discipline but also due to amendment of the CBK Act Section 46(3) to limit the overdraft level to 5 percent of the latest audited ordinary government revenue (Republic of Kenya, 2009). As at the end of 2007, therefore, the maximum overdraft the government could utilize was Ksh 13.3 billion as compared to 1999 and early 2000s when ratio of overdraft to total money supply averaged 3.5%.

Figure 4.3 also shows that advances from commercial banks and government stocks have declined over time. Advances from commercial banks were high between 1990s and 2007 slightly decreasing from 1.6% of total money supplies to 0.65%. Between 2008 to June 2010, advances from commercial banks were zero before rising to an average of 0.3% afterwards.

Similarly, government stocks decreased from 1.85% of total money supply to 0.4% in March 2003. It then leveled between 0.4% and 0.1% of total money supplies in September 2010 before assuming a null value afterwards.

**Figure 4.4: Domestic Instruments - Government Stocks, Overdraft at Central Bank, Advances from Commercial Banks**



**Source: Research Findings**

#### 4.7 Reforms in Money supply

The reforms in Kenya's money supply market have taken several forms especially since 2002; from market structure to institutions dealing with debt management and composition of long to short-term debt. Debt management rests on a Medium Term Debt Strategy (MTDS) that informs debt management. As explained in Figure 4.7, money supplies holdings have surpassed external debts since 2007. This structure of the holding is consistent with the debt strategy of holding more money supply to minimize refinancing risk and promote development of domestic markets for Government debt.

The Government also sought to lengthen the maturity of money supply to minimize rollover risk and reduce borrowing costs associated with short term debt. For example, as shown by Figure 4.8, money supply ratio improved in favour of bonds to bills from 65: 30 in 2007 to 70: 30 in 2008 and 80: 16 in 2012. In 2000, the ratio was 19: 70; treasury bonds comprised the largest proportion of securitized debt from September 2002.

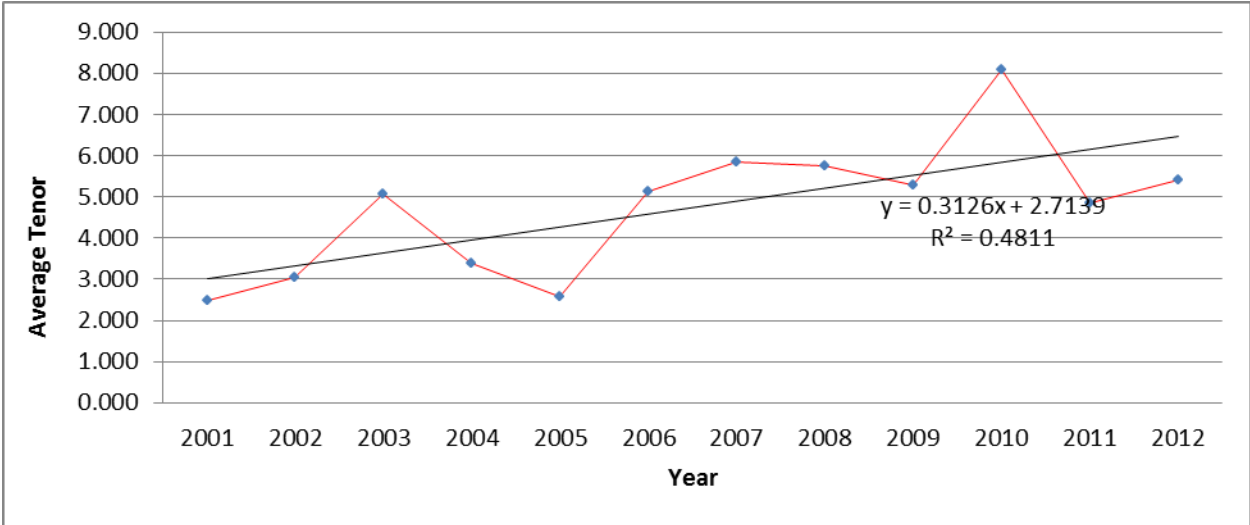
The shift in the composition of money supply in favour of the longer dated instruments followed a deliberate government initiative in May 2001 to restructure public money supply and develop the money supply markets. This was to restructure money supply from the short-dated Treasury Bills to the long-dated Treasury Bonds in order to minimise the risks of short-term borrowing, refinancing risks, cost of borrowing, as well as develop a secondary market for government securities. It was envisaged that the secondary market for government securities would promote financial resource mobilization for both the public and private sector through the financial market. Development of this market has since enabled issuance of other tradable instruments by the private sector especially corporate bonds. Successes in lengthening the maturity of money supply over the past 11 years has made the average maturity profile of outstanding Government securities to increase from 0.8 years in 2001 to 3.9 years in 2012.

The proportion of 91-day treasury bills in outstanding government securities decreased from 68.1% in June 2001 to 6.1% in 2011 while 182-day treasury bills increased from 4.3% to 19.7% in the period (Maana, Owino and Mutai, 2008). Similarly, as shown in Appendix VIII, treasury bonds with tenors of five years and above increased from 2.7% to 47.8% during the period while the longest tenor for existing bonds increased from five to 15 years. Consistent with its debt management strategy, in June the government issued a 20-year bond and 25-year bond in 2010.

Figure 4.10 shows that the average tenor structure of treasury bonds issued annually has been on the incline assuming a gradient of 0.3126.

The issue of longer-dated treasury bonds during the period was important for institutional investors such as pension funds and insurance companies for matching their long-term liabilities with long-term assets (Maana, 2008). Besides, the success of the government bond programme during the period was largely attributed to reforms in pensions and insurance sectors, which required that a specific part of their investment must be in government securities. Additionally, their popularity was also an indication of the confidence that investors have in the government securities market. The shift in the composition of money supply portfolio by instrument in favour of Treasury bonds, as shown in Figure 4.8, resulted in a tremendous increase in the value of Treasury bonds traded at the Nairobi Stock Exchange (NSE) from Ksh 14.1 billion in the year 2001 to Ksh 85.3 billion in 2007 and Ksh652.19 billion in 2012.

**Figure 4.5: Average Tenor**



**Source: Research Findings**

The shift in composition of money supply affected the proportion of overdraft. The proportion of government overdraft at the Central Bank of Kenya in the overall money supply dropped from 20 percent to low levels (Figure 4.9).

#### **4.8 Summary of the Findings and interpretations**

This study sought to provide answers to the question, what are the effect of money supply on the gross domestic product in Kenya. The analysis of the result shows that the money supply determinants accounted for over 80 percent changes in money supply as result of the variations in the determinant factors. The R-squared result of over 78 percent variation in money supply contributed by changes in the determinant variables also confirms the R-squared result. The F-statistic (42) confirms the statistical significance of the model and further signifies that the model is statistically different from zero and thus will be useful for economic analysis and decision making as also revealed by the F. probability result. The empirical evidence arising from the Durbin Watson statistics indicates evidence of positive autocorrelation of the variables that constitutes the model specification. The study further reveals that all the variables used except economic growth, were significant determinants of money supply in Kenya. The analysis of economic growth rate and money supply at 5 percent level of significance reveals that economic growth does not significantly support money supply and thus establishes a negation relation with money supply. This also indicates that economic growth reduces money supply in the economy. As could be seen from the analysis a one percentage growth rate of the economy reduces money supply by 0.38 percent and therefore conforms to a priori expectations. Private credit has an inverse relationship with money supply. This result of the empirical analysis shows that increase private sector credit decreases money supply incurred by the government. Increase in private

sector credit helps in mobilization of funds for investment and growth thereby increasing tax revenue. This reduces the chances of running into debt by private and government investors.

