

**THE EFFECTS OF PUBLIC DEBT ON PRIVATE INVESTMENTS
AND ECONOMIC GROWTH IN KENYA (1980-2013)**

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DECLARATION

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

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DEDICATION

To my parents John and Agnes Kamundia

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ABSTRACT

The Kenya Vision 2030 aims at achieving a 10 percent per annum growth rate in the economy. Investments have been identified as a major channel through which this objective can be met. The government has undertaken various public investments to fuel economic growth. However, for this to be even more effective, private investments have to be taken into consideration. The government has taken various measures such as relying more on external debt to avoid crowding out private investments and consequently promote economic growth. Despite these efforts, private investments and economic growth have remained low. This study aimed at finding out the effect public debt on the level of private investment and economic growth in Kenya. The study used time series data from 1980 to 2013. Granger causality test was used to determine the direction of causality between public debt and private investments and also between public debt and economic growth. Ordinary least squares estimation was used in the estimation of the model. Granger causality tests also show the presence of unidirectional causality from debt to private investments and GDP growth. Debt was found to have a negative effect on private investments and a positive effect on economic growth. This suggests that debt plays a huge role in determining the level of private investments and also the level of economic growth.

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ABBREVIATIONS AND ACRONYMS

BOP	Balance of Payment
GDI	Gross Domestic Investment
GDP	Gross Domestic Product
GNI	Gross National Income
HIPC	Heavily Indebted Poor Countries
EASF	Enhanced Structural Adjustment Facility
IMF	International Monetary Fund
LAPSSET	Lamu Port South Sudan-Ethiopia Transport
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PP	Phillip-Perron
SAPs	Structural Adjustment Programmes
VAR	Vector Autoregression

OPERATIONAL DEFINITION OF TERMS

Causality: Is the ability of past values of one variable to predict another variable.

Crowding out: Refers to a fall in private investment as a result of a rise in interest rates attributed to increase in government borrowing.

Debt crisis: A situation in which a country, usually a Less Developed Country (LCD), finds itself unable to service its debts.

Economic growth: Refer to an increase in a country's output of goods and services, measured by changes in real Gross Domestic Product.

Gross domestic product: It is the total value of all goods and services produced over a given period (usually a year) excluding net property income from abroad.

Private Investment: is the expenditure by firms and private individuals towards the creation and accumulation of physical stock for productive purposes.

Public debt: sum of external debt and internal debt.

CHAPTER ONE

INTRODUCTION

1.1. Background

Public debt is the total amount that the government owes to its creditors. Public debt is characterized as either internal debt or external debt. External debt is debt that is owed to external creditors who include multilateral creditors, bilateral creditors and private institutions such as the Standard Bank UK. Bilateral creditors are mainly countries such as Germany, Japan, France, Italy, USA, Netherlands, Denmark, Finland, China and Belgium. Multilateral creditors include International Development Association (IDA), European Economic Community (EEC), International Fund for Agricultural Development (IFAD), World Bank, European Investment Bank (EIB), International Monetary Fund (IMF) and The African Development Bank (AfDB). Domestic debt is owed to holders of government securities such as from Treasury bills, Treasury bonds, and non-interest bearing stock, (KENDREN, 2009; Republic of Kenya,2014)

To fill the gap between revenues and expenditure and to be able to carry out its functions smoothly, the government borrows so as to be able to cover the difference between its expenditure and revenue collected. However, the primary debt burden lies on the annual interest charges on the debt. Governments protect themselves from bankruptcy arising from public debt using refinancing and taxation. Refinancing comes about when a portion of

public debt becomes due and the government sells new bonds and borrows afresh to pay the matured debt. New bondholders usually have a high incentive to purchase since they have a relatively good interest return with no risk of default by the government. The government can also impose a tax increase so as to get money for paying public debt and the interest that is due. This can also be achieved by coming up with new taxes to achieve the same, (Brue, Flynn, and McConnell, 2009).

Other reasons that lead to a government incurring public debt are borrowing to speed up economic development, to cover BOP deficits and stabilizing the economy, (Hoag and Hoag, 2006). Countries also borrow so as to ensure that investments that have a medium to long time frame and require large amounts of money are realized, (Medeiros and Silva, 2010). For example, the Thika superhighway was funded by the African Development Bank and The EximBank of China to the tune of US \$ 360 million with the Kenyan government contributing less than a quarter of this cost. Without borrowing, this may have been an uphill task for the government. Other projects include the construction of the standard gauge railway and the construction of the LAPSSET corridor that will involve building a road connecting Juba and the Lamu port.

Domestic debt is an instrument for implementing monetary policy, (Medeiros and Silva, 2010). The Central Bank through open market operations buys and sells public securities to control market liquidity and stabilize the domestic currency. Debt instruments also play a huge role in the development of

financial markets. Government debt provides a standard by which the private sector issues private securities such as corporate bonds. Corporates usually issue their securities after considering the prevailing interest rates on government securities such as treasury bonds. The government builds investor confidence by issuing debt instruments that have a secure return, (Medeiros and Silva, 2010).

One way to measure debt is by comparing it to the economy's production or gross domestic product. Measuring debt in absolute terms ignores the wealth and productivity of a country. A wealthy, highly productive country is much better placed to incur and carry a large public debt than a poor country. Thus, a more meaningful measure of public debt is relative to a country's GDP rather than absolute terms, (Brue *et.al*, 2009).

Debt-GDP ratio allows for meaningful comparisons over time or across countries with respect to a government's ability to service its debts and handle its fiscal situation in general. Faster GDP growth relative to the growth of debt helps countries to keep the debt-GDP ratio under control. Low economic growth, on the other hand, leads to an increase in the debt-GDP ratio. Under such circumstances, the government has only three choices. It can choose to have fiscal discipline and control its spending. Secondly it may default on debt payment since it has no way of paying back the debt when it matures. Lastly, it may decide to monetize the debt where the Treasury pays off debt with the money it already holds or by issuing new bonds, (Contessi, 2012).

1.2. Macroeconomic Effects of High Public Debt Levels

High demand for domestic funds by the government tends to push up interest rates since the government is usually more than willing to pay this high cost so as to obtain additional credit. This is more so if the investor base for domestic debt is relatively narrow. The cost of private credit goes up and reduces private investment demand as private investors will be put off by these high interest rates and therefore they invest less. This is known as the crowding-out effect that leads to low capital accumulation and consequently low economic growth. High interest rates also make government assets attractive to foreign investors. Demand for local currency goes up making it more expensive in terms of other currencies. Imports become cheaper and increase while exports become more expensive and decrease. This will lead to a trade deficit that ultimately hinders economic growth, (El-Mahdy and Torayeh, 2009).

Borrowing by the government also uses up private savings that would have been used by the private sector for investment. These funds are used to provide for public goods such as defence and new infrastructure. An increase in public debt means that there are fewer funds available for the private sector. This means that the public sector investment curtails private sector investment, (Hoag and Hoag, 2006). If a country has a high debt ratio, a high percentage of the revenue collected from its citizens will be used to pay interest accruing from the public debt. This reduces the funds that are left available to the government for investment purposes. This limits the economic growth of a country, (El-Mahdy and Torayeh, 2009).

Interest payments also increase the size of the debt that has to be paid. The government may choose to fund its deficit by selling government securities. To do this, it needs to provide enough incentive to the purchaser by offering attractive interest rates. These interest payments also form a part of government spending and are an additional debt burden. These payments may also change with time due to two main reasons. First a large debt will occasion higher interest payments. Therefore, as a government increases the amount of money that it borrows, the higher the burden of interest payments that it has to incur on the debt. Secondly, the prevailing interest rate may increase thus increasing the interest payments that have to be made, (Hoag and Hoag, 2006).

High levels of domestic debt also raise uncertainty due to debt overhang problems. This refers to a situation where it is virtually impossible for the government to borrow more funds since it already owes too much. Debt overhang discourages new investors since most of the benefits from the investment will be reaped by the existing debtors through increased taxes by the government to repay the debt instead of accruing to the investors themselves, (El-Mahdy and Torayeh, 2009).

Public debt borrowing and interest payments may also increase income inequality (Brue *et. al*, 2009). A high percentage of government stocks and bonds are concentrated among the wealthy people. Payment of public debt is mainly achieved through taxation. If the tax system is not progressive, income will be transferred from the low-income groups to the high income bond holders.

Debt servicing coupled with inadequate foreign exchange earnings results in import strangulation that in turn impedes the growth of exports. This leads to a shortage of imports. Debt overhang and other uncertainties further aggravate the situation by reducing investments. Reduction in investments and shortage of essential imports causes a decline in real output. Since the current account deficit is growing and output is declining the country is forced to borrow more thus increasing its debt service obligations, (Iyoha, 1999).

High debt service payments lead to the rising of the budget deficits. This has several negative effects. First, taxes may have to be raised so as to get the necessary resources to service the debt. This serves to reduce investments through the debt overhang effect. Secondly there will be a need to transform the available domestic resources to foreign currency so as to service debt. This result to countries borrowing and using these borrowed funds to pay their debts. Thirdly, debt service payments reduce the finances available for public investments such as education and health. This implies that debt service payments crowd out public investments, (Iyoha, 1999).

Diamond (1965) argues that debt increases the taxes so as to be able to pay for the interest payments arising from the debt. This increase in taxes reduces the disposable income available to an individual and reduces the available lifetime consumption. The reduction in disposable income also reduces the level of savings thus the level of capital stock goes down.

1.3. Debt Situation in Sub-Saharan Africa

The genesis of the current debt crisis in Sub-Saharan African countries can be traced back to the oil price shocks of 1973 and 1979. These resulted in huge current account deficits in most developing countries which did not produce oil. To cover these deficits, developing countries opted to borrow. The 1973 oil price hike also resulted in international commercial banks having a large surplus of the so called “petrodollars’ leading to the banks liberally approving loans to developing countries at low interest rates without really considering the ability of these countries to repay the loans , (Were, 2001).

However, the availability of credit was curtailed in with the global financial crisis of 1982 which was brought about by the collapse of oil prices and a sharp increase in interest rates. This led to Mexico defaulting on its debts by declaring that they would not be able to meet the payment due dates on the loans that were due to be repaid. This inability to service international debt quickly spread to the rest of the world. International commercial banks stopped giving out loans to developing countries and instead started focusing on getting back the money that was owed to them. This meant that developing countries could only service their debt by increasing their exports or decreasing imports. Many countries also had to employ austerity measures so as to reduce their spending, (Cunningham, 1993).

Structural adjustment programmes (SAPs) in the 1980s were recommended by the World Bank and the International Monetary Fund as a way to solve the economic crisis that was mainly brought about by the debt crisis. These programmes were meant to restore stability in the short term and bring about

growth in the medium to long term. However, these programmes had the opposite effect. They instead led to a further lowering of incomes and living standards, increased levels of poverty and unemployment while many sub-Saharan African countries had to employ austerity measures. The devaluation of currencies that were a major component of SAPs led to an increase in total debt and debt service payments. SAPs also required countries to deflate their prices and that led to a fall in GDP and a reduction in national income available for investment, consumption and provision of public goods, (Iyoha, 1999).

In 1985, The World Bank classified some countries as low-income economies. These are countries with a per capita income below \$400. 74 percent of these low-income countries are in Sub-Saharan Africa. In 1996, the World Bank and The IMF came up with the HIPC initiative to assist highly indebted countries. Heavily Indebted Poor Countries are developing countries with high levels of poverty and debt overhang that are eligible for special assistance from the World Bank and the IMF. This special assistance is in the form of debt relief and low interest loans to cancel or reduce external debt repayments to sustainable levels. Out of the 41 countries classified as HIPC, 80 percent are in Sub-Saharan Africa. For a country to be classified as HIPC, its debt-to-export ratio must be above 150 percent and its debt-to-government revenue ratio must be above 250 percent. Kenya has been classified as a low middle income country. These statistics serve to show that not only is most of Sub-Saharan Africa poor, but also the growth of its per capita income is also low thus widening the income gap with the rest of the world, (Iyoha, 1999).

