

**Does Composition of Public Expenditure affect  
Economic growth? Evidence from Kenya**

**BY**

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## **DECLARATION**

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

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## **DEDICATION**

This study is dedicated to my loving husband, my beautiful daughters, parents, brothers and sisters whose encouragement and inspirations has seen me this far in pursuit of knowledge.

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## **LIST OF ABBREVIATIONS**

GDP - Gross Domestic Product

OLS - Ordinary Least Squares

GMM - Generalized Method of Moments

LMICs - Low and Middle Income Countries

MDGs - Millennium Development Goals

MTEF - Medium Term Expenditure Framework

KIPPRA - Kenya Institute for Public Policy Research and Analysis

LSDV - Least Square Dummy Variable

ECM - Error Correction Model

## **ABSTRACT**

This study sought to examine the impact of public expenditure on economic growth in Kenya between 1981 and 2011 with a view of establishing which specific components of government expenditure have significant impact on economic growth. Public expenditure was disintegrated into various components namely education, health, defense, public order and safety, public debt transactions, agriculture and transport and communication. The study employed co integration analysis and error correction methods to investigate the relationship.

The estimation results of the long-run model indicated that public expenditure on public debt transactions was positive and significant in determining growth while Post Election Violence had a significantly negative long run effect on the economy. The lag of GDP also has a positive and significant effect on GDP. However, expenditure on health, education, agriculture, defence, transport and communication and public order and safety are all insignificant determinants of long term GDP. The estimation results of the error-correction model indicated that lagged GDP and public spending on education has positive and significant impact on real GDP. Public spending on agriculture had negative and insignificant effect on real GDP which did not conform to the a priori expectations.

Given the positive and significant effect of public expenditure on education and public debt transactions the government should allocate additional funds to these in order to achieve its economic growth maximization objective. Political instability should be addressed since it has a negative effect on GDP while increased expenditure on defence, agriculture, transport and communication would guarantee food security, reduce the cost of doing business as well as create a favorable environment for investment. The government should also ensure resources are properly managed by promoting efficiency, fighting corruption and embezzlement in the public sector.



## **CHAPTER ONE**

### **1.0 INTRODUCTION**

#### **1.1 Background**

In a bid to achieve the Millennium Development Goals (MDGs), most developing countries have intensified their efforts by increasing and redirecting resources towards achievement of the MDGs. Their concern is whether public spending affects economic growth and how available public resources should be allocated among competing sectors such as education, agriculture, infrastructure, health and defense amongst others in order to achieve economic growth objectives (Bingxin et al., 2009).

In developing countries, expenditure needs exceed the available resources and the situation is made worse by limited options of raising additional revenue domestically. These countries have a large informal sector but they lack effective mechanism of collecting taxes from this sector. Any attempt to raise more tax revenue is thus felt as a disincentive for private investment. The debt carrying capacity of these countries is also very low and external financing is least attractive. The only favorable option involves prioritizing government spending to the more efficient uses in a bid to achieve economic growth objectives. Effective use of public resources for improvement of both human and physical capital would result to increased productivity and income, consequently expanding the scope for both private and public consumption opportunities (World Bank, 2007).

There has been rapid growth in government expenditure in Kenya despite the

government's effort to rationalize expenditure through downsizing and other budgetary measures. The rise in public expenditure was witnessed against a sluggish economic growth raising a lot of concern among policy makers on the implication of such an expenditure on economic growth (Kibe, 2009). Out of a budget of approximately USD 26 Billion, 68 % will be financed through public-private partnership while the balance would be financed through budgetary allocations. This is aimed at increasing investment in key priority social and economic sectors including critical physical infrastructure such as roads, rail, power generation and distribution, port modernization and expansion (Economic Survey, 2011).

Vision 2030 has three key pillars namely economic pillar, Social pillar and Political governance. The economic pillar of vision 2030 aims at achieving and sustaining a growth rate of 10% per annum through the key sectors such as agriculture, tourism, manufacturing and financial services to generate more resources and in turn address the MDGs. The social pillar of vision 2030 also requires the government to prioritize its spending on education, health, housing, water, environment, youth and gender and political governance. The political governance pillar aims to realize an issue based, people centered, result oriented and accountable democratic system (Economic survey, 2011). It is therefore important to address the question of whether increased expenditure in any of these sectors will spur or hinder economic growth.

## **1.2 Overview of Government Budget**

The link between policy, planning and allocation of public resources has been strengthened through the medium term expenditure framework (MTEF) budget preparation process that underscores the importance of program based budgeting. This is intended to optimize returns from public investment through prioritized spending and enhanced absorption of budgeted funds (Njeru, 2003).

An annual budget containing both government revenues and expenditures is presented to Parliament for approval every financial year. It contains three types of estimates namely revenue, recurrent expenditure and development (Njeru, 2003). These estimates are prepared by the various government ministries taking into consideration the total government expenditure ceilings. The guideline to both revenue and expenditure allocation is provided by treasury which reviews the supplementary estimates and decides whether to cut proposed expenditures or come up with additional revenues to finance the budget. It is therefore important for policy makers to identify which components of public expenditure should be cut depending on their contribution to economic growth (Njeru, 2003).

## **1.3 Economic growth and public expenditure in Kenya**

Over the decades, government expenditure in Kenya has grown at a faster rate than the GDP growth rate. Since independence, economic growth has experienced upswings and downswings with significant economic growth witnessed in the first two decades after independence. The economy grew at an annual average rate of 6.71 percent between

1963 and 1973 after which there was a recess in economic growth hitting a minimum of - 0.3 percent in the fiscal year 2000/2001.

A change of government that saw NARC government come into power prompted a revival of the economy from the fiscal year 2003/2004 accelerating GDP growth to 6.1 percent in the fiscal year 2006/2007. This was as a result of increased Foreign Direct Investment, private investments and public investment owing to increased investor confidence. However as a result of various challenges namely, high fuel prices and food prices, post election violence and unfavorable weather conditions experienced during the year 2008 to second half of year 2011, growth in GDP has remained close to 4.4 percent in the year 2011. In contrast, public expenditure allocations in all sectors of Government have continuously been on increase since independence.

### **1.3.1 Kenya's Economic Growth**

In the first decade of independence between 1964 and 1973 there was remarkable performance with the economy growing at an average of 6.7 percent. This was as a result of emphasis on small holder agricultural farming and growing demand both domestically and within East Africa. The period that followed between 1973 and 1985 was characterized by oil shocks of 1973/74 and 1979/80 which affected the economy negatively. The mismanagement of proceeds from coffee boom of 1976/77 together with the effects of the oil shocks resulted to balance of payment problems (Mwega and Ndungu, 2002). During this period the government was the major investor leading to a 37 percent increase in government spending.

Following the effects of the second oil price shock, attempted military coup of 1982 and severe draught in 1983-84, the average growth in GDP declined to 3.2 percent. This was followed by mini-coffee boom of 1986 which saw the economic growth increase to an average of 5 percent. The favorable weather condition after the draught and decreased oil prices also favored economic growth (Mwega and Ndungu, 2002). As a result of ethnic clashes experienced during multi-party elections in 1992 followed by major draught in the same year the average economic growth rate declined further to 2.5 percent. During this period, the interest rates were high, and exchange rate depreciation was large as a result of foreign exchange market liberalization and growing budget deficit. These challenges led to balance of payment problems. In addition, most donors withdrew foreign aid, leading to a remarkable decline in foreign investments.

All major sectors of the economy like tourism, agriculture and manufacturing recorded poor performance leading to further decline in average economic growth to 1.9 percent in the late 1990s. After ethnic clashes in 1997, the effect of El nino rains experienced in 1997/98 which had a great impact on infrastructure and major draught in year 2000, Kenya's economic growth hit a minimum of -0.2 percent in year 2000 (Economic Report on Africa, 2002).

A modest recovery was experienced between 2001 and 2007 when real GDP growth rate rose to 7.0 percent. This was as a result of increased investor confidence after 2002 general elections, increasing economic integration and increased donor support.