Private sector credit is not only statistically significant as a determinant of money supply but also is applicable to the a priori expectation. A percentage increase in private sector credit has a decreasing impact of over 0.18 percent on money supply. A further investigation on foreign exchange reveals that a 1 percent increase in exchange rate would significantly increase money supply by a corresponding rate of 17 percent all things being equal.

This implies that the cost of unit of import would be higher forcing government to borrow more to import the same item. Foreign exchange rate determinant is therefore statistically significant and in line with economic theories. Broad money supply exhibits a positive relationship with money supply and although statistically significant does not conform to a priori expectation. Money supply when endogenously determined is supposed to create more goods and services to the economy and through its multiplier and accelerator principles increase productivity and cause reduction in debt burden. Instead increase in money supply is found to increase money supply by approximately 0.2 percent. This is not farfetched as can be ascertain to be majorly caused by exogenously determined factors of money supply outside the control of the monetary authorities. The predominance of these factors including illegal economic activities that takes place under ground induce inflationary pressures and devaluation on the naira currency.

This hinders proper economic growth and henceforth encourages borrowing for investment projects most times. Finally, fiscal deficit significantly reduce money supply as we can deduce from the study. An increase of one percentage in government fiscal deficit reduces money supply by 0.89 percent. The government fiscal deficit in this study is statistically significant and

goes contrary to theory but may be explained by government resort to inflationary financing, drawing down on foreign reserve, borrowing abroad or by the fact that period of study coincides with when Kenya received debt relieve from the Paris club.



## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

#### 5.1 Summary

This chapter provides the summary of the study findings, conclusions and recommendations based on the study findings. The study investigated the effect of money supply on the gross domestic product among other variables. Time series properties of the data variables were investigated to ensure that reliable results were obtained. Correlation matrix showed that the variables were highly correlated at level; however, the problem was solved by using the correct lag lengths and differencing of variables.

the level of savings in developing countries is usually too low due to low income, and as a result, there is need of external resource to compliment domestic resource. This shifts the focus as to whether foreign resources are useful to developing countries or as to how adequate they are assisting these economies realize their growth potential. The study also concluded that in “the short run, effectiveness of external resource depends on their use to relieve their skills, savings and imported commodities” while the long run fate of the nation depends on the use that is made the initial increase in the output.

The study also supports the two- gap approach and that foreign aid crowds out investments. This can occur if recipient governments in coming up with counterpart funds to match aid inflows by borrowing from the banking system, making credit scarce. The long run model indicated that money supply outstanding, domestic credit, interest rate and money supply were all significant while investment and labour force were insignificant. Additionally, all the variables except investment were insignificant in the short run. The speed of adjustment of the short run model to the long run equilibrium is slow, indicating slow adjustment to the equilibrium.

## 5.2 Conclusion

The study concludes that the effect of money supply is always harmful to the economy as depicted by the study. Over the period under investigation, domestic credit was on the rise, leading to increase in the money supply outstanding. For instance, the coefficients of money supply outstanding and domestic credit were found to be statistically significant with a positive contribution to economic growth both in the short run and long run model. This phenomenon indicates that debt is not always harmful to growth of output of an economy.

After independence, Kenya embarked on growing its economy through prudent policies in education, trade, and investment money supply kept on rising with a relative increase in economic growth. The formulation and implementing the vision 2030 has led to expansion of infrastructure and social amenities in turn led to massive expansion and investment multiplier effect in other sectors in spite of increasing debts. This phenomenon is supported by Laffer curve in the literature review indicates that Kenyan economy debt has not reached a maximum debt burden that is unsustainable. Increase in money supply leading to increased money supply outstanding is not always harmful to the economy as depicted by both short run and long run equilibrium model.

The implementation of the Vision 2030 by the Kenyan government among other development policies has increasingly pushed the government to increase its domestic borrowing. However; growth in GDP from such projects has a positive investment multiplier to other sectors leading to growth in output.

### **5.3 Policy Recommendations**

Debt management rests on a Medium Term Debt Strategy (MTDS). Kenya lacks a money supply management policy to guide both the institutional and systemic frameworks for debt management between the ministry of finance and the CBK; the country does not have a Debt Management Policy. The major policy recommendations are as follows ;Government should maintain a debt bank deposit ratio below 35 percent and resort to increase use of tax revenue to finance its projects as it is our belief that tax revenue is far from the optimum. Government should divest itself of all projects which the private sector can handle including refining crude oil (petroleum product) and transportation but should provide enabling environment for private sector investors such as tax holidays, subsidies, guarantees and most importantly improved infrastructure.

Aggregate supply and demand do not balance out at an equilibrium that delivers full employment. The solution is to use budget deficits to increase overall investments by way of public investment. Public investment would comprise of public works. This would in turn create jobs thus creating increased purchasing power leading to increased economic growth. A country would benefit more from access to more lending than reducing an existing obligation in terms of the impact on investment to GDP ratio. This suggests that in order to maximize on productive investment, debt reduction plan needs not be accompanied by additional foreign lending.

The study established that the mounting volume of public debt is a necessary feature of a strong and healthy financial structure of an economy. Therefore some secular increase in the public debt should be planned by every government of a market oriented economy. However, it appears that as government plans a long term increase in debt, the volume of public debt has tended to

increase in response to compulsions of the moment. Government should maintain a proper balance between short term and long term debt instruments in such a way that long term instruments dominate the debt market. Even if the ratio of the long term debt is a multiple of deposit, the economy can still accommodate it so long as the proceed is channeled towards improving Kenyan investment climate.

#### **5.4 Limitations of the Study**

A major limitation of the study is the problem of data reliability. Different data sources give different data for the same variable.

Other variables that gross domestic product exist apart from those considered in the model specification. The study recommends other studies to expound on the study findings.

According to the study, the key is the cost of debt servicing which includes the repayment of principal and interest due on the loan. Thus, borrowing arising from increased government expenditure on development programmes is justified without generally an additional income to finance. Formulated the following equation to establish the relationship between the unanticipated component of money supply and growth.

#### **5.5 Suggestions for Further Research**

It is inevitable that developing economies such as Kenya could avoid debt in their development agendas. Debt is not always bad. The policy implication deduced from the study is that the Kenyan Economy is yet to reach a debt burden state therefore current public money supply is sustainable.

Policies aimed at attracting internal investments and increasing development support, and domestic credit is critical in this fragile political moments. In the process of doing this, it is critical for the Kenyan government to avoid such supports that have high interest rates as that would be a cost to the Kenyan people and would also impact negatively to economic growth. The a positive coefficient between economic growth and money supply would suggest that increased money supply leads to an increase in economic growth. However, financing of development projects by such means should be done very cautiously as increased money supply has inflationary trends.

An increase in population as proxied for labour force shows a negative contribution to economic growth. Benefits of increased population such ready market for produced goods and services; availability of cheap labour among others has a negative significant contribution to economic growth. This pushes the government to channel productive resources that could be used in development projects to provision of public goods and services. Therefore, policies aimed at population control that the government has continued to promote are recommended by this study.