1.4. Public Debt in Kenya

The amount of public debt has been continually rising with the budget reaching a whopping 1.8 trillion in the 2014/2015 budget while the estimated national revenue stood at 1.026 trillion which is just slightly over half the total expenditure, (Kerrow, 2014). Borrowing is one of the avenues through which Treasury can finance a deficit. The debt levels are set to go even higher with The National Assembly approving the raising of the external debt ceiling from 1.2 trillion to 2.5 trillion. This money is for financing the standard gauge railway, build roads and fund an electricity project that is set to produce 5000 megawatts of electricity, (Gibendi, 2014).

Public debt has been on an upward trend, but the debt-GDP ratio has been erratic and going beyond 100 percent in 1993. According to Rother and Checherita (2010), there exists a concave relationship between public debt and the rate of economic growth with the turning point of debt being at around 90-100 percent of GDP. This implies that the higher the public debt-GDP ratio, the lower is the long-term growth rate above this point. Reinhart and Rogoff (2010) also found that when a debt-GDP ratio is below 90 percent, debt has a positive relationship with economic growth.

Figure 1.1 shows the trend of debt-GDP ratio in Kenya between 1980 and 2013.

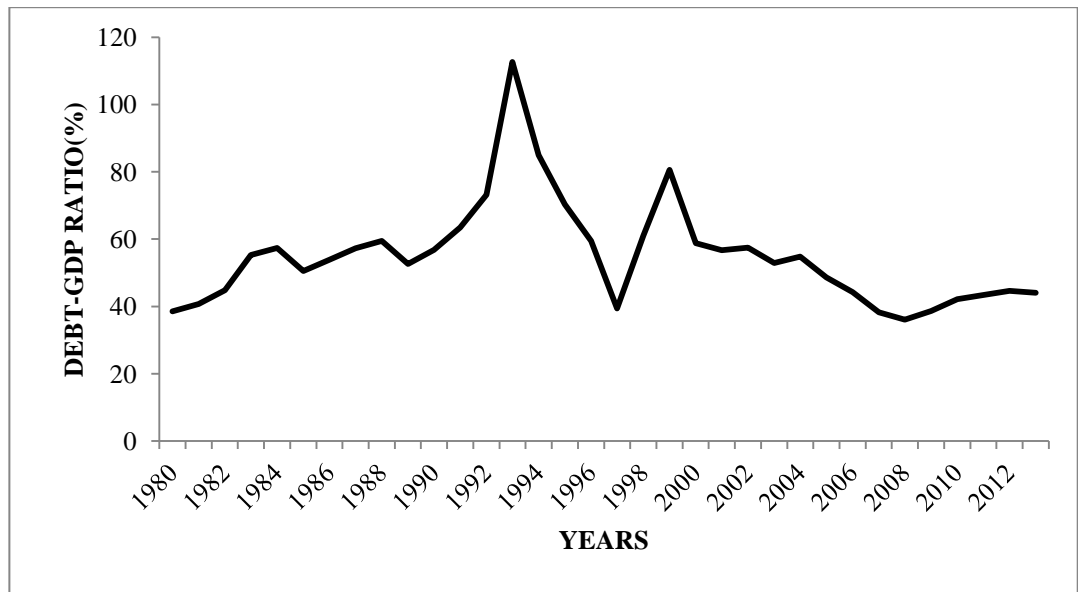


Figure 1.1: Debt-GDP ratio in Kenya from 1980 to 2013

Source of Data: Economic Surveys and The World Bank

Debt crisis in sub-Saharan Africa started in 1982 as a result of the countries being unable to pay the loans that they had borrowed during the 1973 and 1979 oil price shocks that had resulted in huge current account deficits for developing countries which did not produce oil, (Were, 2001). The total public debt grew rapidly between 1980 and 1982 due to an increased need for the government to finance large balance of payment deficits with most of the growth in public debt being attributed to growth in external debt, which was at 29 percent of GDP as at 1982, (Republic of Kenya, 1983). Public debt in 1983 increased by 24 percent mainly due to the government borrowing to pay matured loans from previous years, (Republic of Kenya, 1984). The Government reduced domestic borrowing from commercial banks by more

than half in 1984 from Ksh 620 million to Ksh240 million so as to control credit creation and reduce inflation, (Republic of Kenya, 1985).

In the early 1990s, the debt situation in Kenya became worse due to the end of the cold war, collapse of the Soviet Union and macroeconomic mismanagement such as the Goldenberg scandal that saw the country losing billions of shillings. Donor countries lost faith in the government and reduced the amount of money they were previously giving to the country.the government resorted to using domestic borrowing to finance its expenditures, (Putunoi and Mutuku, 2013; KENDREN, 2009). Public debt between 1990 and 1992 grew by about 75 percent mainly due to the depreciation of the shilling against foreign currencies and suspension of foreign donor aid. Total outstanding public debt rose by 91 percent between 1992 and 1993. This was brought about by prolonged drought which caused the government to divert large amounts of funds to import food for famine relief efforts, (Republic of Kenya, 1993,1994). In 1994, the government undertook various measures to address the economic problems that plagued the country among which they reduced domestic borrowing so as to free up resources for private investments, (Republic of Kenya,1995).

The rise in 1997 was brought about by unplanned expenditures on civil servants, effects of the El Nino, extra expenditures on the 1997 general elections and the suspension of the enhanced structural adjustment facility (EASF) by the International Monetary Fund. The EASF is a facility created by the IMF to provide finance to poor countries in concessional terms after it

emerged that the usual terms were too expensive for these countries to repay. 1997 also marked the beginning in the rise of domestic debt as a form of financing the budget. As at 2003, the domestic debt stood at 45 percent while external debt was at 55 percent of the total debt. This was in line with the government objective to rely more on external concessional borrowing rather than domestic debt to finance deficits, (Republic of Kenya, 2004). Domestic debt between 2005 and 2009 remained below 45 percent of total debt. Substitution of external debt with domestic debt was not possible due to the risk of crowding out private investments, (Republic of Kenya, 2010).

1.5. Private Investments in Kenya

For the Kenya Vision 2030 growth objectives to be achieved, investment levels should be above 32 percent of GDP with public investments being above 9 percent of GDP and private investments being above 24 percent, (Republic of Kenya, 2012). However, private investments in Kenya have consistently remained low.

Figure 1.2 shows the trend of private investments in Kenya from 1980 to 2013.

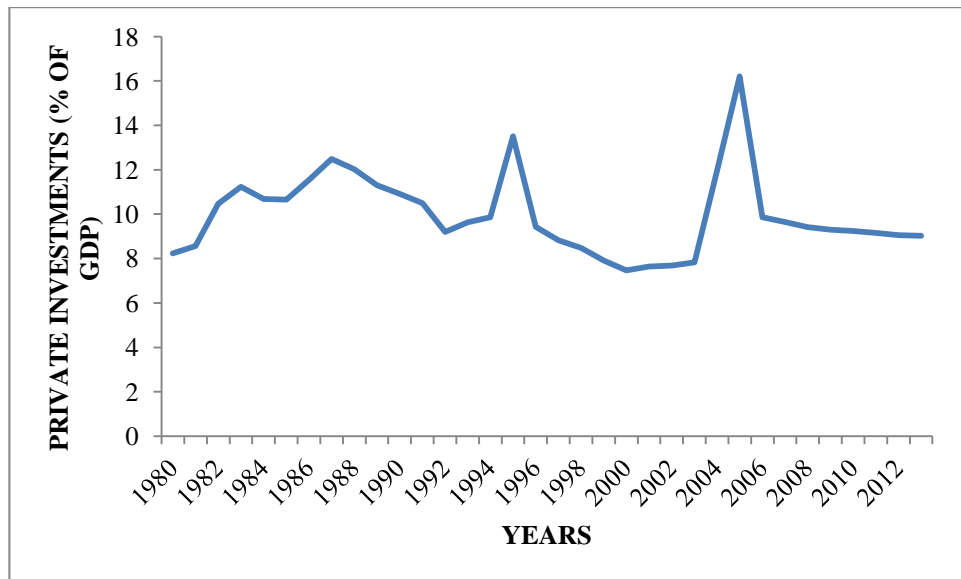


Figure 1.2: Private Investments in Kenya from 1980 to 2013

Source of Data: The World Bank

Private investments declined from the early to mid-1980s due to the onset of the debt crisis in 1982, severe drought conditions in 1984 and a sharp increase in interest rates which was mainly brought about by the debt crisis, (Njuru, Ombuki, Wawire, and Okeri, 2013). Structural adjustment programmes (SAPs) in the 1980s required that countries deflate their prices which led to a fall in GDP and a reduction in national income available for investment, (Iyoha, 1999)

Private investments reduced in 1992 due to the push for political reforms, economic uncertainty especially toward the general election, Ethnic clashes and uncertainty in financial markets. This coupled with donor countries withholding foreign aid meant that Kenya had to borrow more internally leading to higher costs of capital and crowding out of private investments, (Republic of Kenya, 1993). Macroeconomic reforms undertaken by the

government in 1994 to correct the dismal performance of the 1992 -1993 period gave private investors confidence and may have contributed to the increase in private investments in 1995, (Njuru *et. al*, 2013).

El Nino rains in 1997 destroyed critical infrastructure while violence before the elections forced some investors to relocate to areas which were much safer while at the same time discouraging potential investors. Investments also reduced in this period due to budgetary cuts, poor infrastructure, reduced donor funding and high interest rates, (Republic of Kenya, 1998). Private investments increased in 2003, but disagreements within the ruling coalition reduced the confidence that investors had. In 2007, the post-election violence in 2007 led to destruction of property, loss of life and displacement of thousands of people among whom were private investors, both domestic and foreign, (Njuru, Ombuki, Wawire, and Okeri, 2014)

1.6. Economic Growth in Kenya

Kenya's Vision 2030 aims at achieving an average economic growth rate of 10 percent per annum, (Republic of Kenya, 2007). However, economic growth in Kenya has been low and erratic with the economy growing recording its highest growth in 1986 at 7.18 percent and the lowest growth in 1992 at -0.79. The figure below shows the trend in economic growth between 1981 and 2012.