However, various challenges experienced in 2008 namely post election violence, high fuel and food prices, global economic turmoil and unfavorable weather condition saw economic growth take a downturn recording a real GDP growth of 1.7 percent (Kenya Economic Survey, 2009).

In 2010, the real GDP expanded by 5.6 percent after suppressed growth of 1.5 percent and 2.6 percent in 2008 and 2009 respectively. During this period there was macroeconomic stability, low inflationary pressure, favorable weather conditions and private investor confidence remained high therefore boosting economic growth. However, instability of the foreign exchange market in second half of 2011 and inflation due to high oil and food prices restrained growth further to 4.4 percent in the year 2011.

### **1.3.2 An overview of government expenditure in Kenya**

The Kenyan budgetary expenditure comprises of two components, recurrent expenditure and development expenditure. Recurrent expenditure are the provisions made to meet government operations such as compensation to employees in the form of salaries and wages, transport operation expenses, repairs and maintenance of equipment. Development expenditures are provisions made for the creation of new assets. They include expenditures such as construction of roads, rehabilitation and construction of water installations and transfers from government to other agencies for capital expenditure. Development expenditure comprises of total expenditures from all the development projects undertaken by ministries. It accounts for slightly over 10 percent of total Government Expenditure (Institute of Economic Affairs, 2007).

During the period 2001 to 2011 overall government expenditure rose considerably from 307.7 billion in the 2001/2002 financial year to 1165.5 billion in the year 2011/2012. The total government spending in proportion to GDP in Kenya has equally been on the rise (see Table 1.1)

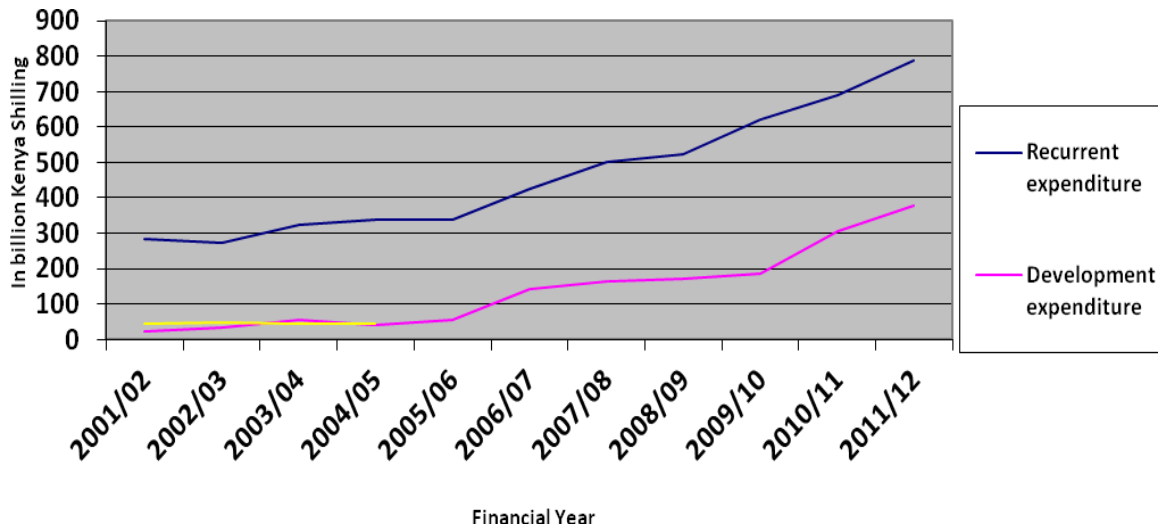
**Table 1.1: Trends in government Expenditures in Kenya, 2002-2011 (billion Kenya shillings)**

Year	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Recurrent expenditure	272.3	321.8	339.7	337.7	423.5	501.7	522.08	620.5	691.6	787.9
Development expenditure	32.0	54.6	40.1	54.6	142.4	162.9	170.1	184.8	306.7	377.6
Total Expenditure	304.3	376.4	379.8	392.3	565.9	664.6	692.9	805.3	998.3	1165.5
GDP at market price	1029.9	1058.5	1,109.3	1,172.8	1,249.5	1336.8	1357.3	1393.2	1470.5	1539.3
% exp/GDP	29.55	35.56	34.24	33.45	45.29	49.72	51.05	57.80	67.89	75.7

Source: Economic Surveys, various issues

A look at the total expenditure trends in the above table shows that government expenditure has been increasing over the years. This can be attributed to increased provision of basic social services by the government in an effort to achieve the MDGs especially the free primary education and increased demand for social services due to population pressure. In addition, most sectors in the economy have continued to demand higher revenue allocations resulting from high number of strikes experienced from public servants (Mudaki and Masaviru, 2012).

Figure 1.1 Trends in recurrent and development expenditure in Kenya (2002- 2011)



Source: Economic Survey, various issues

During the 2001-2005 periods, the recurrent expenditure averaged approximately 85% of total government expenditure. The share of recurrent expenditure has decreased over the years owing to implementation of budget rationalization program (Njeru, 2003). Between the year 2005 and 2010 the share of recurrent expenditure to aggregate public spending declined from 89.4 percent in the year 2004/05 to 67.6 percent in the year 2011/2012. This was accompanied by rise in the share of government expenditure allocated to development projects. The proportion of development expenditure to aggregate spending rose from 7.9 percent in the year 2001/2002 to 32.4 percent in 2011/2012. This rise in development expenditure has been predominantly for infrastructural development.

#### 1.4 Composition of government spending by sector

The public expenditure reforms in Kenya have focused their efforts on the affordability of the current levels of public spending where less emphasis has been given to where the



public money is actually spent. The government is still faced with challenges of making choices regarding the composition of its expenditure allocations. These include how much should be allocated to respective sectors.

Recently, public expenditure allocation to education sector, health sector and infrastructure has been on the rise. However, this has not resulted to any change in the composition of public spending which has remained the same since the late 1990s. Table 1.2 below gives a breakdown of expenditure allocations to the main sectors of the economy for 2001/02 financial year to 2011/2012.

As can be seen in table 1.2, expenditure on education accounts for the largest share of total government spending. The allocation to education rose from ksh 55.6 billion in the fiscal year 2001/2002 to ksh 221.1 billion in 2011/2012. While Kenya has met its Millennium Development Goal for primary education enrollment owing to the Free Primary Education Program, the quality of education provided is still questionable (Kibe, 2009).

The trend of the health budgetary allocations is also on the rise especially after signing of the 2000 Abuja Accord that emphasizes the need to increase revenue allocation in health sector up to 15% of total public spending. The allocation increased from ksh 15.2 billion in the fiscal year 2001/02 to ksh 69.1 billion in 2011/12. As seen in table 1.2, the budget for public order and safety rose from ksh 19.5 billion in the fiscal year 2001/2002 to ksh 93.8 billion in 2011/2012. The budget allocation for defense also increased from Ksh

16.3 billion in the year 2001/2002 to Ksh 68.7 billion in 2011/2012. This was as a result of rise in insecurity including the pursuit of the Al-Shabaab militia.

**Table 1.2: Classification of Public expenditure by sector (in billions Kenya shillings)**

Fiscal Year	Education	Health	Transport & communication	Agriculture	Defense	Public order and safety	Public debt transactions
2011/12	221.1	69.1	104.9	44.6	68.7	93.8	174.7
2010/11	197.5	54.5	92.7	44.3	54.0	76.2	157.2
2009/10	182.3	38.4	61.9	25.3	47.9	61.3	147.5
2008/09	144.4	32.8	57.9	23.9	41.2	60.6	125.9
2007/08	127.4	30.3	43.2	16.7	37.2	51.3	142.1
2006/07	111.7	27.5	31.2	14.1	25.1	41.8	129.7
2005/06	93.9	20.1	18.8	9.9	25.6	39.8	101.5
2004/05	84.7	16.3	13.5	10.3	21.0	30.4	108.1
2003/04	78.1	15.3	20.6	11.1	19.9	26.5	114.4
2002/03	65.1	15.4	11.8	9.4	17.6	21.2	101.1
2001/02	55.6	15.2	12.2	8.7	16.3	19.5	123.84

Source: Economic surveys, various issues

The current emphasis on infrastructure in Kenya is a major step towards achieving the Vision 2030 objectives, was evidenced by rise in share of government expenditure allocated for infrastructure. The allocation for transport and communication rose from Ksh 12.2 billion in the fiscal year 2001/2002 to Ksh 104.9 billion in 2011/2012. The importance of agricultural sector to Kenyan economy as a source of government revenue need not be emphasized. However, only less than 4% of the total government expenditure

is allocated to this critical sector. The budget allocation to the agriculture sector increased from Ksh 8.7 billion in the fiscal year 2001/2002 to Ksh 44.62 billion in 2011/2012.