## REFERENCES

- Abass S.M and Christensen J. E, (2007); “The Role of money supply Markets in Economic Growth: An Empirical investigation for low income countries and emerging Markets” International Monetary Fund.
- Allison, J (2001); Key Issues for Analyzing Money supply Sustainability: Debt Relief international Publication 5.ISBN:1-903971-07-1.
- Barro, R,J (1980a); Federal Deficit Policy and the Effect of Public Debt Shocks’, *Journal of Money, Credit and Banking, Vol 12*, pg745-62.
- Baum, A., Checherita-Westphal, C., & Rother, P. (2012). Debt and growth: New Evidence for the Euro Area. *ECB Working Paper No. 1450*, July.
- Borensztein, E. (1990); Debt overhang, debt reduction and investment: The case of Philippines IMF working paper No. WP/90/77, September
- Central Bank of Kenya (1996);”Banking Act, Revised Version for 1996” Central Bank Of Kenya
- Central Bank of Kenya (2011). *Government Revenue and Expenditure*. Nairobi: Government Printer.
- Checherita-Westphal, C., & Rother, P. (). The Impact Of High And Growing Government Debt On the gross domestic product: An Empirical Investigation For The Euro Area.
- Cherney (1979); “Structural change and development policy” Oxford University press
- Christensen, J. (2004); money supply market in sub Saharan Africa. IMF working paper WP/0646

- Classen, S. (1996); "Analytical aspects of the debt problem of heavily indebted poor countries"  
A paper presented to IMF/World Bank.
- Cohen, D (1993); "low investment and large LDCs debt in the 1980s". Washington D.C The  
American Economic review ,June
- Cunningham, M. (1993). The Research Process, as quoted in Understanding Reliability and  
Validity in Qualitative Research. *The Qualitative Report Volume 8*
- Defege, B. (1992); "Growth and Foreign Debt: The Ethiopian experience: 1964-1986" AERC  
Research paper No.13, Nairobi: AERC.
- Dolan, E.G., & Lindsey, D.E. (1991). *Macro Economics, 6<sup>th</sup> Edn.* Chicago: The Dryden Press.
- Engle, R.F., & Granger, W.J. (1987). Co-integration and Error Correction. Representation,  
Estimation and Testing, *Ecomometrica*, 55, 251-276.
- Gay, K. & Airasian, J. (2003). *Financial intelligence: manager's guide to knowing what the  
numbers really mean.* Boston, MA: Harvard. Business School Press
- Gragner, C.W.J. (1969) 'investigating casual relations by Econometric models and cross spectral  
methods, ' *Econometrica Vol.37*, pp 424-438.
- Gragner, C.W.J. (1969) 'investigating casual relations by Econometric models and cross spectral  
methods, ' *Econometrica Vol.37*, pp 424-438.
- Gurley J.G. and Shaw E.S. (1956); Financial Intermediaries and the Saving-Investment process.  
J. Finance, May11 (2):257-276.
- Hagist, C., Moog, S., Raffelhuschen, B., & Vatter, J. (2009). Public Debt and Demography - An  
International Comparison Using Generational Accounting. *CESifo DICE Report*, 7(4),  
29-36.

- Hanson, J. A. (2007); the growth in government domestic: Changing Burdens and risks, World Bank Policy working research Paper WPS4348.
- Herndon, T., Ash, M., & Pollin, R. (2013). Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff. *Political Economy Research Institute Working Paper no 322*, April 2013.
- Ikiara, G., Olewe, N., & Odhiambo, W. (2004). *Kenya: Formulation and Implementation of Strategic Trade and Industrialization Policies*. IDRC/CRDI, South Africa.
- IMF(2003).”Kenya: 2003 Article IV Consultation. *Staff Report; Staff supplement; Public Information Notice on the Executive Board Discussion; and the Statement by the Executive Director for Kenya*.” Washington, D.C: International Monetary Fund.
- Khan, S. and Bjeler, M (1984);”Governemnt policy and private investment in developing Countries,” IMF Staff papers Vol.31pp379-403.
- Khan, S. and Reinhart C.M (1990);Private Investment and economic growth in developing countries,’ Report World Development, Vol 18 No1 pp 19-27.
- King, R., & Levine, O. (1993). Finance and Growth: Schumpeter Might Be Right. *Quarterly Journal Of Economics*, 108(3), 717-37.
- Lancaster. C. and Wangwe, S. (2000); “Managing a smooth transition from aid dependence in Africa, *policy Essay No.28*, Published jointly by Overseas Development Council (ODC) and African Economic Research Consortium (AERC),Washington.
- Levine, R. and S. Zerros, (1998); “Stock Markets, Banks, and economic growth” *American Economic review*, Vol.88,-3, PP.537-88.
- Levine, R., N. Loyaza, and T.Beck (2000); ”Financial intermediation and growth: Casuality and cause,” *Journal of monetary economics*, Vol 46-1,pp.31-77