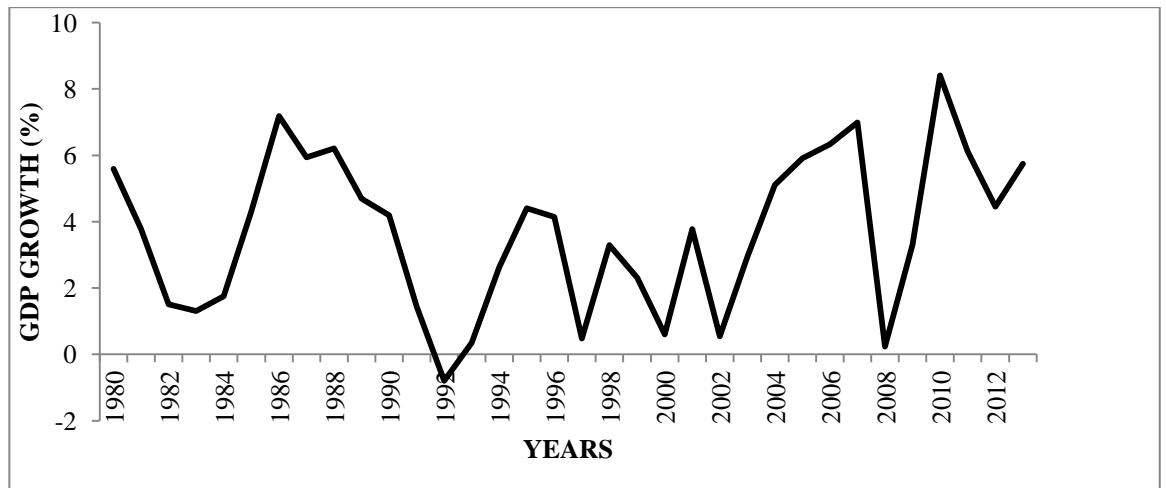


Figure 1.3: Economic Growth in Kenya from 1980 to 2013

Source of Data: The World Bank

Economic growth between 1980 and 1982 fell as a result of drought conditions that led to the reduction in capital formation and a decline in value added agriculture, which is a major component of GDP. This sluggish growth was also attributed to the 1974 oil crisis which curtailed the government's ability to achieve its economic objectives, (Republic of Kenya, 1981). GDP growth improved between 1983 and 1984 due to improved BOP, reduction in the budget deficit, and overall fiscal discipline but severe Drought conditions which were experienced for the first nine months of 1984 affected the agricultural sector and led to a dismal performance of the economy. However, better export prices for tea and coffee in the world market, good economic management and donor support helped alleviate the situation, (Republic of Kenya, 1985).

The increase in GDP between 1985 and 1986 was due to increase in exports because of trade liberalisation, low oil prices which helped lower Kenya's

import bill by almost 37 percent, increase in fixed capital and higher tourism activity. Higher coffee prices in the world market due to a severe drought in Brazil which is a major coffee producer raised world coffee prices by almost 40 percent. This together with the suspension of coffee quotas by the International Coffee Organisation helped Kenya increase coffee exports and increase coffee export earnings by 68 percent, (Republic of Kenya, 1987,1988). Economic growth fell slightly in 1987 due to increased inflation, fall in agricultural production and a fall in coffee and tea prices coupled with doubling of oil prices which increased the BOP deficit, (Republic of Kenya, 1988).

GDP growth in 1991 continued on a downward trend for the third consecutive year from 1989. This was as a result of a decline in output in the agriculture sector, foreign exchange shortages and reduced imports, (Republic of Kenya, 1992). In 1992, economic growth reached an all time low since independence. The main contributors to this poor performance were high rates of inflation which reached an all-time high at 27.5 percent. There was also the push for political reforms coupled with economic uncertainty especially toward the general election. Ethnic clashes coupled with adverse weather conditions disrupted economic activity and led to a fall in output. Uncertainty in financial markets and weak growth in industrial economies reduces Kenya's export trade. A foreign exchange crisis also emerged due to donor countries withholding foreign aid. All this factors also contributed to a fall in private investments, (Republic of Kenya, 1993). Following the dismal economic performance in 1992, the government came up with stringent measures to rectify the situation. This was mainly done by implementing macroeconomic

reforms such as liberalization of foreign exchange and trade regimes, tight monetary policy and deregulation of cereal marketing and petroleum prices boosted economic activities in 1994, (Republic of Kenya,1995).

The economy started on another downward spiral in 1997 due to an increased budget deficit brought about by an increase in government expenditure due to the general elections which were being held that year. There was also an increase in the wage bill public servants, especially for the teachers. Investments also reduced in this period due to budgetary cuts, poor infrastructure, reduced donor funding and high interest rates. Inadequate power supply, deterioration of infrastructure, worsening of the trade deficit and deterioration of the current account, pre-election violence contributed to the fall of GDP growth for five consecutive years from 1996 with GDP growth being at only 0.6 percent in 2000, (Republic of Kenya, 1998,2001).

The economy improved from 2003 to reaching a peak in 2007. This sustained growth was brought about by improved confidence by investors, a stable macroeconomic environment, appreciation of the Kenya shilling against major world currencies and a decrease of inflation, (Republic of Kenya, 2008). There was a reversal of the gains made in 2008 brought about by the 2007/2008 post-election violence following the disputed 2007 general election presidential results which disrupted economic activity and eroded the business confidence that Kenya had previously enjoyed. This year also saw the prices of food and fuel spiral upwards, unfavourable weather conditions and the emergence of the

global financial crisis. Economic growth fell from 7 percent in 2007 to 1.5 percent in 2008, (Republic of Kenya, 2009).

The economy started on an upward trend again in 2009 mainly due to the reawakening of the tourism sector and a lot of investment in the building and construction industry. Macroeconomic stability, low inflation, increased credit to the private sector, better weather conditions, increased remittances from abroad after recovery of the global economy and improved prices of major exports improved the economy in 2010 after suppressed growth in 2008 and 2009, (Republic of Kenya, 2011). This favourable economic growth was however constrained in 2011 due to high food and oil prices, unfavourable weather conditions and foreign exchange market instability. From 2012, the economy has been growing again and it remains to be seen for how long this good performance will continue, (Republic of Kenya, 2013).

1.7. Statement of the Problem

Kenya's Vision 2030 is the country's development blueprint which aims at transforming Kenya into a newly industrializing middle-income country by the year 2030. The Vision 2030 is hinged on the economic, social and political pillars. The economic pillar aims at achieving an average economic growth rate of 10 percent per annum. Investment has been prioritized to ensure that this level of economic growth is achieved, (Republic of Kenya, 2007). The government has undertaken various projects so as to fuel economic growth such as the Thika Superhighway and will undertake construction of the standard gauge railway, construction of the LAPSSET corridor, irrigation

projects and electricity generating projects. However, for this to be more effective, private investments must be promoted so as to accelerate economic growth further.

According to Sessional Paper No 10 of 2012 on Kenya Vision 2030, for the 10 percent per annum growth rate to be achieved, investments must be above 32 percent of GDP with private investments being above 24 percent. From theory, debt is a major determinant of private investments. According to El-Mahdy and Torayeh (2009), high levels of external debt lead to debt overhang problems which discourage new private investments while high demand for domestic funds by the government tends to push up interest rates which result in the cost of private credit going up and private investment demand reduces. This is also due to the government also using up private savings which would have been used by the private sector for investment, (Hoag and Hoag, 2006).

The government has undertaken various steps and measures to promote the level of private investments in Kenya, and in turn economic growth. This includes relying more on external concessional debt rather than domestic debt to avoid crowding out private investments, (Republic of Kenya, 2004, 2010). However, despite government efforts to streamline borrowing, private investments and economic growth have remained lower than is stipulated to achieve the 10 percent growth in the economy as shown in figure 1.2 and figure 1.3.

The aim of this study was to find out the effects of public debt on economic growth and private investments in Kenya. This study also aimed to find out the

direction of granger causality between economic growth and public debt in Kenya.

1.8. Research Questions

- i) What is the direction of Granger causality between public debt and private investments and between public debt and economic growth?
- ii) What is the effect of public debt on the level of private investments in Kenya?
- iii) What is the effect of public debt on the level of economic growth in Kenya?

1.9. Objectives

The general objective of the study was to determine the effect of public debt on private investments and economic growth in Kenya.

The specific objectives of the study were:

- i.To determine the direction of Granger causality between public debt and private investments and between public debt and economic growth.
- ii.To determine the effect of public debt on the level of private investments in Kenya.
- iii.To determine the effect of public debt on the level of economic growth in Kenya.

1.10. Significance of the Study

Most studies on public debt and economic growth focus mainly on the effects of external debt on economic growth. This study intends to focus on total debt, both internal and external, and how it affects the level of private investments and economic growth in Kenya. It also seeks to inform policy on the issue of debt in Kenya.

1.11. Organization of the Study

Chapter one covers the background to the study. It looks at how public debt and economic growth has evolved through the years since 1980, the reasons that the government has for using debt as a form of financing its budget and the macroeconomic effects that result from this borrowing. It also looks at the objectives that the study to achieve and the questions the study seeks to answer. This chapter also shows why a huge public debt may present a problem and the significance of the study.

Chapter two deals with the literature review, both theoretical and empirical and presents an overview of the literature reviewed. Chapter three presents the research design which was be used in the study, the theoretical framework underlying the study, sources of data and methods of data collection. Measurement and description of variables and the methods of data analysis are also presented in this section.

Chapter four presents the empirical findings, results of diagnostic tests and discussion of the results. Chapter five shows the summary of the study, the

conclusions, policy implications emanating from the study and areas of further research.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter deals with the review of literature on the areas of public debt, private investments and economic growth. The first part of this chapter has theoretical literature while the second part deals with the empirical literature. The last part has the overview of the literature.

2.2. Theoretical Literature Review

The theories reviewed in this section include:

2.2.1. Classical View of Public Debt

Classical economists are of the view that government debt withdraws capital from productive private employment. According to Say (1880), national debt is disadvantageous since it diverts capital from productive uses to unproductive consumption. For countries with low credit levels, debt has a more negative effect by raising the interest rates since the government is willing to pay higher interest rates than what individuals will be willing to pay. On the other hand Say argues that moderate levels of debt, when put to productive investment, is advantageous since it puts capital into good use rather than being in the hands of individuals who would use it for consumption purposes or leave it idle. Therefore, not unless debt is to be used for productive investment, it will be better for the government not to borrow or for the capital to remain idle in the hands of the public since then the government will not incur interest payments.

Mill (2004) argues that when the government borrows it opens up a channel for investment of capital which would not have been accumulated within the country or not accumulated at all, then this implies that this was just surplus capital and thus this has no effect on the interest rates. If however it competes for capital and takes away funds that would have been used for productive investment in the country then it will raise the interest rates.

2.2.2. Ricardian View of Public Debt

According to the Ricardian equivalence theorem, the burden to the society from government expenditure was brought about by the wastefulness of its use rather than the source of financing the expenditure. It therefore did not matter whether the funds were raised through taxation or by borrowing loans. If current government expenditure is financed by borrowing, the taxes that the current generation has to pay are reduced. Taxation of future generations will be higher to repay the debt implying that disposable income in the next period will be reduced. The tax burden is merely postponed rather than reduced. If individuals are aware that their tax burden in the future will increase, they will not increase consumption rather they will save or invest an amount of money equal to the reduced taxes. Government debt is viewed as being equivalent to future taxes as there is no crowding effect of capital and consumption by individuals remains unchanged which implies then neutrality of debt to growth, (Roberts, 1942 ;Elmendorf and Mankiw, 1999).

Another aspect of government debt is the effect of government bonds on different sets of individuals. To bondholders, government bonds are an asset

while to taxpayers they are a liability. A debt-financed tax cut makes the bond holders wealthier while the taxpayers become poorer. Thus, the net effect of debt is that there is no wealth creation. Households are no richer than they were before and they should not increase their consumption in response to the tax cut, (Barro, 1974).

2.2.3. Lerner's View of Public Debt

Lerner came up with the theory of functional finance in which fiscal policies are measured by their effect rather than the soundness of the policy. Lerner argues that deficits in government revenue can be covered by either printing money or borrowing. According to Lerner, public debt should only be incurred up to the point where the interest rate is most desirable for private investments. Government debt should only be issued only if it is desirable for the public to hold more bonds and have less money at their disposal. This is to avoid a situation where the public has a lot of money and therefore they are more than willing to lend it out thus pushing the interest rates too low and the private sector undertakes high investment expenditure and brings about inflation as a result. Issuing public debt thus reduces the excess liquidity in the private sector. Lerner, therefore, views debt as a means of achieving the optimal rate of interest for private investment rather than as a means of balancing the budget, (Lerner, 1943; Aspromourgos, 2006). Lerner also argues that for as long as demand for current output is maintained, high national debt is not detrimental to society. Interest payments on the debt should also be paid by borrowing rather than taxation not unless it is necessary to avoid inflation by reducing spending. Lerner disagrees with economists such as Alvin Hansen who argue

that as long as the debt-GDP ratio is reasonable and interest payment for debt can be sourced from taxes. According to Lerner, high income taxes to pay holders of government debt will discourage private investors by reducing returns on risky investments such that the investor is not compensated for the risk of losing his investment. This results in the government undertaking more deficit financing so as to maintain employment and income levels. This will necessitate even higher taxation to pay the even higher interest on debt. Private investments become unprofitable as the burden of taxation increases, (Lerner, 1943).