Economic growth in Kenya has been fluctuating while government expenditure has constantly been on the increase. There has been an increasing trend in government expenditure in all sectors, see Appendices 1 to 5. However, in some situations like health and agriculture expenditure, an increase in government spending did not translate to increase in economic growth. While economic theory depicts that an increase in government spending on education, health care, physical infrastructure, defense, public order and national safety would result to positive economic growth, this is not the case in Kenya.

Although the Kenyan Government has expressed commitment to reduce the share of government expenditure to the GDP ratio, it is important to note that some of the components of public expenditure are more significant in influencing economic growth than others. In view of this, it is important to examine the effect of different components of public expenditure on both long-term and short-term growth (Njeru, 2003).

### **1.5 Statement of the Problem**

Public expenditure in Kenya has grown tremendously over the years despite the government efforts to rationalize expenditure through downsizing and other budgeting measures. As a result the government is faced with hard choices when undertaking public expenditure cuts since the question of which component of public expenditure should be

cut; whether health, education, infrastructure or defense depends on the contribution of these components to economic growth. Thus, there is a cause of concern to policy makers on the implications of such expenditure cuts to economic growth.

This paper therefore seeks to examine the different components of public spending in Kenya and how they influence economic growth. This research will analyze the trends and composition of Government expenditure and the contribution of each component to economic growth using 30 years time series data over the period 1982 to 2011. This study introduces post election violence and lagged GDP as useful explanatory variables that influence economic growth.

## **1.6 Objectives of the study**

The main aim of the study was to examine the impact of public expenditure on economic growth in Kenya, with a view of establishing which specific components of government expenditure have significant impact on economic growth. The specific objectives were:

- (i) To examine the long- run effects of components of government expenditure on GDP growth rate.
- (ii) To analyze the short-run effects of government expenditure patterns on economic growth.
- (iii) To derive policy implications based on (i) and (ii) and give appropriate policy recommendations.

## **1.7 Significance of the Study**

The empirical study on the relationship between the components of government expenditure and economic growth would be significant in several ways. The study will test the assertion that some components of government expenditure contribute significantly to economic growth while others do not. The results will help the policy-makers in prioritizing limited public resources so as to achieve maximum growth through budget rationalization. In addition the study aims to contribute to the existing literature on the effect of public expenditure on economic growth.

## **CHAPTER TWO**

### **2.0 LITERATURE REVIEW**

#### **2.1 Introduction**

There has been a growing body of literature evaluating the influence of the composition of public expenditure on growth all over the world utilizing a variety of time series econometric techniques. This chapter provides a brief survey of the theoretical and empirical literature on the impact of composition of government expenditure on economic growth. The chapter ends with a summary and overview of the literature reviewed.

#### **2.2 Theoretical Literature**

The endogenous growth model explains the relationship between government spending and economic growth where public expenditure composition is taken as one of the determinants of economic growth (Sanz and Velazquez, 2001). Within the endogenous growth model, governments make policies aimed at improving the factor allocation where market forces have failed to do so. The model makes a distinction between nonproductive and productive public expenditure whereas productive public expenditure is believed to be critical in complementing private sector production.

Government consumption affect private sector productivity since an increase in share of non-productive government expenditures may affect incentive to invest which in turn affects GDP growth (Sennoga and Matovu, 2010). In addition to the growth-boosting public expenditures, the government provides some goods to create a favorable environment for economic growth. An example is provision of security and political

stability. These contribute to public input by creating a safe environment for private investments and maintenance of stable institutions where economic activity can thrive (Nijkamp and Poot, 2004).

According to Keynes, there is need for government spending to increase employment when the economy is in depression with high unemployment of labor and capital. In his theory, government spending is necessary in promoting growth. However, lobbying by interest groups, political parties and private sector may lead to misallocation of these public resources. Increase of expenditure by government may also result to crowding out of private sector. Similarly if government cut spending there may be a decline in private investment (Mudaki and Masaviru, 2012). While Keynesian view argues that public consumption affect the economy positively, the classical economists assert that the effect is temporally since long run adjustment of prices lead to optimal output and employment levels (Ocran, 2009)

Other justifications for government spending include; failure of markets to provide particular goods and services due to enormous initial costs and uncertain profits. Second is free rider problem where there is limited ability to charge a price or exclude those who have not paid from using the good or service. An example of such service is defense. The production of some goods is considered unprofitable on a scale demanded by the market therefore necessitating public spending. Therefore, public inputs, natural monopolies and spill-over effects are the reasons for government spending (Pejsavora, 2011).

Government's provision of public goods, make the private sector more efficient through reduction of transaction costs. Examples of public goods are roads, justice, defense and security. However, they are unprofitable if offered by the private sector because of their collective nature. Merit goods on the other hand are provided by government since the benefits the economy derives from them is way beyond their value in a private market (Hutchinson and Schumacher, 1997). Examples of merit goods are education and health care. Government intervention in provision of health care is as a result of unique characteristics of this sector namely asymmetric information and externalities. There exists a positive effect of public health expenditure on life expectancy especially in developing countries. A higher share of government spending on this sector is thus believed to foster economic growth (Aisa and Pueyo, 2004).

Public spending on infrastructure is also viewed to have a strong growth-promoting effect as it impacts productivity of private inputs and return on capital, especially for a country growing from a low base of infrastructure assets. Increased public investment in infrastructure lowers operation costs for the private sector therefore fostering economic growth (Sennoga and Matovu, 2010).

The objective of the government is to reallocate society's resources between private and public uses to improve economic efficiency. It is therefore expected that public expenditure should influence growth positively unless there exists some level of inefficiency that could erode this positive contribution (Hutchison and Schumacher, 1997). Since there exists no generally accepted rules on how to allocate expenditure



amongst competing needs, various guidelines have been proposed and are used by public finance specialists (Paternostro et.al, 2007). All governments are faced with tough choices on the optimal size necessary to achieve their objectives of welfare maximization, political stability and sustainable economic growth. This study focuses effect of public expenditure on the lastly mentioned goal bearing in mind that the government has limited resources and many competing needs.

### **2.3 Empirical Literature**

Narvaez (2000) studied the effects of different components of public expenditure on per capita economic growth rate in a set of Low and Middle-Income Countries (LMICs) across the world over the period 1975 – 2000 using a variation of the augmented Solow model. The per capita GDP growth rate was used as the dependent variable while government spending was disaggregated to different components. The results of generalized method of moments (GMM) estimator revealed that there exists a positive and statistically significant effect of government spending on education, transport and communications, and a negative effect on spending on other economic affairs in a set of LMICs. The conclusion was that composition of government spending does matter for growth in the set of LMICs.

A study by Nurudeen and Usman, (2010) attempted to explain why rising government expenditure in Nigeria had minimal effect on growth using time series data from 1970-2008. They treated both the level and composition of government expenditure as important determinants of growth. The results of OLS estimation revealed government

expenditure on health, transport and communication is positive and significant in influencing growth while that of education is significant but negative. Public spending on transport and infrastructure reduces cost of production while public spending in health improve the health status and hence productivity of the people. The negative effect of public spending on education was as a result of misappropriation and embezzlement resulting to numerous strikes by academic staff unions. The study recommended increased funding to anti graft agencies to arrest those who divert or embezzle public funds.