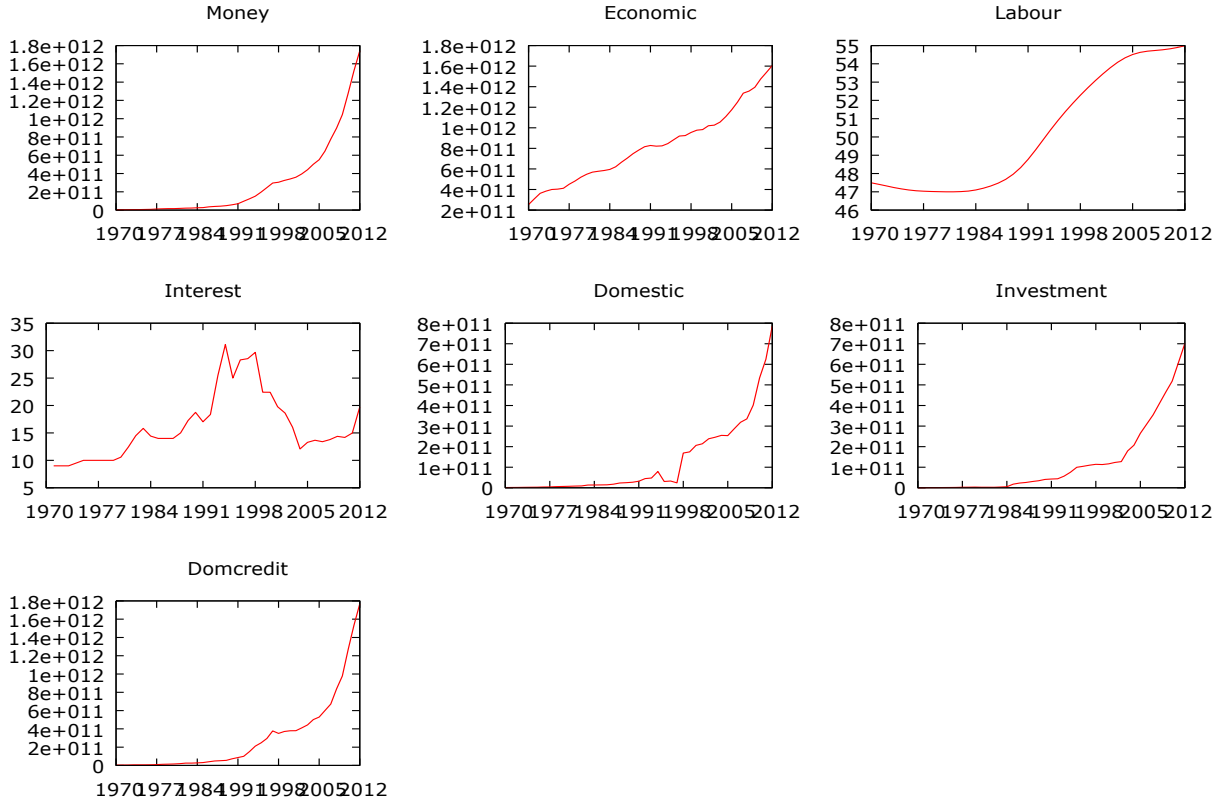


- Lipsey, R.G. (1986); Economics, New York Harper and Row
- Lucas, A. F. (1988). Total Public Debt and Growth in Developing Countries. *European Journal of Development Research*, 24(4), 606–626.
- Maana, I. (2009). Compilation and analysis of data on securitised public debt in Kenya. *Irving Fisher Committee (IFC) Bulletin No 31*,
- Maana, I., Owino, R., & Mutai, N. (2008). Money supply and its Impact on the Economy – The Case of Kenya. *Paper Presented During the 13th Annual African Econometric Society Conference in Pretoria*, South Africa from 9th to 11th July 2008
- Moki, M. (2012). An analysis of the relationship between public debt and economic growth in Africa. *Unpublished MBA Project*, University of Nairobi.
- Nurkse, R. (1953); Problems of capital formation, in Underdeveloped countries, New York: Oxford University Press, New York.
- O’Brein, F.S.O, and Terry C.I Ryan(2001); ”Kenya in Shantayanan, Devarajan, David R.Dollar, and Torgny Holmgren (eds): *Aid and Reform In Africa .Lessons from the ten case studies*” ,Washington ,DC., World Bank.
- Oshadami, O.L. (2006); The effect of money supply on Nigeria’s economic growth; .Unpublished Bsc. Project. Department of economics, Kogi State University, Anyigba, Nigeria.
- Panizza, U., & Presbitero, A.F. (2013). Public Debt and Economic Growth In Advanced Economies: A Survey. *Money and Finance Research Group Working Paper no. 78*, January 2013.
- Queientin, R. (1984); Nigeria and debt problems: Causes and solution: A paper presented at a conference organized by the United Bank of Africa, PLC, Lagos.

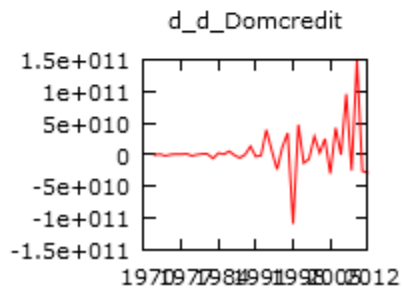
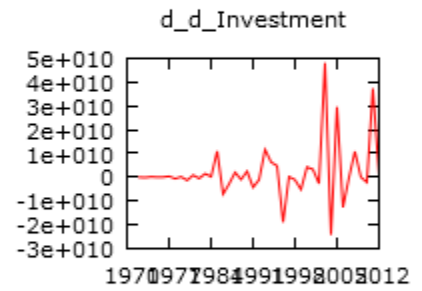
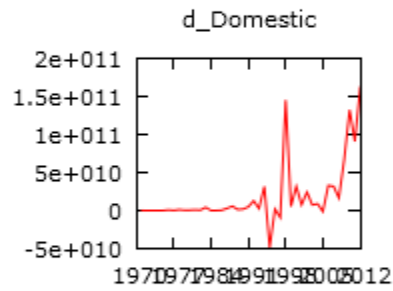
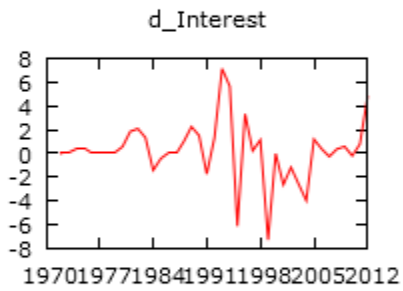
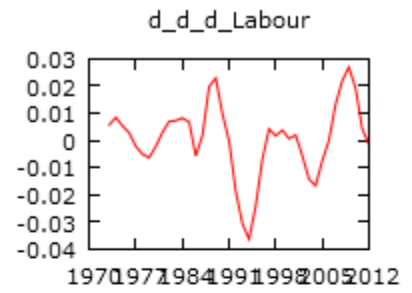
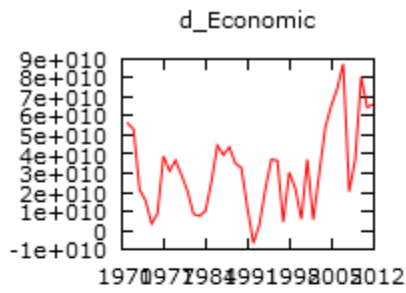
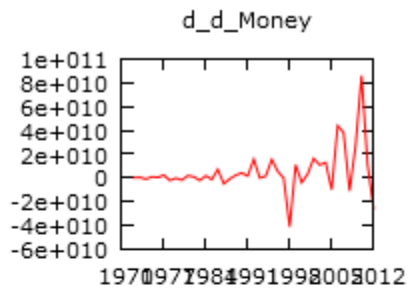
- Rebelo, G. (1991). Fiscal policy in an Endogenous Growth Model, *Quarterly Journal of Economics*, 107, 1243-1259.
- Republic of Kenya. (2009). *The Central Bank of Kenya Act Chapter 491*. Nairobi: Government Printer.
- Romer, K. S. (1986). Growth in a Time of Debt. *American Economic Review*, 100(2), 573–78
- Rostow, W.W (1985); *The stages of Economic Growth*, 2<sup>nd</sup> edition, London: Cambridge University Press.
- Sims, C. A. (1972) “Money income and causality” *American Economic review*, Vol.62, pp 540-552.
- Solow, H. (1956). *Creative Research: The Theory and Practice of Research for the Creative Industries*. New Delhi: AVA Publications
- Swamy G. (1994); “Kenya Structural Adjustment in the 1980’s: *World Bank Policy Research Working Paper 1238*. Washington D.C.
- Were M. (1997); “The Structure and Impact of External Debt on the gross domestic product in Kenya” 1970-1995. MA Thesis, Economic Department, University of Nairobi.
- World Bank (2003); “Kenya: A policy Agenda to Restore Growth.” *Country Economic Memorandum, Report No.25840*. KE. Washington, D.C
- World Bank (2004); *World Bank Development Indicators CD-Rom*. Washington. D.C: World Bank.
- World Bank and International Monetary Fund (2001); “Developing Government Bond Markets, a Handbook”. Washington, World Bank.

# APPENDICES

## APPENDIX 1: Time Series Plot at Levels



## Appendix II: Time Series Plots at Differences



### Appendix III: Cointegration Test

Cointegrating regression -  
 OLS, using observations 1971-2012 (T = 42)  
 Dependent variable: Economic

**Table A-1: Cointegration Test at Levels**

	<b>coefficient</b>	<b>std. error</b>	<b>t-ratio</b>	<b>p-value</b>
const	9.38155e+011	1.46112e+011	6.421	2.46e-07***
Money	0.266564	0.313783	0.8495	0.4015
Labour	-1.42980e+010	3.23083e+09	-4.425	9.42e-05***
Interest	8.41083e+08	1.20719e+09	0.6967	0.4907
Domestic	-0.0461068	0.119145	-0.3870	0.7012
Investment	0.700520	0.292459	2.395	0.0223**
Domcredit	-0.273332	0.213660	-1.279	0.2095

Mean dependent var	8.39e+11	S.D. dependent var	3.48e+11
Sum squared resid	1.37e+22	S.E. of regression	2.01e+10
R-squared	0.997232	Adjusted R-squared	0.996662
Log-likelihood	-1051.562	Akaike criterion	2119.123
Schwarz criterion	2133.025	Hannan-Quinn	2124.219
rho	0.582140	Durbin-Watson	0.834223

Step 9: testing for a unit root in uhat

Augmented Dickey-Fuller test for uhat including 3 lags of (1-L)uhat (max was 6)  
 sample size 35

unit-root null hypothesis:  $a = 1$

1st-order autocorrelation coeff. for e: 0.101  
 lagged differences:  $F(3, 31) = 5.760$  [0.0030]  
 estimated value of  $(a - 1)$ : -0.946945  
 test statistic:  $\tau_{ct}(7) = -5.18232$   
 asymptotic p-value 0.04708