2.2.4. Keynesian View of Public Debt

According to Keynesian theory of debt, at high debt levels, taxes are expected to increase which in turn negates the positive effects of public spending by decreasing investment, lowering consumption, reducing employment and reducing the growth rate of the economy. However at moderate levels, public debt may increase the economic growth rate, (Ferreira, 2009). The government can use the creation of debt to use the savings that are available to undertake productive investment and thus increase national income. The increase in national income facilitates debt servicing through payment of taxes. The increase in debt during periods of unemployment contributes to capital formation and stimulates economic growth, (Varughese, 1999).

2.2.5. Neoclassical View of Public Debt

According to Diamond, if the rate of growth of the economy is higher than the interest rate, capital will be over accumulated and increase in public debt in this

scenario will serve to improve the welfare of current and future generations, (Saint-Paul, 1992). Diamond also argues the debt reduces future consumption and savings by households since taxes are used to make payments for interest accrued from debts. The reduction in savings leads to a decrease in capital stock. Debt is assumed to mature after one period and is refloated in each period and that it pays for the current interest costs. External debt affects the economy through reduced utility that is brought about by the increased taxes that are needed to finance the interest cost that is not paid for by the increased debt. Internal debt also has the same effect and an additional effect of reducing capital stock due to the substitution of physical capital by government debt in the wealth owners' portfolios thus causing a decline in output. Thus crowding out is brought about by internal debt, (Diamond, 1965).

2.2.6. Modigliani's Theory on Debt

Modigliani argued that an increase in national debt is advantageous to those who are in existence at the time of the increase but it is the next generation which bears the burden of the current national debt through a reduction in private capital stock. The reverse holds true where a reduction in the national debt levels is a burden to the present generation and a gain to the next generation. The burden or gain to future generations is measured by the rate of interest at which the government borrows which can be taken as a proxy to represent the marginal productivity of private capital. The burden may be offset in part, totally or more than offset if the increase in debt leads to an increase in government expenditure that increases the real income of future generations through channels such as productive public investments, (Modigliani, 1961).

2.2.7. Endogenous Growth Model

According to Romer (1990), technological change increases the rate at which capital stock increases. This increases the level of output which in turn increases the proportion of output dedicated to saving and investments thus increasing the rate of economic growth even more. Technological change comes as a result of investments by agents in the economy. Capital accumulation combined with technological change increase the output produces per hour worked. Technological change is assumed to be endogenous since people intentionally respond to market incentives to bring about technological change. Technology is also assumed to have a fixed cost since after the initial development cost is incurred, technology can be used over and over again without incurring additional costs. Romer also argues that human capital is a major factor affecting economic growth. Human capital is assumed to be separate from the technological component since technological change has a separate existence from the individual. As an individual's education level rises, they become more productive and have more skills. The differences in levels of human capital formation can thus be used to explain the differences between labour productivity and income per person.

The endogenous growth model assumes constant tax rate and that the government maintains a constant debt-GDP ratio. It holds that an increase in public debt reduces the growth rate of the economy and as such future generations will be at a disadvantage as a result. The opposite holds when public debt is reduced. It raises the growth rate of the economy but harms the current generation. Therefore irrespective of whether debt is increased or

reduced, the effect is bound to be felt by at least one generation. This is so because the model assumes that the interest rate remains unaffected. For the reduction in debt to have a positive effect, there must be an investment subsidy such that the government pays a portion of the interest cost of capital. Since the private return on capital will now be higher, people save, consume less and increase growth, (Saint-Paul, 1992).

2.3. Empirical Literature Review

Ghura and Hadjimichael (1996) used panel data analysis to investigate factors that determine growth in 29 sub-Saharan countries. The study found that private investments have a positive and significant impact on growth and that government policies which increase the level of investment have an effect on growth. Therefore growth was found to increase if a public policy reduced the budget deficit relative to GDP without reducing the the level of investment.

Were (2001) carried out a study to determine the impact of external debt on economic growth in Kenya. Current debt flows as a percentage of GDP and past debt accumulation were found to have a negative relationship with economic growth. Thus showing the existence of a debt overhang problem in Kenya. However, the debt service ratio was found to have a positive effect on economic growth contrary to expectation. The reason behind this was that Kenya's debt service ratio as compared to other low-income countries is low. Private investments and investment in human capital were found to have a positive effect on economic growth. Debt was also found to have a negative

impact on private investments thus showing the presence of crowding out effects of debt.

Maana, Owino, and Mutai (2008) used the generalised method of moments regression model to examine the effect that domestic debt has on economic growth between 1996 and 2007. According to the study, lagged values of GDP, ratio of government expenditure to GDP, broad money supply, secondary school enrolment, private sector credit, ratio of debt to GDP and trade are the variables which influence the level of economic growth. The findings of the study were that debt and secondary school enrolment have a positive but insignificant effect on economic growth. The increase in domestic debt in this period resulted in an increase in interest payments but this didn't crowd out private investments due to the favourable level of financial development in Kenya. Growth in trade, financial deepening, growth in the private sector and government expenditure on real output have a positive and statistically significant impact on growth.

Muhdi and Sasaki (2009) investigated the role of external and internal debt in the Indonesian economy using ordinary least squares regression. The study determined that external debt has a positive effect both on the levels of investment and growth but a negative effect in terms of causing the domestic currency to depreciate. The domestic debt was found to discourage private investment through the crowding out effect thus decreasing the level of economic growth.

Ferreira (2009) carried out a panel data Granger causality analysis using data from 20 OECD countries to find out whether there is causality between public debt and economic growth. Public debt and economic growth were found to have a bi-directional causality. The relationship between public debt and economic growth was found to be negative and statistically significant. This implies that high public debt reduces economic growth while low GDP growth may lead to a country incurring a higher public debt.

Rother and Checherita (2010) investigated how per-capita GDP growth is impacted on by government debt. Panel fixed effects model was used to show the effect of high and growing government debt on economic growth in 12 countries in the euro area over a period of 40 years. The study found that there is a concave relationship between public debt and the rate of economic growth with the turning point of debt being around 90-100 percent of GDP. This implies that the higher the public debt-GDP ratio, the lower is the long term growth rate above this point. Below this point, the effect is determined by the impact that public debt has on the level of private savings and public investments. If the higher debt level is associated with higher levels of public investment, then there will be a positive impact on growth. The study showed that the growth rate of GDP per capita is determined by the previous level of GDP per capita, gross government debt as a share of GDP, saving or investment as a share of GDP and population growth. The study focuses on various channels through which public debt influences economic growth. These are through its effects on private savings, private investments, public

investment, total factor productivity and sovereign long term nominal and real interest rates.

Reinhart and Rogoff (2010) investigated the relationship between public debt and economic growth in advanced economies. Economic growth at debt-GDP ratios above 90 percent was found to be about 1 percent lower than at debt-GDP ratios below 90 percent. However, this study was disproved by Hendron, Ash, and Pollin (2013) due to errors such as selective exclusion of available data, inappropriate weighting of summary statistics and coding errors that resulted in miscalculations that grossly misrepresented the relationship between public debt and economic growth.

Balassone, Francese, and Pace, (2011) investigated the link between debt-GDP ratio and real per capita growth in Italy for the years between 1861 and 2009. The study used regression analysis and found a negative relationship between the debt-GDP ratio and per capita GDP growth with the negative effect of debt being higher beyond the debt-GDP ratio of 100 percent. Debt and investments were also found to have a negative relationship. The study concluded that debt affects economic growth through the investment channel.

Akram (2011) used Autoregressive Distributed Lag (ARDL) modelling to assess the impact of public debt on the economic growth in Pakistan. The study found that there is debt overhang in Pakistan and that per Capita GDP and investments had a negative and significant relationship with public external debt. However, the crowding out effect of external debt could not be confirmed as the relationships between investment and per capita GDP to debt servicing

was found to be insignificant. The domestic public debt was found to have a crowding out effect on private investments and a negative relationship with per Capita GDP.

Maji, Okon, and Denies (2013) used the error correction model to investigate the relative potency of external and domestic debt on the economic performance in Nigeria. Economic growth is determined by external debt, domestic debt, gross domestic investment, exchange rates and inflation while gross domestic investment is influenced by external debt, domestic debt and interest rates. Both domestic and external debt were found to have a positive effect on economic performance but while external debt had a significant impact, domestic debt had an insignificant impact. The impact of external debt on GDI was negative and insignificant while the impact of domestic debt on GDI was positive and significant. This has the implication that external debt and not domestic debt has a crowding out effect on the level of investments in Nigeria.

Barik (2013) used ordinary least squares estimation to find out how public debt has an effect on economic growth indirectly through the investment channel and the direct effects that public debt has on economic growth. According to the study, the investment rate is determined by the level of public debt, money supply, GDP, openness to international trade and the real interest rate while economic growth is determined by the level of public debt, investments, human capital openness to international trade and population growth rate. The study found that there was a positive and statistically

significant relationship between public debt and the rate of investment and also between public debt and the level of economic growth and that there is a positive relationship between investments and economic growth. Public debt thus has a direct positive effect on economic growth and also an indirect positive effect on economic growth through the investment channel. This implies that an increase in public debt increases the level of investment and the real output levels thus increasing the rate of economic growth.

Putunoi and Mutuku (2013) used VAR analysis to investigate the relationship between domestic debt and economic growth in Kenya. A positive and statistically significant relationship was found to exist between the two. Past values of GDP, interest rates, private sector credit and debt were the variables affecting economic growth. The study concluded that if domestic debt is used for productive purposes then it will have a positive effect. Interest rates and GDP growth were found to have a negative but statistically insignificant relationship. This could imply that debt has no effect on interest rates and therefore no crowding-out effect on private investments.

Tasos (2014) used Granger causality analysis to establish the relationship between public debt and GDP growth in Greece. The results showed that it was not possible to establish causality between debt and levels of economic growth in Greece. This means that the two variables are exogenous of one another. This implies that public debt does not play a huge role in determining the economic growth and neither does economic growth determine public debt levels.

2.4. Overview of Literature

Classical and Keynesian economists argue that not unless debt is used for productive investments then it is detrimental to the growth of the economy. Ricardo views debt as having no effect on either investments or growth while to Lerner, debt is a means of achieving optimal rates of interest for private investment. According to Modigliani and neoclassical economists, debt affects economic growth negatively through interest payments and reduction of capital stock. The endogenous growth model, debt reduces the economic growth rate and future generations. This study will adopt the endogenous growth model to form the theoretical framework since it creates a link between growth and public policies.

On the relationship between debt and economic growth Were (2001) found it to be negative while Putunoi and Mutuku (2013), Barik (2013), Maji *et.al* found it to be positive. Debt was found to have a negative effect on private investments according to Were (2001) and Balassone *et.al*. Barik (2013) found a positive relationship between debt and private investments. However, most of the empirical literature deals with either domestic debt or external debt separately. Causality between public debt and economic growth was found to be bidirectional by Ferreira (2009) while Tasos(2014) found there was no causality.

From the above literature debt and economic growth may either have a positive or negative relationship. The positive effect comes about when debt has a positive effect on investments. Debt and private investments may also have a

positive or negative relationship depending on whether there is a crowding out effect. It is also not clear what the direction of causality between public debt and economic growth is.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter describes the research design, the theoretical framework forming the basis of the study and the empirical model used in this study. The variables used in the study and their measurement are also described. The study area, data collection and analysis methods are also presented.