Wang and Davis (2009), in their study on the Composition of State and Local Government Expenditures and Economic Growth, investigated how different areas of state and local government expenditure are related with economic growth at the state level. They applied Two-step GMM method to study the effects of different areas of state and local government expenditure on growth. The data drawn from the 48 U.S. states was spanned into three ten-year time periods from 1970-1980 though 1990-2000 and the dependent variable was the average ten-year growth in real per capita income in dollars. The independent variables included nine areas of state and local government expenditures namely expenditures on education, public welfare, highway, hospital and health, public safety, environment and housing, government administration, utility, and insurance trust. The results revealed that state and local government expenditure on highway, public safety, and utilities affect growth positively while expenditure on state and local expenditures on education, hospitals and health, and administration were negatively related to growth. Changes of expenditures on environment and housing and insurance

trust also had negative impacts on growth and were considered non productive. The results conform to the assumption that different areas of expenditure affect growth differently. The study emphasized the need to improve efficiency in provision of government services through supervision and regulation.

Devarajan, et al., (1996) in their study on the composition of public expenditure and economic growth, used annual time series data for 43 developing countries for the period 1970 to 1990. In their model they did not classify government expenditure as productive and unproductive expenditure but instead allowed the results of the data demonstrate which components would be classified as productive. They used central government expenditure including current and capital expenditure on defense, education, health, transport and communication with the share of each component of total government expenditure being the explanatory variable. The dependent variable was a five year moving average of per capita GDP growth with five year lags being used to eliminate short term fluctuations resulting from shifts in public expenditure.

The results of OLS estimation revealed that spending on defence and economic affairs had significantly negative effect on growth. Public spending on infrastructure also had negative but insignificant effect on growth which was in contrast with apriori expectation. They concluded that though the governments in developing countries may be focusing on capital expenditure as an engine for growth, too much spending on capital expenditure may have rendered them unproductive at the margin. Developing countries should therefore reallocate resources towards current expenditures as they are likely to be

more favorable to growth. This study ignored the fact that different countries have different objective functions which affects their choice of the level and composition of public spending. It is therefore important to narrow down to the specific countries in order to better results.

Bingxin et al, (2009) in the study; Does Composition of Government Spending Matter to Economic Growth studied the impact of government spending on economic growth in various developing countries. They used a dynamic GMM model and a panel data set for 44 developing countries in Asia, Africa and Latin America for the period 1980-2004. They made the following conclusions; composition of government spending affected growth in Africa and Asia while in Latin America none of the government spending items had any significant effect on growth. The study concluded that governments needed to allocate more resources to the sectors that boost economic growth. This explains the need for empirical research on how different components of public expenditure affect growth at country level.

Pejsarova, (2011) in his study, composition of public expenditure and growth used an Autoregressive Distributed Lag model to estimate the long-run relationship between fiscal variables and growth using panel data of four Central European countries from 1995-2010. He argued that, components of government expenditure affect economic growth over an extended time period. He estimated the growth effects of per capita GDP on both levels and shares of various components of public expenditures in consideration to government decentralization and budget constraint. LSDV (Least Squares Dummy

Variable) method was applied with the dependent variable taken as GDP per capita growth and its three year forward moving average. The explanatory variables included the respective levels and shares of different components of public spending, public revenues and control variables. The control variables included capital formation, population growth, terms of trade and ratio of government expenditure to GDP.

The results of the study revealed a significant negative relationship between health expenditure and economic growth while public spending on economic affairs exhibited negative but insignificant effect on per capita growth. Public expenditure on both defence and education had a significant and positive effect on growth. The study recommended that a shift from economic affairs spending towards spending on education may actually benefit economic growth.

In Kenya, Maingi, (2010) examined the effects of government expenditure on GDP growth using time series data for the period 1963 to 2008. Government expenditure components that included expenditure on economic affairs, public debt servicing, government investment, physical infrastructure, public order and national security, education, health care, general administration and services, defense, and government consumption were used as explanatory variables. The results of Vector Auto Regression revealed that government expenditure on investment and on physical infrastructure had positive effect on economic growth. This is by creating a favorable environment for private investment hence reduction in cost of production.

Government expenditure on education improved the economic growth initially but later had a negative effect. The study concluded the long-run impact of public debt servicing on economic growth was insignificant. Defense spending had positive effect in the short run and nil effect in the long run. This could be attributed to increased foreign direct investments owing to political stability. The spending on public order and national security however had mixed effect on GDP growth rate while spending on healthcare had positive effect on growth. This could be attributed to the fact that improved healthcare raises the health status hence improving productivity. However, Maingi's study ignored the contribution of agriculture as one of the backbone of economic growth.

In a recent study, (Mudaki and Masaviru, 2012) studied the impact of various components of public spending on economic growth using Kenyan time series data for the period 1972 to 2008. The explanatory variables were; public expenditure on health, defense, education, economic affairs, agriculture, and expenditure on transport and communication. Public expenditure on education was found to be highly significant in influencing economic growth while expenditure on agriculture is also significant though negative. Expenditure on economic affairs, health, transport and communication was positive but insignificant. Expenditure on defense and manufacturing were not only negative but insignificant determinants of economic growth. The negative results were attributed to inefficiency, inadequate investment and slow adoption of technology.

The study recommended increase allocation of public spending to education owed to its positive contribution as a key determinant of economic growth in Kenya. Despite the

findings, the study also recommended increased spending in agriculture, economic affairs, defense and manufacturing sectors as they remain important pillars in the economy. However, the study concluded that the composition of government expenditure and public expenditure reforms matter for economic growth. The study ignored the effect of government spending on public debt transactions as key determinant of economic growth.

## **2.4 Overview of Literature**

Most of the literature on the influence of government spending on growth in Kenya has focused its interest on the impact of the overall size of government spending. It is only recently that the literature has begun to focus on the influence of different components of public expenditure on economic growth. The government through budget reforms is committed towards prioritizing the use of meager public resources to achieve maximum growth through budget rationalization and downsizing.

While economic theory does not provide clear cut answers to the question of how different components of public expenditure affect economic growth, empirical evidence has provided conflicting results. More empirical analysis of the relationship between economic growth and different components of government expenditure is therefore important in order bridge this research gap. Very few studies have been done in Kenya to address this research gap.

The study by Maingi, (2010) examined the effects of government expenditure on GDP growth using Kenya time series data from 1963 to 2008. The explanatory variables were

government investment, physical infrastructure, education, health care, public debt servicing, economic affairs, general administration and services, defense, public order and national security. Another study was done by Mudaki and Masaviru in 2012. They studied the impact of various components of government spending on Kenyan economic growth from 1972 to 2008. These two studies omitted important variables that together would have significant effect on economic growth.

This paper aims to extend the previous research through introduction of government spending on Public debt transactions and agriculture as additional explanatory variables. Either of the two variables is excluded in the previous studies. The study also introduced lagged GDP and a dummy variable to take care of the effect of post election violence experienced in the years 1992, 1998 and 2007 which had significant effect on short-run economic growth.