**Table A-2: Cointegration at Differences**

	<b>coefficient</b>	<b>std. error</b>	<b>t-ratio</b>	<b>p-value</b>
constant	-3.90761e+09	4.15418e+09	-0.9406	0.3535
Money	0.676856	0.215499	3.141	0.0035***
Labour	8.28601e+09	1.43101e+010	0.5790	0.5664
Interest	-7.95215e+08	1.47611e+09	-0.5387	0.5936
Domestic	0.125915	0.0939723	1.340	0.1892
Investment	0.118369	0.257240	0.4601	0.6483
Domcredit	-0.270268	0.113789	-2.375	0.0233 **

Mean dependent var	2.42e+08	S.D. dependent var	2.07e+10
Sum squared resid	1.17e+22	S.E. of regression	1.85e+10
R-squared	0.320366	Adjusted R-squared	0.200431
Log-likelihood	-1023.664	Akaike criterion	2061.328
Schwarz criterion	2073.323	Hannan-Quinn	2065.696
rho	-0.095644	Durbin-Watson	2.182752

Step 9: testing for a unit root in uhat

Augmented Dickey-Fuller test for uhat  
including one lag of (1-L)uhat  
sample size 39  
unit-root null hypothesis:  $a = 1$

1st-order autocorrelation coeff. for e: -0.013  
estimated value of  $(a - 1)$ : -1.13737  
test statistic:  $\tau_c(7) = -4.79084$   
asymptotic p-value 0.04900

There is evidence for a cointegrating relationship if:

- (a) The unit-root hypothesis is not rejected for the individual variables.
- (b) The unit-root hypothesis is rejected for the residuals (uhat) from the cointegrating regression.

## Appendix IV: Stationarity Analysis

**Table A-3: Stationarity Analysis at Levels**

Variable	No of lags	Critical values at 10%	Critical values at 5%	Critical values at 1%	ADF	Order of Integration
Money Supply	1	0.352	0.472	0.721	1.5975	I(0)
Economic Growth	1	0.352	0.472	0.721	2.141	I(0)
Labour Force	1	0.352	0.472	0.721	2.084	I(0)
Interest Rate	1	0.352	0.472	0.720	0.7896	I(0)
Money supply Outstanding	1	0.352	0.472	0.721	1.6334	I(0)
Investment	1	0.352	0.472	0.721	1.6119	I(0)
Domestic Credit	1	0.352	0.472	0.721	1.6157	I(0)

**Table A-4: Stationarity Analysis at Differences**

Variable	No of lags	Critical values at 10%	Critical values at 5%	Critical values at 1%	ADF	Order of Integration
Money Supply	1	0.352	0.472	0.720	0.4173	I(2)
Economic Growth	2	0.352	0.472	0.721	0.45098	I(1)
Labour Force	3	0.352	0.472	0.721	0.4512	I(1)
Interest Rate	1	0.352	0.472	0.720	0.1202	I(1)
Money supply Outstanding	1	0.352	0.472	0.720	0.1936	I(2)
Investment	1	0.352	0.472	0.720	0.3626	I(2)
Domestic Credit	1	0.352	0.472	0.720	0.2864	I(2)

## Appendix V: Rank Test - Johansen Cointegration Test

Lag order = 1

Estimation period: 1972 - 2012 (T = 41)

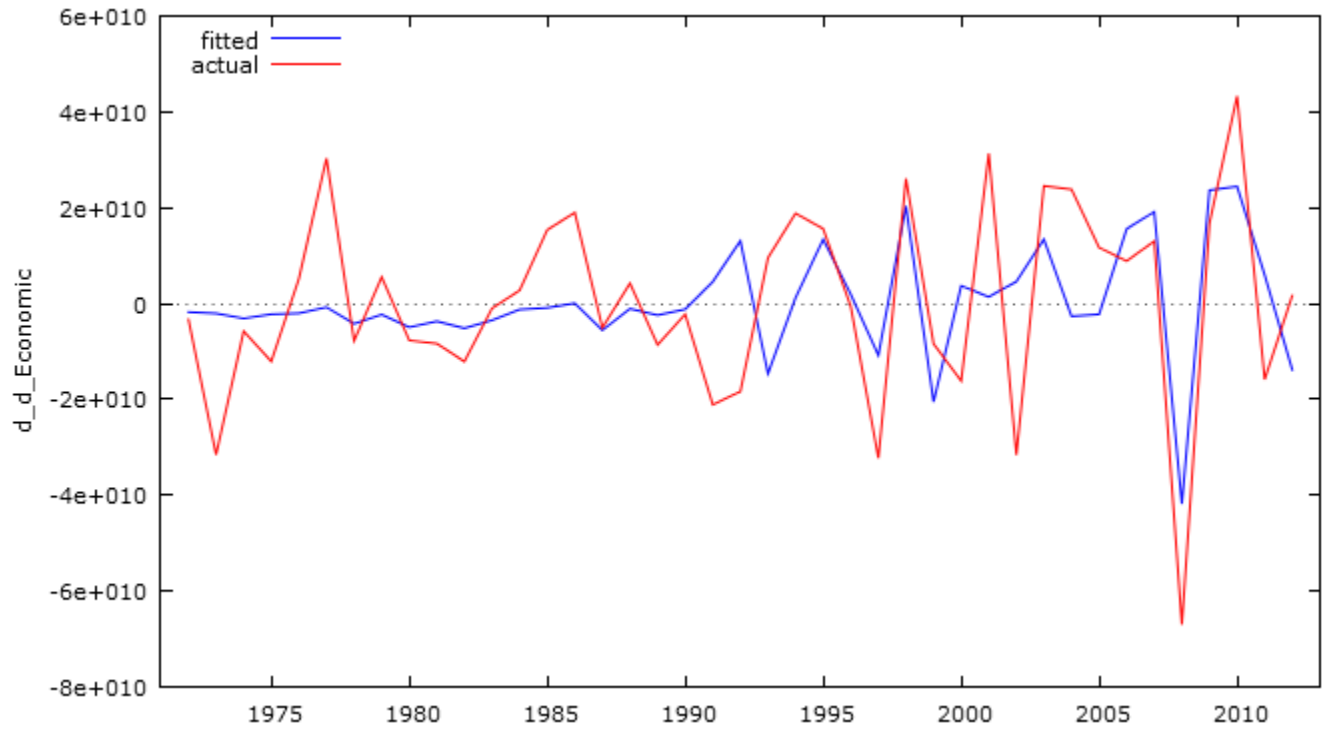
Unrestricted constant

Log-likelihood = -4957.92 (including constant term: -5074.27)