3.2. Research Design

This study aimed to find out the effect of public debt on private investments and economic growth in Kenya. The study used a non-experimental time series research design. Time series data was used for the period 1980 to 2013. This was appropriate for this study since the data was collected for the variables over the years.

3.3. Theoretical Model

According to Ghura and Hadjimichael (1996), endogenous growth models create a link between growth and public policies. The study used the endogenous growth model as presented in the study by Ghura and Hadjimichael (1996). Technological progress is taken as being endogenous. Assuming a Cobb-Douglas production function,

$$Y = A_0(A_k K)^\alpha (A_h H)^\beta (A_l L)^{1-\alpha-\beta} \dots\dots\dots (3.1)$$

Where Y is output, K is the capital stock, H is the human Capital, L is Labour, A_0 is the overall index for technology and efficiency in the economy, A_k is the physical capital augmenting technology, A_h is the human capital augmenting technology and A_l is the labour augmenting technology.

Labour and level of technology are also assumed to grow exogenously at rates n and g respectively.

$$L = L_0 e^{nt} \dots\dots\dots (3.2)$$

$$A = A_0 e^{gt + X\theta} \dots\dots\dots (3.3)$$

Where X refers to policies that affect the level of technology and efficiency in the economy and θ is the vector of coefficients related to these policies.

Expressing equation 3.1 in terms of units of effective labour,

$$y = k^\alpha h^\beta \dots\dots\dots (3.4)$$

Where $k=K/AL$ is the level of physical capital per unit of effective labour, $h=H/AL$ is the level of human capital per effective unit of labour and $y=Y/AL$ is the output per unit of effective labour

Assuming s_k is the fraction of output invested on physical capital and s_h is the fraction of output invested on human capital and that both physical and human capital depreciates by rate δ , then the evolution of capital is determined by

$$\dot{k}(t) = s_k y - (n + g + \delta)k \dots\dots\dots (3.5)$$

$$\dot{h}(t) = s_h y - (n + g + \delta)h \dots\dots\dots (3.6)$$

Equations 3.5 and 3.6 imply that the economy converges to a steady state as defined k^* and h^* respectively.

$$k^* = \left(\frac{s_k^{1-\beta} \cdot s_h^\beta}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \dots\dots\dots (3.7)$$

$$h^* = \left(\frac{s_k^\alpha \cdot s_h^{1-\alpha}}{n+g+\delta} \right)^{\frac{1}{1-\alpha-\beta}} \dots\dots\dots (3.8)$$

Substituting equations 3.7 and 3.8 into equation 3.1 and taking the natural logarithm,

$$\ln y = \ln A_0 + g_t + X\theta + \frac{\alpha}{1-\alpha-\beta} \ln s_k + \frac{\beta}{1-\alpha-\beta} \ln s_h - \frac{\alpha+\beta}{1-\alpha-\beta} \ln (n + g + \delta) \dots\dots\dots (3.9)$$

Therefore from equation 3.9, steady state per capita output depends on level of technology, level of technological progress, government policies, accumulation of capital and the level of population growth. In this study government policies were represented by the effect of public debt on economic growth and private investments.

3.4. Empirical Model

This section presents the empirical model that was used so as to achieve the objectives. The model is derived from studies done by Ghura and Hadjimichaels (1996), Barik (2013) and Were (2001). Debt, growth of physical capital, increase in human capital and population growth as factors affecting economic growth are derived from the theoretical model.

The first objective sought to find out the effect of public debt on private investments in Kenya. This was achieved using the following equation:

$$PI_t = \beta_0 + \beta_1 D_t + \beta_2 DC_t + \beta_3 Y_t + \beta_4 T_t + \beta_5 R_t + \beta_6 \pi_t + \beta_7 DS_t + \mu_t. \quad (3.10)$$

Where I_t is the private investment, D_t is total public debt, DC_t is domestic credit to private sector, Y_t is the GDP growth, T_t is openness to trade, R_t is real interest rates, π_t is the inflation rate and DS_t is the total debt service. The second objective sought to find out the effect of public debt on economic growth in Kenya. This was achieved using the following equation:

$$Y_t = \alpha_0 + \alpha_1 I_t + \alpha_2 D_t + \alpha_3 H_t + \alpha_4 P_t + \alpha_5 \pi_t + \alpha_6 RER_t + \alpha_7 T_t + \alpha_8 DS_t + \mu_t \dots \dots \dots (3.11)$$

Where Y_t is the GDP growth, I_t is the investment ratio, D_t is total public debt, H_t is human capital, P_t is population growth, π_t is the inflation rate, RER_t is the real interest rate, T_t is openness to international trade and DS_t is the total debt service.

The third objective sought to establish the direction of causality between public debt and economic growth in Kenya. This was achieved by estimating the following equations:

$$D_t = \sum_{i=1}^n \theta_i PI_{t-i} + \sum_{j=1}^n \phi_j D_{t-j} + \mu_t \dots \dots \dots (3.12)$$

$$PI_t = \sum_{i=1}^n \vartheta_i PI_{t-i} + \sum_{j=1}^n \psi_j D_{t-j} + \mu_t \dots \dots \dots (3.13)$$

$$D_t = \sum_{i=1}^n \alpha_i Y_{t-i} + \sum_{j=1}^n \beta_j D_{t-j} + \mu_t \dots \dots \dots (3.14)$$

$$Y_t = \sum_{i=1}^n \lambda_i Y_{t-i} + \sum_{j=1}^n \delta_j D_{t-j} + \mu_t \dots \dots \dots (3.15)$$

3.5. Definition and Measurement of Variables

Private Investment: refers to outlays on additions to the fixed assets of the economy done by private investors. It was measured by the gross fixed capital formation by private investors as a percentage of GDP.

Public debt: refers to the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It was measured by the reported total central government debt as a percentage of GDP.

Domestic Credit: refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of non equity securities, trade credits and other accounts receivables that establish a claim for repayment.

GDP growth: refers to the annual percentage change in GDP at market prices. It was measured by the reported annual GDP growth.

Openness to trade: the sum of imports and exports of goods and services as a percentage of GDP was used as a proxy to measure openness to trade.

- Real interest rate:** refers to the lending interest rate adjusted for inflation as measured by the GDP deflator. It was measured by the reported real interest rates.
- Inflation:** refers to the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. It was measured by the consumer price index.
- Debt service:** Total debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term debt. It was measured by the total debt service as a percentage of GNI.
- Investment:** refers to land improvements, purchase of plant, machinery and equipments, construction of roads, railways and other infrastructure.
- Human capital:** refers to the measure of skills and training of the country's labour force was measured by the reported gross enrolment ratio for secondary schools.
- Population growth:** refers to the exponential rate of growth of midyear population from year $t-1$ to t . It was measured by the reported percentage of annual population growth.

Real Exchange Rate: Official exchange rate refers to the exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).

3.6. Data Type and Sources

The study used secondary data. Data for private investments, GDP growth, openness to trade, real interest rates, debt servicing, domestic credit to the private sector, enrolment, inflation rates, real exchange rates, investment and population growth was obtained from The World Bank databank. Data for internal debt and external debt will be obtained from the Kenya Economic Surveys for the years 1980 to 2013.

3.7. Research Instruments

Data was collected using a data collection schedule as presented in Appendix I.

3.8. Data Refining

Data for public debt was obtained by adding the values of external and internal debt for each year.

The debt ratio was calculated by dividing the public debt values by the GDP values for each year.

Data for GDP, external and internal debt between the years 1980 to 1998 is expressed in Kenyan pounds and has to be converted into Kenya shillings.

3.9. Time Series Properties

3.9.1. Stationarity Tests

Regression equations may have very high degree of fit as indicated by R^2 or the adjusted R^2 but have very low values for the Durbin-Watson statistic. This may be an indicator for spurious regression where the errors are autocorrelated. This leads to inefficient estimates of the coefficients, invalid significance tests and forecasts made on these regression equations are not correct, (Granger and Newbold, 1974). To guard against the problem of spurious regression, unit root tests are used to determine whether a series is stationary or non-stationary.

This study used the Augmented Dickey Fuller and the Phillip-Perron (PP) tests determine whether the series are stationary or non-stationary. The ADF test takes care of serial correlation between the error terms by adding the regressand at first difference. The PP test is similar to the ADF test but it also takes care of serial correlation between the error terms using non-parametric statistical methods rather than adding lagged difference terms, (Gujarati, 2003). For a series Y, testing for unit roots using Augmented Dickey Fuller test involves estimating

$$\Delta Y_t = \theta + \lambda t + \psi Y_{t-1} + \sum_{i=1}^p \alpha_i \Delta Y_{t-i} + \mu_t \dots \dots \dots (3.16)$$

Where θ is the intercept

t is the trend

p is the number of lags

μ_t is the random error term

The hypotheses tested are:

$H_0: \psi=0$ (series is non-stationary)

$H_1: \psi \neq 0$ (series is stationary)

3.10. Granger Causality Analysis

Relationships between variables do not imply causality or show direction of causality. The Granger Causality test assumes that past events can influence future events, (Gujarati, 2003). In this study, Granger Causality test was used to determine the presence and direction of causality between public debt and economic growth. Ferreira (2009) found that there exists a bi-directional causality between public debt and economic growth in 20 OECD countries while Tasos (2014) found that there was no causality between debt and levels of economic growth in Greece. This study aims to determine the direction of causality between public debt and economic growth in Kenya.

According to Engle and Granger (1987), in the presence of cointegration, using the Granger causality test at first differences through VAR will be misleading. Therefore, an additional term such as the error correction term is included to capture the long run relationship.

$$\Delta D_t = \sum_{i=1}^n \alpha_i \Delta Y_{t-i} + \sum_{j=1}^n \beta_j \Delta D_{t-j} + \lambda ECT_{t-1} + \mu_1 \dots \dots \dots (3.17)$$

$$\Delta Y_t = \sum_{i=1}^n \lambda_i \Delta Y_{t-i} + \sum_{j=1}^n \delta_j \Delta D_{t-j} + \theta ECT_{t-1} + \mu_2 \dots \dots \dots (3.18)$$

Where Δ is the difference operator, ECT is the error correction term, c_i ($i = 1, 2$) is constant and μ_i ($i = 1, 2$) are serially uncorrelated error terms with mean zero. Long run causality is determined by the significance of the lagged error correction terms using t-test while the F-statistic is used to determine the short run causality by testing the significance of joint test on the sum of lags of the explanatory variables in the model, (Shahbaz, Ahmed, and Ali, 2008).

If $\sum \alpha_i \neq 0$ and $\sum \delta_j$ is not statistically different from zero, then there is unidirectional causality from economic growth to public debt.

If $\sum \delta_i \neq 0$ and $\sum \alpha_i$ is not statistically different from zero, then there is unidirectional causality from public debt to economic growth.

If $\sum \alpha_i \neq 0$ and $\sum \delta_i \neq 0$ then there is bidirectional causality between public debt and economic growth.

If $\sum \delta_j$ and $\sum \alpha_i$ are not statistically different from zero then the two variables are independent, (Gujarati, 2003).

3.11. Data analysis

3.11.1. Ordinary Least Squares Estimation

Objective one and two was met by estimating equations 3.10 and 3.11 respectively using ordinary least squares method of estimation.

Given a general regression model,

$$y = X\beta + \mu \dots \dots \dots (3.19)$$

Then the β coefficient is calculated as

$$\hat{\beta}_{OLS} = (X'X)^{-1}X'y \dots \dots \dots (3.20)$$

Where y is an $N \times 1$ vector of dependent variables, X is an $N \times K$ vector regression matrix and μ is an $N \times 1$ error vector, (Cameron and Trivedi, 2005).