## CHAPTER THREE

### 3.0 RESEARCH METHODOLOGY

#### 3.1 Theoretical Framework

Recent research on endogenous growth has come up with various models linking public spending to economy's long term growth rate. A simple version of the model is that developed by Barro, (1990). He argued that the role of public services as inputs to private production lead to a potential linkage between government expenditure and growth. Government expenditure is thus taken to complement private production

A general production function relates economic growth (expressed in form of output or income) to various explanatory variables with an assumption that the direction of causality flows from these variables to economic growth. This is presented in a simple neoclassical production function which assumes that output is determined by a Cobb-Douglas production function of the form;

$$Y_t = A_t L_t^\alpha K_t^\beta \quad (1)$$

Where  $Y_t$  is the aggregate output (GDP),  $A$  is efficiency of production at time  $t$ ,  $L$  is labour,  $K$  is other physical capital of the country. In an endogenous growth model, the efficiency of production,  $A$ , affects the long-run growth in output. Hence in the endogenous growth model developed by Barro (1990) government expenditure is taken to be a determinant of  $A$ . This model is based on the assumptions that government purchases goods from the private sector in order to offer free public services to the producers, government production function is similar to that of private firm and that

public goods and services are non-rival. Based on these assumptions a modified Cobb-Douglas production function is adopted to analyze the relationship between government expenditure and economic growth. The modified production function is of the form;

$$Y_t = A_t L_t^\alpha K_t^\beta \text{Expenditure}_t^\gamma \dots\dots\dots (2)$$

Where  $Y_t$  is aggregate output (GDP),  $A_t$  is efficiency of production at time  $t$ ,  $L_t$  is labour at time  $t$ ,  $K_t$  is other physical capital of the country,  $\text{Expenditure}_t$  is disaggregated into different components of Public Expenditure namely expenditure on defence, education, health, transport and communication, public order and safety among others,  $t$  denotes time (introduces possibility of technical change),  $\alpha$ ,  $\beta$  and  $\gamma$  are shares of  $L$ ,  $K$  and expenditure respectively. We assume constant returns to scale in terms of other physical capital and labor. If government expenditure,  $\text{Expenditure}_t$ , increases with increase in other aggregate capital,  $K$ , there will be constant returns since labor force is constant. As a result, the economy will grow endogenously (Barro, 1990).

Taking the logarithmic transformation of equation 2, we obtain an equation of the form;

$$\log Y_t = \log(A_t) + \alpha \log(L_t) + \beta \log(K_t) + \gamma \log(\text{Expenditure}_t) + \text{error term} \dots\dots\dots (3)$$

The basic concept of growth implies periodical changes in output from periodical changes in inputs (Banister 2000) i.e.  $Y$ ,  $A$ ,  $L$ ,  $K$  and  $\text{Expenditure}$  change over time.

### 3.2 Econometric Model

Empirical literature has highlighted the distinction between productive and unproductive expenditure (Devarajan, et al, 1996). This study focuses on the link between various components of government expenditure and economic growth without pre-judging which area should be productive or unproductive.

Equation (3) can therefore be written as:

$$\begin{aligned} \ln \text{GDP}_t = & \beta_0 + \beta_1 \ln \text{GDP}_{t-1} + \beta_2 \ln \text{Private Capital}_t + \beta_3 \ln \text{Labour Force}_t + \beta_4 \ln \text{Education}_t + \\ & \beta_5 \ln \text{Health}_t + \beta_6 \ln \text{Transport and Communication}_t + \beta_7 \ln \text{Agriculture}_t + \beta_8 \ln \text{Defense}_t + \\ & \beta_9 \ln \text{Public Order and Safety}_t + \beta_{10} \ln \text{Public Debt Transactions}_t - \beta_{11} \text{DummyPEV}(1992 \\ & ,1998,2007) + \text{error term} \dots \dots \dots (4) \end{aligned}$$

Where:

$\ln \text{GDP}_t$  = Natural logarithm of GDP

$\ln \text{GDP}_{t-1}$  = Natural logarithm of Lagged GDP

$\ln \text{Private Capital}_t$  = Natural logarithm of Private Capital

$\ln \text{Labour Force}_t$  = Natural logarithm of Labour Force

$\ln \text{Education}_t$  = Natural logarithm of Education Expenditure

$\ln \text{Health}_t$  = Natural logarithm of health Expenditure

$\ln \text{Transport and Communication}_t$  = Natural logarithm of Transport and Communication expenditure

$\ln \text{Agriculture}_t$  = Natural logarithm of Agriculture Expenditure

$\ln \text{Defense}_t$  = Natural logarithm of Defense Expenditure

$\ln \text{Public Order and Safety}_t$  = Natural logarithm of Public Order and Safety Expenditure

$\ln \text{Public Debt Transactions}_t$  = Natural logarithm of public debt transactions expenditure

$\text{DummyPEV}(1992,1998,2007)$  = Dummy for post election violence for the year 1992, 1998 and year 2007

$\beta_{0,1,2,3,\dots,11}$  are parameters to be estimated and  $\varepsilon_t$  is a random error term.

### **3.3 Definition and measurement of variables**

The study examines the different components of public spending and how they influence economic growth. The various components of public expenditure are defined and estimated as shown in Table 1.3.

### **3.4 Estimation Issues**

Many macroeconomic time series are usually non-stationary and OLS regressions between such series may give spurious results. It is therefore important to test and correct the various flaws of time series data before applying OLS regression on the data. However, Granger (1988) argued that though a single variable may be non-stationary, a linear combination of variables may be stationary. These variables are said to be cointegrating and a meaningful long-run relationship exists between them. The estimation procedure with time series data must therefore take this into account.

**Table 1.3: Table of Expectations**

<i>Name of variable</i>	<i>Measurement of variable</i>	<i>Expected apriori sign</i>
<b><i>Dependent Variable</i></b>		
$\ln\text{GDP}_t$ = Natural logarithm of GDP	Real GDP=GDP at market price divided by consumer price index	+
<b><i>Independent Variables</i></b>		
$\ln\text{GDP}_{t-1}$ = Natural logarithm of Lagged GDP	Real GDP at time t-1	+
$\ln\text{Private Capital}_t$ = Natural logarithm of Private Capital	Total lending to private sector by commercial banks used as proxy for private investment	+
$\ln\text{Labour Force}_t$ = Natural logarithm of Labour Force	The population that is actively engaged in production (The proxy will be Real wages)	+
$\ln\text{Education}_t$ = Natural logarithm of Education Expenditure	Government expenditure on education divided by CPI	+
$\ln\text{Health}_t$ = Natural logarithm of health Expenditure	Government expenditure on Health divided by CPI	+
$\ln\text{Transportandcommunication}_t$ = Natural logarithm of Transport and Communication expenditure	Government expenditure on transport and communication divided by CPI	+
$\ln\text{Agriculture}_t$ = Natural logarithm of Agriculture Expenditure	Government expenditure on agriculture divided by CPI	+
$\ln\text{Defense}_t$ = Natural logarithm of Defense Expenditure	Government expenditure on defence divided by CPI	+
$\ln\text{Public Order and Safety}_t$ = Natural logarithm of InPublic Order and Safety Expenditure	Government expenditure on public order and safety divided by CPI	+
$\ln\text{Public Debt Transactions}_t$ = Natural logarithm of public debt transactions expenditure	Government expenditure on public debt transaction divided by CPI	-
DummyPEV(1992,1998,2007) = Dummy for post election violence for the year 1992, 1998 and year 2007		-

### 3.4.1 Testing for Unit Roots

Applying the standard OLS method to non-stationary data series can produce ‘nonsense correlation’ or ‘spurious regression’ (Inder, 1993). That is, the OLS regression can give high R squared, low Durbin Watson (DW) statistics and significant t-values of the estimated coefficients suggesting a significant relationship between dependent and explanatory variables when in fact they are completely unrelated.

The first step in analyzing time series data is to determine if the series is stationary. This involves testing for unit roots to correctly test hypothesis concerning the relationship between two variables having unit roots i.e. integrated of at least order one. We test therefore whether the time series are I (1) which is a necessary condition. The Augmented Dickey Fuller (ADF) is often used to test whether a time series is a stationary series or not. The ADF regression equation to test unit root in time series Y is written as:

$$\Delta Y_t = \alpha + \beta_1 y_{t-1} + \beta_2 T + \sum_{j=1}^K \gamma_j \Delta y_{t-j} + \varepsilon_t \quad (5)$$

Where  $y_t$  and  $\Delta y_t$  are the level and first difference of the relevant time series, T is the time trend variable, and  $\alpha$ ,  $\beta_1$ ,  $\beta_2$  and  $\gamma$  are parameters to be estimated. The k lagged difference terms are added to remove serial correlation in the residual.  $\varepsilon_t$  is the error term with zero mean and constant variance. Equation (4) is applied to each variable in equation (3). The null hypothesis is that  $H_0: \beta_1 = 0$  and the alternative hypothesis is that  $H_1: \beta_1 < 0$ . If the computed ADF statistic is greater than the ADF critical value at a given level of significance, do not reject the null hypothesis, i.e.,

unit root exists and if computed ADF statistic is less than ADF critical value, reject the null hypothesis (unit root does not exist/series is stationary) in levels. If not stationary in levels, then all the series are differenced once to make them stationary. These series are therefore said to be integrated of order one, 1(1).