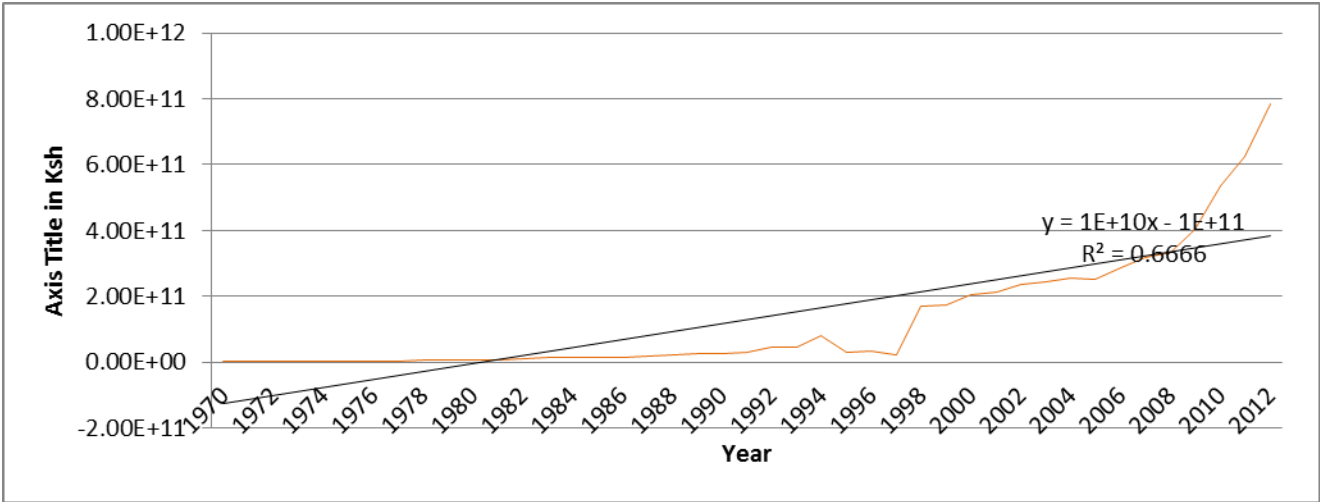
Rank	Eigenvalue	Trace test	p-value	Lmax test	p-value
0	0.97892	374.27	[0.0000]	158.24	[0.0000]
1	0.94193	216.03	[0.0000]	116.69	[0.0000]
2	0.64736	99.335	[0.0000]	42.735	[0.0020]
3	0.54110	56.600	[0.0052]	31.936	[0.0102]
4	0.34391	24.664	[0.1793]	17.280	[0.1647]
5	0.15779	7.3842	[0.5402]	7.0408	[0.4929]
6	0.0083408	0.34341	[0.5579]	0.34341	[0.5579]



## Appendix VI: Actual Versus Fitted Plot Graph



Appendix VII: Money supply



## Appendix VIII: Public Debt in Kenya

**Table A-5: Money supply by Instrument in Million Ksh**

FISCAL YEAR	Treasury Bills	Treasury Bonds	Government Stocks	Overdraft at Central Bank	Advances from Commercial Banks	Other Money supply	Total Money supply	External Debt
Sep-99	115,068.55	27,886.19	3,430.28	6,787.60	2,885.37	27,359.01	183,417.00	320,137.00
Dec-99	121,658.53	28,427.98	3,005.92	6,664.38	2,899.89	27,643.30	190,300.00	311,953.00
Mar-00	131,224.49	33,477.49	3,005.92	6,662.98	2,654.36	24,437.99	201,463.22	396,800.00
Jun-00	131,029.45	36,851.07	3,005.92	6,528.95	2,608.57	26,103.04	206,127.00	395,694.00
Jul-00	132,167.45	39,650.79	3,005.92	5,802.95	2,458.81	19,276.08	202,362.00	394,667.37
Aug-00	129,982.70	39,292.68	3,005.92	6,281.82	2,511.76	15,509.12	196,584.00	395,710.06
Sep-00	131,672.70	37,187.28	3,005.92	5,839.36	2,566.12	15,248.61	195,520.00	399,798.72
Oct-00	132,503.45	36,881.13	1,905.92	5,875.78	2,618.20	15,779.52	195,564.00	400,203.03
Nov-00	133,260.45	36,877.03	1,905.92	5,838.47	2,665.54	15,358.59	195,906.00	400,714.45
Dec-00	132,660.35	34,114.71	1,905.92	5,838.47	2,432.31	15,713.54	192,665.30	405,355.31
Jan-01	134,273.85	32,375.96	1,468.22	7,397.47	2,253.95	15,563.50	193,332.95	403,645.68
Feb-01	139,593.30	33,144.26	1,468.22	7,324.64	2,286.02	15,720.82	199,537.27	402,555.40
Mar-01	139,008.45	34,560.28	1,468.22	7,324.64	2,320.63	15,940.35	200,622.58	403,373.54
Apr-01	137,502.95	36,374.69	1,468.22	5,775.64	2,289.28	27,170.67	210,581.44	402,308.31
May-01	134,767.60	40,786.60	1,468.22	2,156.64	2,179.56	21,522.26	202,880.88	408,100.64
Jun-01	137,540.05	44,499.24	1,468.22	2,861.85	2,207.72	23,235.52	211,812.60	393,978.00
Jul-01	140,249.65	49,108.67	1,468.22	1,514.60	2,034.37	10,636.49	205,012.00	393,491.36
Aug-01	144,458.60	55,940.93	1,468.22	500.85	2,063.91	10,334.49	214,767.00	392,335.83
Sep-01	143,838.85	60,460.33	1,468.22	500.85	2,092.29	10,804.45	219,165.00	392,052.74
Oct-01	137,764.75	71,056.86	1,468.22	0.00	2,121.97	13,540.20	225,952.00	389,276.05
Nov-01	132,115.55	71,052.63	1,468.22	0.00	2,151.13	10,736.48	217,524.00	386,971.92
Dec-01	123,802.55	80,327.61	1,468.22	0.00	2,431.40	13,954.22	221,984.00	384,302.58
Jan-02	120,095.20	87,989.86	1,468.22	0.00	2,456.93	10,700.78	222,711.00	382,302.84
Feb-02	120,784.05	92,040.56	1,468.22	0.00	2,485.77	10,802.40	227,581.00	381,497.47
Mar-02	121,338.50	92,679.11	1,468.22	0.00	2,718.87	10,962.29	229,167.00	380,169.06
Apr-02	119,203.60	98,164.78	1,468.22	0.00	3,351.86	10,960.54	233,149.00	378,475.98
May-02	116,548.05	105,186.53	1,468.22	490.10	3,440.91	4,639.19	231,773.00	378,594.34
Jun-02	118,050.00	106,332.99	1,468.22	0.00	3,486.54	6,653.24	235,991.00	377,748.00
Jul-02	120,509.80	110,440.77	1,468.22	4,424.94	3,509.91	1,748.41	242,102.05	376,712.94
Aug-02	119,662.70	109,812.28	1,468.22	8,094.16	3,514.01	4,617.61	247,168.98	376,868.51
Sep-02	119,589.65	116,220.43	1,468.22	2,952.19	3,502.43	7,075.68	250,808.60	375,034.19
Oct-02	116,273.20	119,526.45	1,468.22	5,849.58	3,114.46	4,964.75	251,196.67	373,140.09
Nov-02	114,655.55	127,112.01	1,468.22	1,130.12	3,354.19	7,472.56	255,192.66	371,334.71