3.11.2. Diagnostic Tests

Ordinary least squares assumes that the error term is normally distributed, has no serial autocorrelation and it is homoskedastic, (Cameron and Trivedi, 2005).

The Jarque-Bera test is done to test for normality, Breusch- Godfrey LM test for serial autocorrelation and the Breusch-Pagan-Godfrey test to test for heteroskedasticity. The Ramsey RESET test is used to determine whether a model is correctly specified while the CUSUM test and the CUSUM of squares test determine whether a model is stable.

CHAPTER FOUR

EMPIRICAL FINDINGS

4.1. Introduction

This chapter presents the results of data analysis. First, the results of stationarity tests that were done to avoid the problem of spurious regression results are presented. Secondly, the results of the ordinary least squares estimation, diagnostic tests and discussion of the results are presented. Lastly, the results and discussion for Granger causality tests between the debt-GDP ratio and economic growth are shown.

4.2. Time Series Properties

4.2.1 Stationarity Tests

The study used Augmented Dickey-Fuller test and Phillip-Perron test to determine whether data on variables is stationary at levels or if the data needed to be differenced so as to make it stationary. The null hypothesis for both tests is that the variables have a unit root. The tests were conducted with an intercept and no trend at a 5 percent level of significance. The results for stationarity tests are presented in appendix II.

Table A3 shows the results for stationarity tests conducted at levels. If the test statistic is greater than the critical value, we do not reject the null hypothesis and conclude that there is presence of unit root in the series and therefore the series is non-stationary. From table A3, debt-GDP ratio, debt service, domestic credit to private sector, gross secondary school enrolment, investment,

population growth and real exchange rates are not stationary at levels while private investments, GDP growth, trade, real interest rates and inflation rates are stationary at levels.

Data which is non-stationary is differenced to make it stationary. Table A4 shows the results for stationarity tests conducted at first difference. At first difference, debt-GDP ratio, debt service, domestic credit to private sector, gross secondary school enrolment, investment and real exchange rates are stationary.

Population growth is still non-stationary at first difference and is therefore differenced for the second time to make it stationary. Table A5 shows the results for stationarity tests conducted at second difference. At second difference, population growth is stationary according to the ADF statistic as shown in table A5.

Therefore, stationarity tests indicate that GDP growth, private investments, trade, real interest rates and inflation rates are integrated of order zero, i.e. $I(0)$. debt-GDP ratio, debt service, domestic credit to private sector, gross secondary school enrolment, investment and real exchange rates are integrated of order one i.e. $I(1)$. Population growth is integrated of order two, i.e. $I(2)$.

4.3. Granger Causality Tests

Granger causality test determines whether one variable is useful in forecasting another variable. Objective three was met by testing for Granger causality between equations 4.1 and 4.2 and also between equations 4.3 and 4.4.

$$D_t = \sum_{i=1}^n \theta_i PI_{t-i} + \sum_{j=1}^n \phi_j D_{t-j} + \mu_t \dots \dots \dots (4.1)$$

$$PI_t = \sum_{i=1}^n \vartheta_i PI_{t-i} + \sum_{j=1}^n \psi_j D_{t-j} + \mu_t \dots \dots \dots (4.2)$$

$$D_t = \sum_{i=1}^n \alpha_i Y_{t-i} + \sum_{j=1}^n \beta_j D_{t-j} + \mu_t \dots \dots \dots (4.3)$$

$$Y_t = \sum_{i=1}^n \lambda_i Y_{t-i} + \sum_{j=1}^n \delta_j D_{t-j} + \mu_t \dots \dots \dots (4.4)$$

The lag length selection criteria in table A7 indicate that the optimum lags to be included in the model for the endogenous variables are 9 lags for equations 4.1 and 4.2 and 10 lags for equations 4.3 and 4.4. If the p-value is lower than the level of significance, then the null hypothesis is rejected. The null hypothesis for granger causality tests is that X does not granger cause Y and Y does not granger cause X. The results for granger causality tests are presented in table 4.3.

Table 4.1: Granger Causality Tests Results

Pair-wise Granger Causality Tests			
Sample: 1 34			
Lags: 10			
Null Hypothesis:	Obs	F-Statistic	Prob.
Private investments does not Granger cause Debt-GDP ratio	25	0.98193	0.5296
Debt-GDP ratio does not Granger Cause Private investments		3.12799	0.0893*
GDP growth does not Granger Cause debt-GDP ratio	24	0.74439	0.6849
Debt-GDP ratio does not Granger Cause GDP growth		41.0232	0.0055***
***significant at 1 percent level of significance			
*significant at 10 percent level of significance			

Source: Computed from study data

At a 1, 5 and 10 percent level of significance, the null hypothesis of private investments does not granger cause debt-GDP ratio was not rejected. The null

hypothesis that debt-GDP ratio does not Granger cause private investments was ejected at a 10 percent level of significance. This implies the existence of unidirectional granger causality between debt-GDP ratio and private investments. Debt –GDP ratio therefore plays an important role in predicting the level of private investments in Kenya but the reverse does not apply.

At a 1 percent level of significance, the p-values for the null hypothesis of debt-GDP ratio does not granger-cause GDP growth is lower than 0.01. This implies that the null hypothesis should be rejected and the conclusion is that debt-GDP ratio granger causes GDP growth. For the null hypothesis that GDP growth does not granger cause debt-GDP ratio, the p-value is higher than 0.05. This implies that the null hypothesis should be rejected leading to the conclusion GDP growth does not granger cause debt-GDP ratio. The results mean that that there exists unidirectional granger causality between GDP growth and debt-GDP ratio. It also implies that variations in the debt-GDP ratio lead to changes in GDP growth but GDP growth has no predictive power on the debt-GDP ratio. These results differ from the results by Tasos (2014) which found there was no granger causality between debt and economic growth in Greece and Ferreira (2009) which found the existence of bi-directional granger causality between debt and economic growth in 20 OECD countries.

4.4. Ordinary Least Squares Estimation

Regressing an I(1) series on another at levels will lead to spurious results, (Baltagi, 2008; Gujarati, 2003). The data is therefore differenced before conducting the OLS estimation. The data used was either stationary at levels as in the case of GDP growth, trade, real interest rates, private investments and

inflation rates; stationary at first difference for debt-GDP ratio, debt service, domestic credit to private sector, real exchange rate, investments and gross secondary school enrolment and stationary at second difference for population growth.

For the t-statistic, the null hypothesis is that the coefficient is equal to zero against the alternative hypothesis that the coefficient is greater than zero. The F-statistic tests the null hypothesis that all coefficients in the estimated equation are equal to zero against the alternative hypothesis that the coefficients are not equal to zero. If the p-value is lower than the level of significance, then the null hypothesis is rejected.

Objective one was met by estimating equation 4.5:

$$PI_t = \beta_0 + \beta_1 PI_{t-1} + \beta_2 D_t + \beta_3 DC_t + \beta_4 Y_t + \beta_5 T_t + \beta_6 \pi_t + \beta_7 R_t + \beta_8 DS_t + \mu_t \dots \dots \dots (4.5)$$

Objective two was met by estimating equation 4.6:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 I_t + \alpha_3 D_t + \alpha_4 H_t + \alpha_5 P_t + \alpha_6 \pi_t + \alpha_7 RER_t + \alpha_8 T_t + \alpha_9 DS_t + \mu_t \dots \dots \dots (4.6)$$

4.4.1: Results

The results for the regression on private investments are presented in table 4.1.

Table 4.2: Private Investments Regression Results

Dependent Variable: Private Investments				
Independent Variable	Coefficient	Std. Error	t-Statistic	Probability
Private Investments (1 st lag)	0.791949***	0.203123	3.898858	0.0018

Debt-GDP Ratio	-0.051654**	0.017503	-2.951210	0.0112
Domestic Credit to Private Sector	0.334858***	0.097762	3.425244	0.0045
GDP Growth	0.193783	0.121287	1.597721	0.1341
Trade	0.110124**	0.040519	2.717834	0.0176
Inflation Rates	-0.013912	0.057536	-0.241798	0.8127
Real Interest Rates	-0.288419***	0.060958	-4.731479	0.0004
Debt Service	-0.412096	0.277882	-1.482988	0.1619
Constant	3.691851	4.664223	0.791525	0.4428
R ² : 0.881986				
Adjusted R ² : 0.736738				
F- Statistic 6.07227				
Probability(F-Statistic): 0.001073				
*** significant at 1 percent level of significance				
** significant at 5 percent level of significance				

Source: Constructed from study data

The results for the regression on GDP growth are presented in table 4.2.

Table 4.3: GDP growth regression results

Dependent Variable: GDP Growth				
Independent Variable	Coefficient	Std. Error	t-Statistic	Probability
Investments	0.584680***	0.143626	4.070858	0.0028
Debt-GDP Ratio	0.099759**	0.031454	3.171580	0.0113
Gross Secondary School Enrolment	0.239050*	0.115004	2.078625	0.0674
Population Growth	-0.048936**	0.020873	-2.344429	0.0437
Inflation Rates	-0.005689	0.036331	-0.156602	0.8790
Real Exchange Rates	-0.379566***	0.069973	-5.424494	0.0004
Trade	0.418495***	0.068449	6.114008	0.0002
Debt service	-0.748924**	0.237202	-3.157325	0.0116
Constant	2.751311***	0.372915	7.377842	0.0000
R ² : 0.968915				
Adjusted R ² : 0.899837				
F- Statistic : 14.02645				
Probability(F-Statistic): 0.000159				
* ** significant at 1 percent level of significance				
** significant at 5 percent level of significance				
* significant at a 10 percent level of significance				

4.4.2: Diagnostic Tests

The results for the diagnostic tests are shown in appendix III. The probability of the Jarque-Bera statistics for the private investments equation and the GDP growth equation are higher than 0.05. The null hypothesis of a normal distribution is not rejected. The conclusion is that the error terms are normally distributed.

For the Breusch-Godfrey test for autocorrelation, the probability of the chi-square statistic for the private investments equation and the GDP growth equation are higher than 0.05. The null hypothesis of no serial correlation is not rejected. This leads to the conclusion that there exists no serial autocorrelation between the error terms in both equations.

The Breusch-Pagan-Godfrey test is used to determine whether heteroskedasticity exists in a model. The chi-square statistic for this test in both equations is higher than 0.05. The null hypothesis of no heteroskedasticity cannot be rejected at a 5 percent level of significance thus leading to the conclusion that the errors terms are homoskedastic.

The Ramsey RESET tests whether a linear regression model is correctly specified while the CUSUM test and the CUSUM sum of squares test determine whether a model is stable at a 5 percent level of significance. The Ramsey RESET test shows that both models are correctly specified at a 5 percent level of significance. The CUSUM test and the CUSUM sum of squares test show that the models are stable at a 5 percent level of significance.

4.4.3. Discussion

Private investments Equation Results

At a 5 percent level of significance, the coefficient for the debt-GDP ratio was found to be negative and significant. The coefficient implies that holding all factors constant, an increase in the current debt-GDP ratio by 1 percent leads to a reduction in the level of private investments by 0.05 percent. These results are similar to the findings by Muhdi and Sasaki (2009), Akram (2011) and Balassone *et.al* (2011) who found that increase in current debt stock has a negative effect on investments in Indonesia, Pakistan and Italy respectively. The increase in debt means that the government will incur more interest payments for the debt. This discourages private investors from investing since they fear that the government will tax them more so as to pay for these interest payments. This is referred to as the debt crowding out effect.