### 3.4.2 Co-integration Test

If the variables are I (1) the next step is to determine whether there is a stable non-spurious (co integrated) relationship in level form. The E-G approach shall be used to analyze the stationarity of residuals from levels regression. In the long-run equilibrium, the error term  $\varepsilon_t$  in equation (3) should be zero. However, in any period the GDP per capita can deviate from the long-run equilibrium i.e.  $\varepsilon_t$  is an equilibrium error. In this case;

$$\varepsilon_t = \ln GDP_t - \beta_0 - \beta_1 \text{ Expenditure}_t - \beta_2 K_t - \beta_3 L_t \dots \dots \dots (6)$$

The co integration test is based on the following regression equation:

$$e_t = \delta_0 + \delta_1 e_{t-1} + \delta_2 T + \sum_{j=0}^m \gamma_j \Delta e_{t-1} + u_t \quad (7)$$

Where  $e_t$  are the residuals from the co integrating regression (equation 4),  $T$ = time trend,  $u_t$  is the disturbance term,  $m$  is the lag length determined through the schwarz criterion. For a variable under consideration ( $e_{t-1}$ ) the statistical significance of  $\delta_1$  in equations (6) and (7) is examined with the null hypothesis that  $\delta_1$  is equal to zero ( $e_{t-1}$  is non-stationary). In other words, the null hypothesis is  $H_0 = \delta_1 = 0$  and the alternative is  $H_0 = \delta_1 < 0$ . If the null

hypothesis of unit root is rejected;  $e_{t-1}$  is stationary and vice versa. Therefore, we conclude that the variables in (equation 4) are co integrated of the order CI (1, 1).

### **3.4.3 Error Correction Model**

The unrestricted error correction modeling (ECM) and co-integration approach are used to rule out the possibility of having a spurious relationship in the regression equation. The co-integration approach is appropriate when dealing with non-stationary data that are integrated of the same order, while the error correction modeling method can be applied to data series that are integrated of different orders (Suphanachart, et al., 2009). Error correction modeling (ECM) offers an improved method to estimate the long-run dynamic relationship among time series economic variables without imposing any lags thus allowing both short-term and long-term relationships among variables. It also guards against the possibility of spurious regression, arising from use of time series data (Suphanachart, et al., 2009).

If we conclude co integration in relationship I (1), we estimate the error correction model (ECM), other wise granger causality is conducted. ECM captures (i) short run dynamics that measure any dynamic adjustment between the first difference of the variables GDP and expenditure and (ii) long run relationship that measures any relation between the level of the variables (GDP and Expenditure).



To examine the long run relationship between  $GDP_t$  and  $Expenditure_t$ , we will estimate the static model

$$GDP_t = \beta Expenditure_t + \varepsilon_t \dots \dots \dots (8)$$

From equation 8 Granger (1964) defined ECM as;

$$\varepsilon_t = GDP_t - \beta Expenditure_t \dots \dots \dots (9)$$

Where;  $\beta$  is a co-integrating coefficient and  $\varepsilon_t$  is the error from a regression of  $GDP_t$  on  $Expenditure_t$ .

The ECM can be defined as;

$$\Delta GDP_t = \alpha C_{t-1} + \gamma \Delta Expenditure_t + \mu_t \dots \dots \dots 10$$

Equation 10 implies that change in  $GDP_t$  can be explained by lagged value  $\varepsilon_{t-1}$  and change in  $Expenditure_t$  where  $\varepsilon_{t-1}$  is the equilibrium error (or disequilibrium term) that occurred in the previous period. That is, If  $\varepsilon_{t-1} > 0$ , it means that  $GDP_{t-1}$  is too high above its equilibrium, so in order to restore equilibrium,  $\Delta$  the change in  $y_t$  must be negative meaning that the error correction coefficient must be negative such that (equation 10) is dynamically stable. Since  $GDP_{t-1}$  is above its equilibrium, then it will

start falling in the next period and the equilibrium error will be corrected in the model, hence, the term error correction model. From equation (9) and (10),  $\beta$  is the long run parameter while  $\gamma$  and  $\alpha$  are short run parameters. The long run relationship is thus embedded in the error correction term  $\epsilon_{t-1}$  and the short run behavior is partially captured by the error correction coefficient,  $\alpha$ .

### 3.4.4 Granger Causality Test

If we conclude that there is no co integration in relationship I (1), we ignore the error correction model (ECM), and conduct granger causality tests. In this case, x is said to granger cause y if it is useful in forecasting y. In this study we seek to test whether the disaggregated components of expenditure “*Granger cause*” economic growth and vice versa.

Consider two time - series  $Y_t$  and  $X_t$ . A test for Granger causality aims to find out whether  $Y_t$  predicts future values of  $X_t$  and vice-versa. Specify the unrestricted equations;

$$Y_t = \beta_0 + \sum_{j=0}^J \beta_j Y_{t-j} + \sum_{k=0}^K \gamma_k X_{t-k} + \mu_t \quad (11)$$

and

$$X_t = \alpha_0 + \sum_{j=1}^J \alpha_j X_{t-j} + \sum_{k=1}^K \beta_k Y_{t-k} + v_t \quad (12)$$

Where:  $u_t$  and  $v_t$  are serially uncorrelated white noise residuals

$j, k$  are lag lengths for each variable,

$\alpha_0 \dots \alpha_j, \beta_0 \dots \beta_k$  are parameters to be estimated

$\mu_t, v_t$  are random error terms

$X_{t-k}, Y_{t-j}$  refers to lagged values of independent variables in equation (11)

$X_{t-j}, Y_{t-k}$  refers to lagged values of independent variables in equation (12)

In order to test for Granger causality, verify whether the coefficients on  $X_{t-k}$  in equation (11) and coefficients on  $Y_{t-k}$  in equation (12) are statistically significant. The null hypothesis to be tested in equation (9) is that X does not Granger-cause Y. That is,  $H_0 = \gamma_0 = \gamma_1 = \dots = \gamma_k = 0$  and Y does not Granger-cause X ( $H_0 = \beta_0 = \beta_1 = \dots = \beta_k = 0$ )

### 3.5 Data and Data sources

The data on GDP, labour force, components of government expenditure and total lending to private sector by commercial banks(proxy for private investment), will be obtained from the various issues of the Kenya Economic surveys and statistical abstracts.

## **CHAPTER FOUR**

### **4.0 DATA ANALYSIS**

#### **4.1 Descriptive Statistics**

A graphical representation of the real education expenditure together with Real GDP indicates that the two series have an upward trend for the period running 1980 to 2011, See Appendix 1. This means that there is high public spending on education owed to free primary education. This includes expenditure on school fees, education materials such as textbooks and teaching equipment as well as personnel salaries. From this trend the study concludes that public spending on education has a significant and positive impact on economic growth.

A graphical representation of the real health expenditure and GDP series also indicates the two series had an upward trend for the period running 1980 to 2011, see Appendix 2. However, the trend in the GDP and real expenditure on health indicates the two have been consistent for the period running 1980 to 1996. Later in 1997 towards 2011 there has been an increasing and decreasing trend on the real health expenditure while GDP had an upward trend throughout the years. Changes occurred on the GDP in 2005 when there was a drop, with the real health expenditure rising on the other hand leading to the conclusion that the impact of health care spending on GDP is minimal. From year 2007, the growth in health spending increased faster than the economic growth as the economy devoted a certain percentage of the GDP to health spending.

A graphical representation of the real transport and communication expenditure and real GDP series indicates the two series had an upward trend for the period running 1980 to

2011, see Appendix 3. The trends in transport and communication expenditure and the real GDP have an upward movement from years 2002 to 2011. Between 1980 and 2002 the public expenditure on transport and communication was stagnant with a slight increase in 1995. During this period real GDP was raising leading to a conclusion that public spending on transport and communication is insignificant in influencing short term growth.