Dec-02	107,010.70	130,483.63	1,468.22	4,165.69	3,121.98	13,578.01	259,828.23	369,729.83
Jan-03	105,820.15	128,113.27	1,468.22	7,798.83	3,174.83	17,611.03	263,986.33	369,051.09
Feb-03	111,829.90	134,998.72	1,057.98	4,889.71	3,223.03	8,193.87	264,193.21	367,469.40
Mar-03	109,240.30	139,524.48	1,057.98	8,162.42	3,277.55	9,453.55	270,716.28	364,904.26
Apr-03	107,781.60	147,825.09	1,057.98	7,697.51	3,862.33	7,858.94	276,083.44	363,605.43
May-03	109,124.20	155,559.20	1,057.98	4,966.02	2,713.62	7,507.96	280,928.98	361,731.20
Jun-03	105,744.00	161,549.06	1,057.98	4,318.91	2,685.18	14,021.83	289,376.97	407,053.00
Jul-03	104,266.80	164,976.97	1,057.98	8,000.00	2,984.54	10,991.18	292,277.47	398,532.85
Aug-03	99,543.65	174,467.52	1,057.98	4,797.02	3,024.90	12,603.44	295,494.51	397,991.28
Sep-03	100,322.20	182,409.52	1,057.98	3,808.92	3,049.44	12,604.00	303,252.05	411,067.00
Oct-03	114,438.05	179,966.92	1,057.98	2,704.50	3,056.32	695.20	301,918.96	409,359.85
Nov-03	116,904.00	179,181.60	1,057.98	3,272.13	2,620.29	512.40	303,548.41	406,592.25
Dec-03	113,626.60	178,352.31	1,057.98	5,052.07	2,605.18	496.43	301,190.58	410,149.00
Jan-04	108,042.05	180,485.23	1,057.98	6,970.79	2,640.41	504.80	299,701.26	409,158.26
Feb-04	104,639.00	182,814.48	1,057.98	9,162.72	2,709.98	523.75	300,907.92	407,417.62
Mar-04	102,764.60	187,536.25	1,057.98	7,327.45	2,740.67	596.63	302,023.58	412,036.08
Apr-04	101,235.70	185,521.91	1,057.98	9,232.14	2,797.20	1,332.43	301,177.37	409,950.33
May-04	98,891.65	187,427.28	1,057.98	8,104.07	2,761.38	1,104.93	299,347.29	408,547.54
Jun-04	99,835.75	188,625.99	1,057.98	9,232.14	2,774.47	4,708.32	306,234.66	443,157.43
Jul-04	100,994.45	191,903.35	1,057.98	6,388.96	2,819.47	297.90	303,462.12	444,611.00
Aug-04	97,582.60	192,820.75	1,057.98	7,091.54	2,853.07	272.39	301,678.34	444,460.66
Sep-04	98,912.75	187,446.45	1,057.98	9,232.14	2,860.93	235.33	299,745.58	454,438.56
Oct-04	102,397.05	185,310.04	1,057.98	9,232.14	2,945.44	598.64	301,541.30	454,539.95
Nov-04	107,770.00	181,057.52	1,057.98	9,232.14	2,939.17	487.10	302,543.91	454,664.42
Dec-04	100,656.40	180,867.11	1,057.98	9,232.14	3,007.21	553.59	295,374.44	439,992.95
Jan-05	95,927.70	181,103.13	1,057.98	9,232.14	3,033.59	868.12	291,222.66	446,226.13
Feb-05	95,350.55	182,748.93	1,057.98	8,534.74	3,090.32	1,444.82	292,227.33	445,544.58
Mar-05	97,352.90	186,029.38	1,057.98	8,421.91	3,122.22	345.82	296,330.22	424,857.08
Apr-05	98,645.40	194,154.07	1,057.98	8,908.70	3,121.39	1,273.08	307,160.62	424,345.69
May-05	99,930.60	192,583.01	1,057.98	7,694.45	3,256.47	453.14	304,975.65	423,476.45
Jun-05	107,838.30	193,357.81	1,057.98	5,225.31	2,539.04	5,554.06	315,572.50	433,975.65
Jul-05	113,460.20	198,255.76	1,057.98	8,344.18	2,555.60	353.70	324,027.42	435,399.90
Aug-05	115,053.10	200,463.56	1,057.98	6,139.33	2,321.00	345.57	325,380.53	434,850.69
Sep-05	115,457.90	200,890.51	1,057.98	8,908.70	2,436.31	48.58	328,799.98	418,860.33
Oct-05	113,706.50	204,172.56	1,057.98	8,908.70	2,404.89	2,475.02	332,725.65	418,417.49
Nov-05	113,349.05	206,980.30	1,057.98	8,908.70	2,559.33	646.12	333,501.48	417,897.89
Dec-05	113,336.75	209,424.84	1,057.98	8,908.70	2,068.12	205.49	335,001.89	408,601.92
Jan-06	115,474.50	209,250.69	1,057.98	5,796.63	2,112.36	258.66	333,950.84	407,544.63
Feb-06	120,869.60	208,969.39	1,057.98	5,201.83	2,139.37	375.06	338,613.23	407,132.44
Mar-06	120,848.50	210,323.79	1,057.98	11,323.87	2,185.53	324.37	346,064.04	407,003.71
Apr-06	122,383.65	210,482.03	1,057.98	11,323.87	2,200.43	772.40	348,220.36	406,531.77

May-06	128,210.65	211,961.76	1,057.98	5,645.16	2,257.88	356.50	349,489.93	406,493.69
Jun-06	130,308.36	218,357.33	1,057.98	5,201.83	2,290.60	622.86	357,838.95	431,236.83
Jul-06	131,808.81	220,556.58	1,057.98	7,432.42	2,305.13	1,674.80	364,835.71	430,667.84
Aug-06	133,720.71	223,527.83	1,057.98	7,890.07	2,342.69	-575.96	367,963.31	431,095.63
Sep-06	134,083.76	229,950.32	1,057.98	3,668.91	2,373.18	457.32	371,591.47	422,647.93
Oct-06	133,103.96	233,319.00	1,057.98	5,232.75	2,415.48	394.86	375,524.02	424,414.09
Nov-06	132,391.05	236,042.80	1,057.98	8,855.36	2,472.73	214.93	381,034.85	424,933.07
Dec-06	132,227.85	237,988.05	754.70	11,323.86	2,501.97	324.79	385,121.22	407,742.55
Jan-07	130,373.15	244,086.15	754.70	41.05	2,531.50	341.07	378,127.61	417,467.73
Feb-07	131,813.10	250,126.70	754.70	41.05	2,560.12	529.27	385,824.93	416,510.41
Mar-07	133,858.60	248,592.82	754.70	125.72	2,681.81	274.08	386,287.74	409,055.74
Apr-07	136,128.35	248,792.29	754.70	41.05	2,613.93	2,161.57	390,491.89	420,265.23
May-07	133,400.76	253,656.89	754.70	41.05	2,633.58	308.64	390,795.61	419,743.45
Jun-07	129,970.26	272,199.74	754.70	41.05	1,066.11	658.26	404,690.11	396,564.00
Jul-07	129,477.10	273,658.68	754.70	4,838.37	1,070.56	429.60	410,229.01	410,512.75
Aug-07	127,691.25	277,300.69	754.70	7,526.91	1,086.30	1,555.19	415,915.04	409,066.12
Sep-07	130,559.75	280,902.69	754.70	13,268.82	1,065.21	270.19	426,821.36	408,680.79
Oct-07	124,100.10	285,941.97	754.70	5,670.59	1,066.36	954.43	418,488.14	419,738.84
Nov-07	126,118.00	293,783.07	754.70	4,138.87	1,081.60	186.20	426,062.44	424,243.21
Dec-07	126,375.05	304,676.55	754.70	1,992.08	1,083.24	3,177.48	438,059.11	406,923.00
Jan-08	118,984.00	303,630.15	754.70	8,229.71	6.05	579.28	432,183.90	424,205.02
Feb-08	118,166.55	308,146.51	754.70	7,021.59	11.50	520.54	434,621.39	425,976.18
Mar-08	122,866.80	309,874.96	754.70	8,141.88	17.68	3,080.35	444,736.37	425,086.89
Apr-08	122,381.40	312,015.86	754.70	1,355.44	12.78	1,350.75	437,870.94	425,992.78
May-08	117,900.00	318,334.09	754.70	5,108.79	423.41	163.76	442,684.75	429,644.66
Jun-08	111,286.15	315,189.66	754.70	0.00	426.92	2,954.30	430,611.73	439,967.00
Jul-08	113,833.30	311,342.46	754.70	1,340.37	8.82	868.48	428,148.13	432,808.95
Aug-08	116,864.80	312,555.76	754.70	0.00	29.69	3,284.40	433,489.36	433,670.73
Sep-08	127,812.00	314,710.01	754.70	4,393.10	2.17	1,661.86	449,333.84	432,954.02
Oct-08	124,265.80	315,013.81	754.70	14,071.82	8.46	571.38	454,685.97	434,487.59
Nov-08	125,309.85	320,914.56	754.70	3,894.81	4.83	513.34	451,392.10	450,248.35
Dec-08	121,345.45	318,613.11	754.70	15,092.90	4.82	416.93	456,227.91	516,671.33
Jan-09	127,625.35	320,628.46	754.70	4,712.53	7.91	537.49	454,266.44	512,475.65
Feb-09	130,813.20	330,163.46	754.70	16,882.64	7.03	275.39	478,896.43	514,635.34
Mar-09	133,066.55	334,418.21	754.70	6,198.69	6.85	304.80	474,749.81	513,623.00
Apr-09	138,870.60	343,454.86	754.70	12,371.31	25.40	1,973.29	497,450.16	511,981.59
May-09	132,957.55	348,318.01	754.70	6,703.09	6.10	494.93	489,234.39	517,929.10
Jun-09	150,122.30	360,743.95	754.70	5,124.38	6.10	1,594.72	518,346.15	535,143.70
Jul-09	154,148.25	371,205.25	754.70	3,909.48	69.72	313.56	530,400.97	532,144.51
Aug-09	160,943.45	378,476.75	754.70	6,148.34	104.74	754.38	547,182.36	530,075.39
Sep-09	155,524.35	386,074.05	754.70	8,013.20	91.12	156.38	550,613.80	524,982.60