The coefficient for domestic credit to the private sector was positive and significant at a 1 percent level of significance. If the domestic credit to the private sector increases by 1 percent, private investments will go up by 0.33 percent, holding all factors constant. A negative and significant relationship was found to exist between real interest rates and private investments at a 1 percent level of significance as shown by the coefficient. An increase in real interest rates by 1 percent reduces private investments by 0.29 percent, *ceteris paribus*. This is attributed to the crowding out effect. This result is similar to findings by Were (2001), Maji *et.al* (2013) and Barik (2013) in Kenya, Nigeria and India respectively.

Private investments lagged once were found to have a positive and significant coefficient at a 1 percent level of significance. Ceteris paribus, a 1 percent increase in the previous year's level of private investments increase the current year's level of private investments by 0.79 percent. The coefficient for trade was positive and significant at a 5 percent level of significance. Ceteris paribus, private investments go up by 0.11 percent when trade goes up by 1 percent. Barik (2013) also found that openness to trade has a positive effect on investments in India. The coefficients for inflation, GDP growth, debt service and the constant were found to have a statistically insignificant relationship to private investments.

The p-value of the F-statistic for is lower than 0.05 indicating that at least one or more of the coefficients estimated in the model are not equal to zero. The adjusted R^2 for the private investments equation indicates that 73.67 percent of the changes in private investments are explained by the variables in the model.

GDP growth Equation Results

Debt –GDP ratio was found to have a positive and significant relationship to economic growth at a 1 percent level of significance. Ceteris paribus, a 1 percent increase in the debt-GDP ratio increases the level economic growth by 0.1 percent. Putunoi and Mutuku (2013) and Maana *et.al* (2008) also found that debt had a positive effect on economic growth in Kenya. This result indicates that debt is being used for productive purposes which in turn fuel economic growth. Therefore, the cost of servicing debt is less than the proceeds from the investments undertaken using debt.

The coefficient for the gross secondary school enrolment was positive and significant at a 10 percent level of significance. The coefficient means that the level of economic growth increases by 0.23 percent when gross secondary school enrolment increases by 1 percent, holding other factors constant. Ghura and Hadjimichael (1996), Were (2001) and Barik (2013) also found similar results in sub-Saharan Africa, Kenya and India respectively. This serves to show the importance of human capital development to the growth of the economy.

Debt service was found to have a negative and significant relationship at a 5 percent level of significance to GDP growth as indicated by the coefficient. Increasing debt service by 1 percent reduces economic growth by 0.75 percent. Akram (2011) also found similar results in Pakistan. The coefficient for investment was found to have a positive and statistically significant relationship at a 1 percent level of significance with GDP growth. This indicates that investments have a positive effect on economic growth. An increase in investments by 1 percent increase in the levels of GDP growth by 0.58 percent, holding all other factors constant. The population growth coefficient was found to have a negative and significant relationship to GDP growth at a 5 percent level of significance. An increase in population growth by 1 percent reduces economic growth by 0.05 percent, holding other factors constant.

The Real exchange rate coefficient was found to have a negative and significant relationship to GDP growth at a 1 percent level of significance.

Holding other factors constant, economic growth reduces by 0.38 percent when real exchange rates go up by 1 percent. The constant was found to be positive and significant at 1 percent level of significance. This coefficient means that holding all factors constant, the economy grows by 2.75 percent. The coefficient for inflation rates was found to have an insignificant relationship with GDP growth.

The p-value of the F-statistic for is lower than 0.05 indicating that at least one or more of the coefficients estimated in the model are not equal to zero. The adjusted R^2 for the GDP growth equation indicates 89.98 percent of the variations in GDP growth are explained by the independent variables included in the model.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1. Introduction

This chapter presents the summary of the study and its conclusions. It also presents the policy implications of the findings and areas for further research.

5.2. Summary

This study was informed by the consistent rising of the public debt levels while the private investments and economic growth levels have remained lower than what is stipulated to make Kenya a newly industrializing middle-income economy by the year 2030. This is despite various measures being undertaken to regulate the debt levels and promote private investments and economic growth. Various literatures reviewed also presented conflicting results on the role that debt plays in determining the levels of private investments and economic growth. This study was therefore carried out to find out the effect of public debt on private investments and economic growth in Kenya. The study also sought to find out the presence and direction of granger causality between GDP growth and debt.

The study was guided by the endogenous growth model that takes into account the role of public policies in influencing economic growth. Data for all the variables were collected for the years 1980 to 2013. The data was obtained from the Kenya economic surveys and The World Bank publications. Granger-causality analysis was used determine the existence and direction of granger causality between public debt and economic growth and also between public debt and private investments. The study used ordinary least squares estimation

to find out the effect of public debt on private investments and economic growth. The variables were tested for stationarity and the variables that were not stationary were differenced to make them stationary before carrying out estimation. The diagnostic tests confirm that the models used meet the ordinary least squares assumptions of normality, no serial autocorrelation and no heteroskedasticity. The models were also found to be correctly specified and stable.

After estimation, the coefficients for debt-GDP ratio and real interest rates were found to have a negative and significant relationship to private investments. Domestic credit to private sector, private investments lagged once and trade were found to have a positive and significant relationship with private investment as indicated by their coefficients.

On the GDP growth equation, the coefficients of investment, debt-GDP ratio, Gross secondary school enrolment and trade had a positive and significant relationship as shown by their coefficients. The coefficients for population growth, real exchange rates and debt service were found to be negative and significant.

5.3. Conclusions

Debt plays a crucial role in the determination of the level of private investments and economic growth. As shown by the presence of unidirectional granger causality between debt-GDP ratio and private investments and also between debt-GDP ratio and economic growth. Debt-GDP ratio granger causes

private investments and economic growth meaning that public debt levels have predictive power on the level of private investments and economic growth.

Debt has a negative effect on private investments. This implies that when public debt is high, the level of private investment goes down. When public debt is used for productive purposes, it leads to growth in GDP as shown by the positive coefficient. Domestic credit to private sector, private investments lagged once and trade were also found to play a pivotal role in promoting private investments while debt-GDP ratio and real interest rates were found to cause a decline in private investments. Investment, debt-GDP ratio, Gross secondary school enrolment and trade cause an increase in GDP growth while population growth, real exchange rates and debt service were found to be detrimental to the growth of the economy.

5.4. Policy Implications

The study shows that debt-GDP growth granger causes private investments and economic growth. Debt, therefore, plays a great role in determining the amount of investments undertaken by the private sector and the level of economic growth experienced in Kenya.

Debt-GDP ratio was found to have a negative effect on private investments. This shows the existence of debt overhang effects. An increase in government borrowing leads to a reduction of the resources available to the private sector. This also means that the private sector will be taxed more to pay for interest payments on debt thus discouraging private investments. The effect of debt on economic growth was found to be positive. The government should therefore

find an optimal level of debt which promotes both private investments and economic growth.

5.5. Areas for Further Research

Debt can affect the economic growth of a country through various channels, (Rother and Checherita, 2010). This can be through its effect on private investments, private savings, public investments, total factor productivity and sovereign interest rates, both nominal and real. This study focused on the effect of debt on private investments in Kenya and its effect on GDP growth through private investments. Therefore, the effect of debt on economic growth through the other channels has not been explored in this study.

A study can also be undertaken to determine the optimal level of public debt in Kenya. This is because debt was found to have opposing effects on private investments and economic growth. Therefore, a study determining the level of public debt that promotes both private investments and economic growth will inform government policy on the optimal level of debt to borrow.

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2002	-1.40	-4.58	0.55	17.36	-0.14	-1.26	2.13	-0.02	1.96	-2.81	7.69	55.17
2003	0.42	1.86	2.93	9.77	-1.70	2.19	4.03	-0.01	9.82	3.24	7.82	54.13
2004	2.44	-6.18	5.10	5.05	0.64	-0.86	0.69	0.00	11.62	-3.62	11.99	59.48
2005	0.73	-4.36	5.91	7.61	-1.21	-3.21	2.15	0.01	10.31	-3.45	16.21	64.48
2006	0.54	-6.03	6.33	-8.13	-0.24	0.23	2.52	0.01	14.45	-4.78	9.86	55.24
2007	-1.10	-2.17	6.99	4.96	-0.28	2.43	6.65	0.01	9.76	1.86	9.65	53.89
2008	-0.36	2.64	0.23	-0.98	-0.10	-0.36	0.94	0.00	26.24	8.18	9.42	57.58
2009	1.87	3.45	3.31	2.84	-0.04	2.21	2.29	0.00	9.23	1.88	9.30	50.86
2010	0.02	1.28	8.41	12.03	0.03	3.34	2.29	-0.01	3.96	9.58	9.25	54.23
2011	0.85	1.19	6.12	3.85	0.09	-0.99	2.29	-0.02	14.02	-4.28	9.15	60.45
2012	-0.83	-0.52	4.45	9.51	-0.01	2.05	2.29		9.38	1.59	9.05	55.30
2013			5.74	10.94					5.72		9.03	50.90

Source: Constructed from study data

KEY:

I: Investments (% of GDP)

IN: Inflation

PI: Private Investments (% of GDP)

DGR: Debt-GDP ratio

DC: Domestic Credit to Private sector

ID: Internal debt

ED: External Debt

GG: GDP Growth (%)

GDP: Gross Domestic Product

TR: Trade (% of GDP)

RIR: Real Interest Rate

DS: Total Debt service (% of GNI)

SSE: Secondary School Enrolment (% Gross)

PG: Population Growth (Annual %)

RER: Real Exchange Rate

APPENDIX II: STATIONARITY TESTS

Table A3: Stationarity Tests at Levels

Variables	ADF Statistic		PP Statistic	
	ADF Test Statistic	Critical Values	PP Test Statistic	Critical Values
Private investments(% of GDP)	-3.36	-2.25	-3.38	-2.95
Debt-GDP ratio	-2.48	-2.95	-2.56	-2.95
Domestic credit to private sector (% of GDP)	-2.33	-2.95	-2.26	-2.95
GDP Growth	-3.43	-2.95	-3.43	-2.95
Trade (% of GDP)	-3.12	-2.95	-3.13	-2.95
Real interest rates	-3.88	-2.95	-3.91	-2.95
Inflation rates	-3.30	-2.95	-3.36	-2.95
Debt service(% of GNI)	-0.44	-2.95	-0.6	-2.95
Investment(% of GDP)	-2.61	-2.95	-2.65	-2.95
Gross secondary school enrolment	1.60	-2.95	1.30	-2.95
Population growth	-2.25	-2.96	-1.42	-2.95
Real Exchange Rates	-0.93	-2.95	-0.93	-2.95

Source: Constructed from study data

Table A4: Stationarity Tests at First Difference

Variables	ADF Test Statistic		PP Test Statistic	
	ADF Statistic	Critical Values	PP Statistic	Critical Values
Debt-GDP ratio	-5.66	-2.95	-6.23	-2.95
Domestic credit to private sector	-7.38	-2.96	-7.38	-2.96
Debt service(% of GNI)	-4.43	-2.96	-3.94	-2.96
Investment(% of GDP)	-5.39	-2.96	-7.39	-2.95

Gross secondary school enrolment	-4.63	-2.95	-4.69	-2.95
Population growth	-1.52	-2.96	-1.87	-2.96
Real Exchange rates	-5.35	-2.96	-5.35	-2.96

Source: Constructed from study data

Table A5: Stationarity Tests at Second Difference

Variables	ADF Test Statistic		PP Test Statistic	
	ADF Statistic	Critical Values	PP Statistic	Critical Values
Population growth	-4.30	-2.96	-2.16	-2.96