A graphical representation of the real agriculture expenditure and real GDP series indicates the two series had an upward trend for the period running 1980 to 2011, see Appendix 4. The trend in agriculture expenditure however, was irregular from 1980 to 2004. Though the agricultural sector received less government funding from 1980 to 2005 there was some steady growth on real GDP during the period. From 2005 to 2011 agriculture expenditure increased constantly owing to agricultural mechanization, government funded irrigation schemes, government subsidy on fertilizers, seeds and other farm equipment. The rate of growth in real GDP remained less that of growth in agriculture expenditure leading to the conclusion that agriculture spending may be insignificant in influencing economic growth.

A graphical representation of the real public debt transactions expenditure and GDP series indicates the two series had an upward trend for the period running 1980 to 2011, see Appendix 5. As real public debt transaction expenditure increased, there was a steady increase in real GDP. This trend leads to the conclusion that real public debt transaction expenditure has significant effect on economic growth.

### 4.1.1 Normality tests

The skewness coefficients displayed in table 4.1 reveals that the distribution of the variables, real debt transactions, Real GDP and labor were normal. This conclusion was arrived after all the skewness coefficients were between +1 and -1 for these variables. However, the kurtosis coefficients indicate that all the variables had a leptokurtic distribution (sharp peak compared to a normal distribution) since the reported excess kurtosis was more than the rule of the thumb of -1 and +1. The high kurtosis indicated lack of normality. Since skewness and Kurtosis coefficient were not conclusive on whether the data was normal or not, the Jacque Bera test offered a more conclusive test on normality.

**Table 4.1: Descriptive Results before natural logs**

	REALG DP	REALAGRIC ULTURE	REALC APITAL	REALDEBT TRANSACTION	REALDE FENSE	REALEDU CATION	REALH EALTH	REALORDE RSAFETY	REALTRA NSPORT	LABOUR FORCE
Mean	193532.7	3017.6	56514.85	22678.30	4682.830	16189.59	4077.0	5843.8	4938.5	1446.1
Median	146059.3	2288.7	40045.25	23120.65	2851.780	9687.895	2843.3	2634.1	2491.2	1214.3
Maximum	481434.4	13239.17	260243.9	55350.15	20370.92	65611.87	20513.65	27817.51	34088.13	3405.4
Minimum	15620.18	556.62	3308.4	857.63	532.58	1046.4	387.42	243.50	358.16	353.35
Std. Dev.	162309.5	3051.5	63576.51	17097.88	5096.8	17381.59	4601.1	7207.2	7652.6	1005.2
Skewness	0.44	2.04	1.59	0.23	1.64	1.32	1.89	1.51	2.36	0.53
Kurtosis	1.63	6.49	5.10	1.89	4.82	3.85	6.63	4.38	8.25	1.90
Jarque-Bera	3.51	38.4	19.3	1.92	18.7	10.2	36.6	14.6	66.3	3.11
Probability	0.17	0.00	0.00	0.38	0.00	0.01	0.00	0.00	0.00	0.21
Observations	32	32	32	32	32	32	32	32	32	32

*Source: Eviews computations*

The Jarque-Bera test statistic tested the null hypothesis that the distribution of the variables was not significantly different from a normal distribution. The results of the test

revealed that real expenditure on agriculture, capital, defense, education, health, public order and safety and transport expenditures were not normally distributed. This conclusion was arrived at since the reported p values were less than the critical p value of 0.05. However, the results indicated that real debt transactions expenditure, real GDP and labour force all were normally distributed as the reported p values were higher than the critical p value of 0.05. The high p values indicated that there is a very high probability that the distribution of the data is normal. The results in table 4.1, indicates that it was necessary to convert the variables into natural logarithms in an effort to introduce normality. After converting all the variables excluding the dummy into their natural logarithm form, all variables achieved normality as shown in table 4.2.

**Table 4.2: Descriptive Results after natural logs**

	LNAGRIC	LNDEBT	LNDEF	LNEDU	LNHEALTH	LNGDP	LNK	LNLF	LNORDER	LNTRANS
Mean	7.644	9.501	7.938	9.033	7.709	11.67	10.22	7.004	7.838	7.599
Median	7.736	10.05	7.954	9.178	7.952	11.89	10.59	7.100	7.873	7.820
Maximum	9.491	10.92	9.922	11.09	9.929	13.08	12.47	8.133	10.23	10.44
Minimum	6.322	6.754	6.278	6.953	5.960	9.656	8.104	5.867	5.495	5.881
Std. Dev.	0.846	1.270	1.032	1.269	1.173	1.144	1.346	0.783	1.413	1.350
Skewness	0.361	-0.778	0.256	-0.119	0.017	-0.314	-0.136	-0.075	0.028	0.430
Kurtosis	2.553	2.191	2.018	1.789	1.830	1.653	1.701	1.512	1.782	2.134
Jarque-Bera	0.962	4.098	1.635	2.030	1.828	2.946	2.348	2.984	1.981	1.984
Probability	0.618	0.129	0.442	0.362	0.401	0.229	0.309	0.225	0.371	0.371
Observations	32	32	32	32	32	32	32	32	32	32

Source: Eviews computations

## 4.1.2 Multicollinearity test using Bivariate correlation and Variance Inflation Factor (VIF)

The next step was to check for multicollinearity among independent variables. From the Bivariate correlation results, there is a very strong and significantly positive correlation between the independent variables, see Appendix 6.

## 4.2 Unit Root Tests

Both Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests were used to determine whether the data series was stationary and test results presented in table 4.3.

**Table 4.3: Unit root tests at Level**

Variable name	ADF test	PP test	1% Level	5% Level	10% Level	Conditions	Comment
LnGDP	0.688663	0.688663	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LagLnGDP	0.748164	0.748164	-4.2949	-3.5670	-3.2169	Lag 0,Trend and Intercept	Non Stationary
LnAgric	-1.944087	-1.944087	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnDebt	-1.954211	-1.954211	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnDef	-2.951403	-2.951403	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnEdu	-2.029492	-2.029492	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnHealth	-2.330964	-2.330964	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnK	-1.533262	-1.533262	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnLf	-1.350630	-1.350630	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary
LnOrder	0.628024	0.628024	-3.6576	-2.9591	-2.6181	Lag 0, Intercept only	Non Stationary
LnTrans	-1.610362	-1.610362	-4.2826	-3.5614	-3.2138	Lag 0,Trend and Intercept	Non Stationary

*Source: Eviews computation*



The results in table 4.3, indicates that all variables are non stationary at 1%, 5% and 10% levels of significance. Converting all the variables to first difference would make the series stationary.

**Table 4.4: Unit root tests at First Differences**

Variable name	ADF test	PP test	1% Level	5% Level	10% Level	Comment
DlnGDP	-5.003305	-5.003305	-4.2949	-3.5670	-3.2169	Stationary
DlaglnGDP	-4.909000	-4.909000	-4.3082	-3.5731	-3.2203	Stationary
DlnAgric	-6.503670	-6.503670	-4.2949	-3.5670	-3.2169	Stationary
DlnDebt	-7.434733	-7.434733	-4.2949	-3.5670	-3.2169	Stationary
DlnDef	-7.484198	-7.484198	-4.2949	-3.5670	-3.2169	Stationary
DlnEdu	-4.883701	-4.883701	-4.2949	-3.5670	-3.2169	Stationary
DlnHealth	-5.134096	-5.134096	-4.2949	-3.5670	-3.2169	Stationary
DlnK	-4.192548	-4.192548	-4.2949	-3.5670	-3.2169	Stationary
DlnLf	-4.570695	-4.570695	-4.2949	-3.5670	-3.2169	Stationary
DlnOrder	-7.001548	-7.001548	-4.2949	-3.5670	-3.2169	Stationary
DlnTrans	-5.032027	-5.032027	-4.2949	-3.5670	-3.2169	Stationary

*Source: Eviews computation*

Table 4.4 displays the unit root tests after first differencing. It is clear from these results that all the variables become stationary at 1%, 5% and 10% levels of significance on first differencing.