Oct-09	166,879.40	389,887.45	754.70	9,334.74	114.21	154.63	567,125.13	523,899.66
Nov-09	171,069.20	381,042.80	754.70	9,829.42	89.56	141.11	562,926.79	521,232.48
Dec-09	174,160.70	402,688.35	754.70	11,127.92	129.60	109.04	588,970.31	588,970.31
Jan-10	174,479.10	395,461.20	754.70	9,179.71	686.88	159.88	580,721.47	525,552.75
Feb-10	187,066.75	408,003.35	753.35	11,426.82	123.12	139.22	607,512.61	525,369.18
Mar-10	194,059.15	437,474.35	753.35	6,544.79	123.12	161.57	639,116.32	538,157.99
Apr-10	208,902.05	442,356.25	753.35	1,109.31	182.55	310.91	653,614.42	537,424.84
May-10	199,745.10	443,434.50	753.35	5,237.37	937.11	154.54	650,261.96	541,976.71
Jun-10	191,267.55	448,615.35	753.35	17,649.38	1,595.86	386.20	660,267.68	565,452.00
Jul-10	190,422.50	459,274.45	753.35	15,508.55	1,668.37	176.20	667,803.42	562,941.95
Aug-10	184,014.30	488,492.30	753.35	22,926.07	1,708.69	152.65	698,047.35	566,166.88
Sep-10	181,138.05	501,233.25	0.00	20,563.11	1,608.36	159.99	704,702.77	594,223.00
Oct-10	176,380.85	498,137.90	0.00	19,961.29	1,485.23	167.38	696,132.65	598,080.46
Nov-10	168,117.15	517,794.50	0.00	22,926.07	1,462.77	1,148.49	711,448.98	599,251.46
Dec-10	165,104.75	529,871.50	0.00	22,665.77	1,546.08	1,019.87	720,207.97	599,930.46
Jan-11	167,344.35	538,569.95	0.00	17,628.60	1,653.89	5,000.98	730,197.77	615,604.98
Feb-11	162,311.40	558,130.90	0.00	22,926.07	2,214.27	1,087.65	746,670.28	630,400.03
Mar-11	160,174.00	570,774.25	0.00	19,727.19	2,360.78	1,011.88	754,048.10	642,847.92
Apr-11	134,537.50	574,489.65	0.00	22,926.07	2,335.83	1,171.01	735,460.06	652,675.73
May-11	135,140.15	585,388.65	0.00	22,926.07	2,160.74	959.12	746,574.73	675,887.12
Jun-11	157,388.10	595,661.35	0.00	7,571.00	2,243.30	1,359.05	764,222.80	722,888.31
Jul-11	150,106.10	600,953.95	0.00	19,933.56	2,650.50	8,068.92	781,713.03	744,486.60
Aug-11	143,716.90	603,838.90	0.00	25,373.20	2,750.09	1,013.51	776,692.61	768,510.85
Sep-11	144,521.30	591,518.45	0.00	25,373.20	2,335.90	525.69	764,274.54	799,834.03
Oct-11	159,349.10	605,849.50	0.00	25,373.20	3,505.02	488.74	794,565.56	810,011.60
Nov-11	146,778.55	616,151.05	0.00	25,373.20	2,380.67	13,210.87	803,894.34	728,645.25
Dec-11	137,873.40	633,549.35	0.00	25,373.20	2,639.49	444.62	799,880.06	685,607.92
Jan-12	140,384.55	640,132.85	0.00	25,373.20	2,473.64	913.87	809,278.11	686,718.48
Feb-12	170,427.00	677,802.58	0.00	25,373.20	2,802.37	899.64	877,292.72	663,050.00
Mar-12	175,250.90	683,565.25	0.00	25,373.20	2,760.93	921.11	887,871.40	676,330.00
Apr-12	177,399.25	689,983.30	0.00	25,373.20	2,314.00	921.11	896,437.80	700,900.00
May-12	164,574.00	692,321.00	0.00	25,373.00	2,314.00	921.00	885,503.00	721,040.00
Jun-12	161,830.05	686,950.90	0.00	7,256.50	2,255.71	536.39	858,829.55	
Jul-12	144,629.55	692,988.09	0.00	25,373.20	1,757.75	376.93	865,125.52	

### Appendix VIII: Tenor Structure and Volume of Treasury Bonds

Year	Tenor of Bonds Issued															Total Issuance	Volume Issued (Ksh. M)
	1	2	3	4	5	6	7	8	9	10	11	12	15	20	25		
<b>2001</b>	6	3	5	1	1	1	0	0	0	0	0	0	0	0	0	<b>17</b>	92,188.49
<b>2002</b>	4	7	5	3	5	1	0	0	0	0	0	0	0	0	0	<b>25</b>	91,076.60
<b>2003</b>	3	2	4	3	3	3	2	2	2	2	0	0	0	0	0	<b>26</b>	88,781.85
<b>2004</b>	5	5	2	2	1	2	2	1	0	0	0	0	0	0	0	<b>20</b>	53,329.80
<b>2005</b>	6	5	3	2	2	1	0	0	0	0	0	0	0	0	0	<b>19</b>	74,854.80
<b>2006</b>	3	4	4	1	2	2	2	1	1	2	1	1	0	0	0	<b>24</b>	88,773.26
<b>2007</b>	3	5	1	1	3	1	1	1	0	1	0	1	3	0	0	<b>21</b>	99,509.60
<b>2008</b>	3	5	0	0	4	0	0	0	0	3	0	0	1	1	0	<b>17</b>	65,681.85
<b>2009</b>	1	3	0	0	1	0	0	0	0	1	0	0	1	0	0	<b>7</b>	108,274.05
<b>2010</b>	4	0	0	0	2	0	0	0	0	2	0	0	2	0	1	<b>11</b>	132,324.00
<b>2011</b>	1	4	0	0	1	0	0	0	0	0	0	0	0	1	0	<b>7</b>	144,576.10
<b>2012</b>	3	4	0	0	5	0	0	0	0	1	0	0	1	1	0	<b>15</b>	140,812.75