Source: Constructed from study data

APPENDIX III: GRANGER CAUSALITY TEST RESULTS

Table A6: Lag selection criterion

VAR Lag Order Selection Criteria						
Endogenous variables: DEBT-GDP RATIO PRIVATE INVESTMENTS						
Exogenous variables: C						
Sample: 1980 2013						
Included observations: 25						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-158.1727	NA	1259.092	12.81382	12.91133	12.84086
1	-147.6810	18.46537	750.7329	12.29448	12.58701	12.37562
2	-146.7065	1.559260	964.5803	12.53652	13.02407	12.67174
3	-144.8682	2.647129	1169.613	12.70945	13.39202	12.89877
4	-143.9764	1.141449	1556.046	12.95811	13.83570	13.20152
5	-140.9897	3.345096	1794.259	13.03918	14.11179	13.33667
6	-139.9601	0.988471	2505.918	13.27681	14.54444	13.62839
7	-127.7331	9.781569*	1503.398	12.61865	14.08130	13.02433
8	-119.1723	5.478947	1305.684	12.25378	13.91145	12.71355
9	-108.6277	5.061396	1095.888*	11.73021*	13.58291*	12.24407*
<p>* indicates lag order selected by the criterion LR: sequential modified LR test statistic (each test at 5 percent level) FPE: Final prediction error AIC: Akaike information criterion SC: Schwarz information criterion HQ: Hannan-Quinn information criterion</p>						

VAR Lag Order Selection Criteria						
Endogenous variables: DEBT-GDP RATIO GDP GROWTH						
Exogenous variables: C						
Sample: 1980 2013						
Included observations: 24						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-155.2524	NA	1683.638	13.10437	13.20254	13.13041
1	-144.5556	18.71951	966.0089	12.54630	12.84081	12.62443
2	-141.7909	4.377334	1081.249	12.64925	13.14010	12.7794
3	-139.9658	2.585607	1325.588	12.83048	13.51768	13.0128
4	-136.5528	4.266278	1451.801	12.87940	13.76294	13.1138
5	-133.2224	3.607943	1647.326	12.93520	14.01508	13.2216
6	-131.5314	1.550073	2233.311	13.12762	14.40384	13.4662
7	-125.1122	4.814410	2170.982	12.92601	14.39858	13.3166

8	-121.6190	2.037706	2964.560	12.96825	14.63716	13.4110
9	-80.89790	16.9671*	214.7043	9.908158	11.77341	10.4030
10	-54.03846	6.714858	69.6548*	8.00320*	10.0648*	8.5501*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

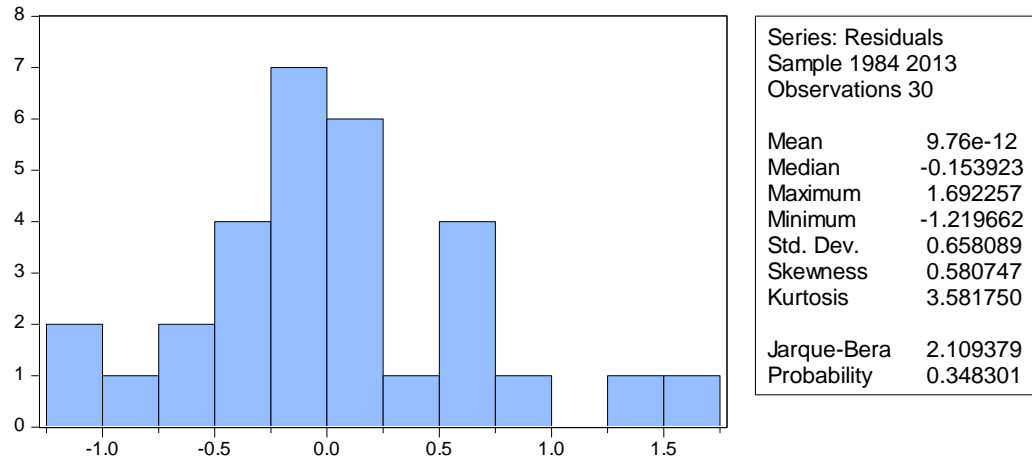
SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

APPENDIX IV: DIAGNOSTIC TEST RESULTS

Table A7: Residual properties

PRIVATE INVESTMENT



Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.368797	Prob. F(2,11)	0.6998
Obs*R-squared	1.885208	Prob. Chi-Square(2)	0.3896

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.387897	Prob. F(15,14)	0.2728
Obs*R-squared	17.93743	Prob. Chi-Square(15)	0.2660
Scaled explained SS	4.347991	Prob. Chi-Square(15)	0.9964

Ramsey RESET Test

Equation: UNTITLED

Specification: PI PI(-1) DDGR DDCPS DDCPS(-2) GG T

RIR IR DDS C

Omitted Variables: Squares of fitted values

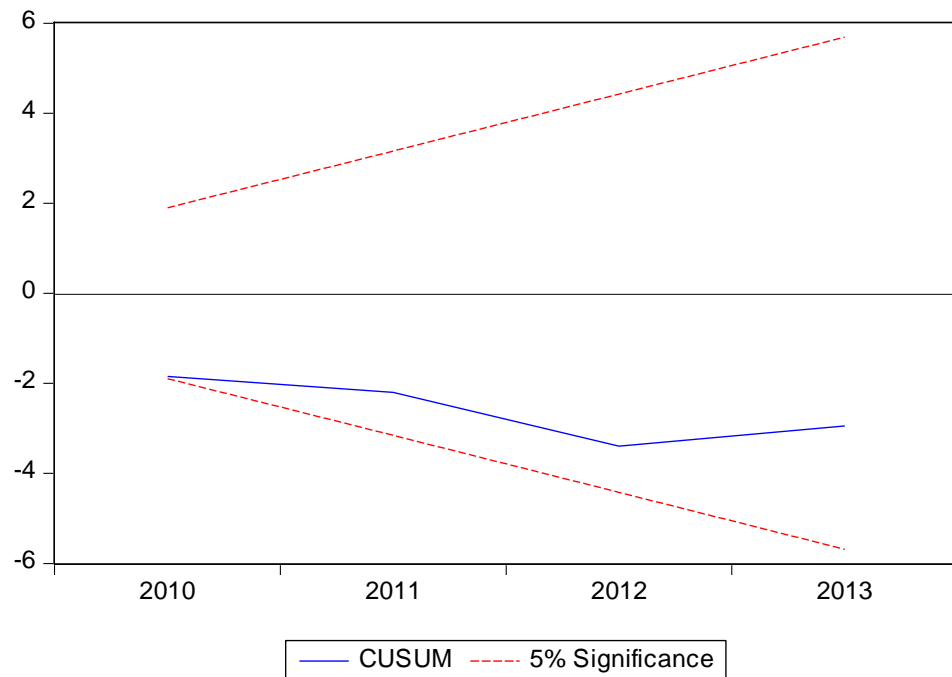
	Value	df	Probability
t-statistic	1.513306	12	0.1561
F-statistic	2.290094	(1, 12)	0.1561
Likelihood ratio	5.239797	1	0.0221

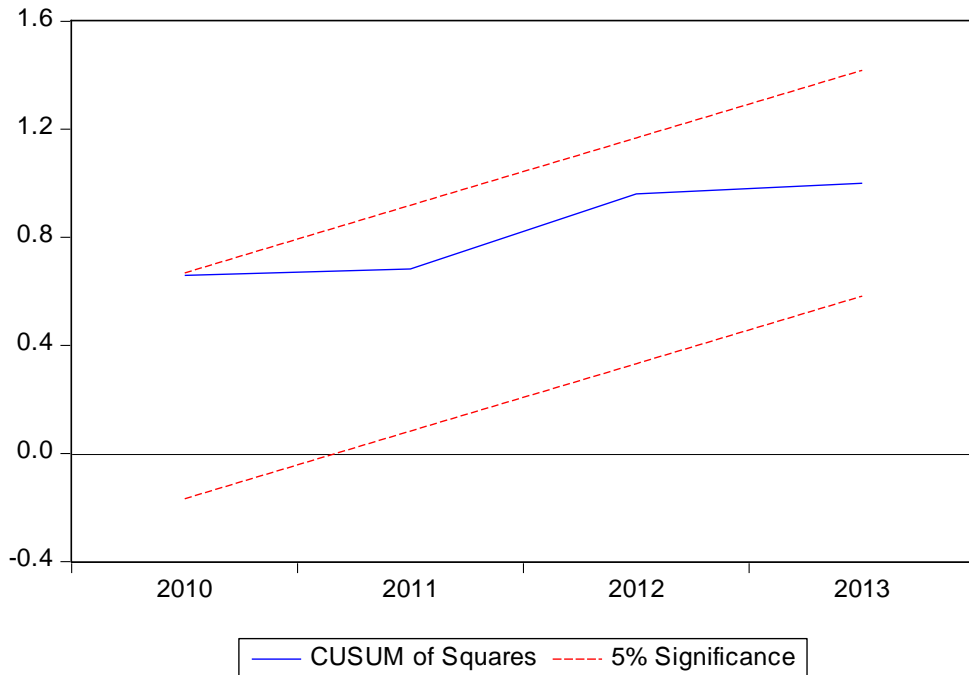
F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.012729	1	2.012729
Restricted SSR	12.55935	13	0.966104
Unrestricted SSR	10.54662	12	0.878885
Unrestricted SSR	10.54662	12	0.878885

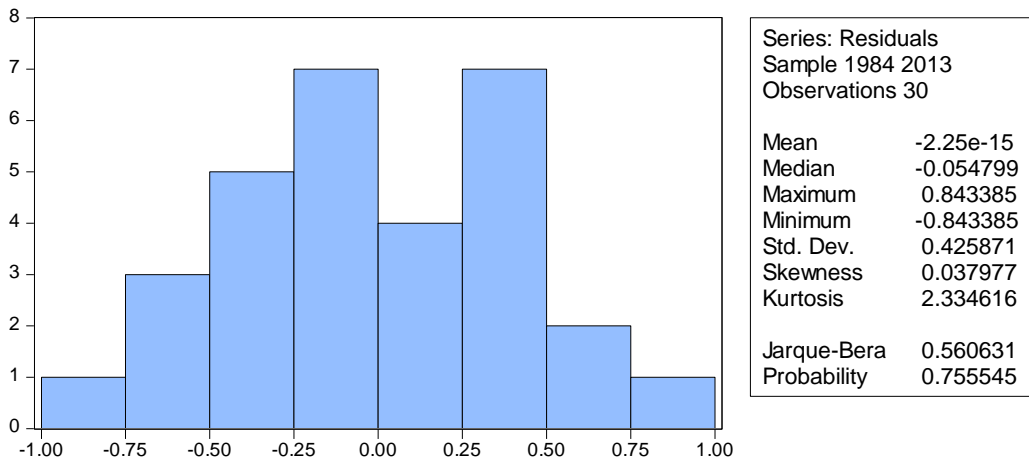
LR test summary:

	Value	df
Restricted LogL	-29.50717	13
Unrestricted LogL	-26.88728	12





GDP GROWTH



Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.219525	Prob. F(2,19)	0.8049
Obs*R-squared	0.700164	Prob. Chi-Square(2)	0.7046

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.695710	Prob. F(20,9)	0.2096
Obs*R-squared	23.70838	Prob. Chi-Square(20)	0.2554

Scaled explained SS 1.423871 Prob. Chi-Square(20) 1.0000

Ramsey RESET Test

Equation: UNTITLED

Specification: GG DI DDGR DGSSE

DDPG IR DRER T DDS

C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.222904	8	0.2562
F-statistic	1.495494	(1, 8)	0.2562
Likelihood ratio	5.141275	1	0.0234

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.828365	1	0.828365
Restricted SSR	5.259626	9	0.584403
Unrestricted SSR	4.431260	8	0.553908
Unrestricted SSR	4.431260	8	0.553908

LR test summary:

	Value	df
Restricted LogL	-16.45109	9
Unrestricted LogL	-13.88046	8