### **4.3 Long Run Estimation Results**

The first objective of this study was to examine the long- run effects of different components of government expenditure on GDP growth rate. The long run results presented in table 4.5 are generated from the variables in their level form.

**Table 4.5: Long Run Results**

Dependent Variable: LNGDP				
Method: Least Squares				
Date: 07/12/13 Time: 19:42				
Sample(adjusted): 1981 2011				
Included observations: 31 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEDU	0.223034	0.198928	1.121179	0.2762
LNDEF	-0.140990	0.067629	-2.084750	0.0508
LNDEBT	0.106322	0.038456	2.764774	0.0123
LNAGRIC	-0.132115	0.063204	-2.090304	0.0503
LAGLNGDP	0.612560	0.138046	4.437357	0.0003
LNHEALTH	0.188988	0.102997	1.834893	0.0822
LNK	-0.147838	0.086037	-1.718307	0.1020
LNLF	0.326114	0.165174	1.974372	0.0631
LNORDER	0.017452	0.110229	0.158323	0.8759
LNTRANS	-0.031894	0.038308	-0.832555	0.4154
PEV	-0.123018	0.032827	-3.747496	0.0014
C	1.579554	0.476317	3.316185	0.0036
R-squared	0.998835	Mean dependent var		11.73130
Adjusted R-squared	0.998160	S.D. dependent var		1.101169
S.E. of regression	0.047235	Akaike info criterion		-2.982710
Sum squared resid	0.042392	Schwarz criterion		-2.427618
Log likelihood	58.23200	F-statistic		1480.466
Durbin-Watson stat	3.024473	Prob(F-statistic)		0.000000

*Source: Eviews computation*

From table 4.5, the model R squared was 0.998. This implied that the goodness of fit of the model was satisfactory as 99.8% of the variation in real GDP was explained by the independent variables. The overall model was significant as demonstrated by a calculated F-statistic of 1480.4 (p value= 0.000). This further implied that the independent variables were good joint predictors of long run GDP.

The long-run results indicate that public debt expenditure (LNDEBT) has a positive and statistically significant coefficient at 5% level of significance (as indicated by a coefficient of 0.1063 and a P-value of 0.0123). The coefficient of 0.1063 implies that an increase in public debt expenditure by one unit leads to an increase in GDP by 0.0123 units. The findings differ with those of Maingi (2010) who noted that public debt servicing had nil effect on long run economic growth. A government budget deficit gives rise to adverse growth effects. It is therefore important that the government increase the expenditure on public debt transactions as this would improve the real GDP.

The long-run results indicate that education expenditure (LNEDU) has a positive but statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of 0.2230 and a P-value of 0.2762). The coefficient of 0.2230 implies that an increase in education expenditure by one unit leads to an increase in GDP by 0.223 units. These results agree with those of Maingi (2010) who concluded that the effect of education expenditure on economic growth was minimal in the long-run. This could have been as a result of high rate of unemployment resulting in high number of educated

people who are unproductive. It could also be as a result of inefficiency and misallocation of funds in the education sector leading to numerous strikes by academic and teaching staff unions.

The long-run results indicate that healthcare expenditure (LNHEALTH) has a positive but statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of 0.1889 and a P-value of 0.0822). The coefficient of 0.2230 implies that an increase in health care expenditure by one unit leads to an increase in GDP by 0.1889 units. This agrees with the study by Maingi (2010) and that of Mundaki and Masaviru (2012). The positive effect is because allocation of more funds to health sector for both hospital infrastructure and medical inputs improves health status leading to increase in productivity. However, the effect on real GDP is insignificant because public expenditure on health are small proportion of total government spending and increase in health spending does not necessarily translate to improved health due to inefficiencies in the sector.

Private capital (LNK) had a negative but a statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of -0.1478 and a P-value of 0.1020). This agrees with Keynesian theory that public spending may crowd out the private sector affecting growth negatively. The long-run results indicate that the first lag of GDP (LAGLNGDP) has a positive and statistically significant coefficient at 5% level of significance (as indicated by a coefficient of 0.6125 and a P-value of 0.0003). The

coefficient of 0.6125 implies that an increase in first lag of GDP by one unit leads to an increase in real GDP by 0.6125 units.

Post election Violence (PEV) had a negative but statistically significant coefficient at 5% level of significance (as indicated by a coefficient of -0.1230 and a P-value of 0.0014). This implies that years with post election violence experienced a drop in GDP by 0.1230. The government should enhance political stability through empowering institutional such as the judiciary, reformed police service and enhance community integration through the Truth Justice and Reconciliation commission as well as the National Cohesion Commission. This will reduce the incidence of ethnic and politically instigated clashes.

The Long-run results revealed that public spending on agriculture (LNAGRIC), transport and communication (LNTRANS) and defence (LNDEF) all had negative coefficients implying that an increase in public spending on agriculture, transport and communication and defence lead to decrease in long run growth. The results agree with Mudaki and Masaviru (2012) who noted that public expenditure on defense and agriculture was not only negative but insignificant determinants of economic growth. This contradicts the expectation of a positive linkage between agriculture and economic growth.

The negative results may have been as a result of minimal or no mechanization in the agricultural sector, unfavourable weather conditions and poor farming methods mainly consisting of crop farming. Unfavourable result on defence spending may have been a result of crowding effect where funds meant for private investment were diverted towards

maintaining national security and inefficiencies resulting from slow adoption of technology. It is important that the policy makers do not cut expenditure on these sectors as they remain important pillars of economic growth. Increased public spending in agriculture will guarantee food security while spending on transport and communication infrastructure creates a favourable environment for private investment by lowering the cost of production.

#### 4.4 Co-integration Tests

The two step angle granger test was conducted and results presented in table 4.6. The residuals generated from a long run equation were lagged and tested whether they are stationary using the ADF test. Results indicated that the lagged residuals were stationary at 1%, 5% and 10% levels of significance. This implies presence of co-integration among the long run variables.

**Table 4.6: Engle Granger Co-integration Test**

ADF Test Statistic	-11.15283	1% Critical Value*	-4.3082
		5% Critical Value	-3.5731
		10% Critical Value	-3.2203
*MacKinnon critical values for rejection of hypothesis of a unit root.			

*Source: Eviews computation*

The Johansen Co-integration test was also conducted since it is more accurate and superior to Engle granger test of Co-integration.

**Table 4.7: Johansen Co-integration Test**

Date: 07/12/13 Time: 19:03							
Sample: 1980 2011							
Included observations: 30							
Test assumption: Linear deterministic trend in the data							
Series: LNGDP LNEDU LNDEF LNDEBT LNAGRIC LNHEALTH LNK LNLF LNORDER LNTRANS PEV LAGLNGDP							
Warning: Critical values were derived for a maximum of 10 endogenous series							
Lags interval: No lags							
	Likelihood	5 Percent	1 Percent	Hypothesized			
Eigenvalue	Ratio	Critical Value	Critical Value	No. of CE(s)			
1.000000	1291.388	233.13??	247.18??	None **			
0.969318	414.1839	233.13??	247.18??	At most 1 **			
0.924494	309.6616	233.13	247.18	At most 2 **			
0.899863	232.1553	192.89	205.95	At most 3 **			
0.812405	163.1186	156.00	168.36	At most 4 *			
0.753852	112.9145	124.24	133.57	At most 5			
0.573415	70.85985	94.15	103.18	At most 6			
0.409465	45.30153	68.52	76.07	At most 7			
0.353125	29.49973	47.21	54.46	At most 8			
0.279204	16.43168	29.68	35.65	At most 9			
0.191814	6.609707	15.41	20.04	At most 10			
0.007333	0.220812	3.76	6.65	At most 11			
<p>*(**) denotes rejection of the hypothesis at 5%(1%) significance level</p> <p>?? denotes critical values derived assuming 10 endogenous series</p> <p>L.R. test indicates 5 cointegrating equation(s) at 5% significance level</p>							

Source: Eviews computation

Johansen Results on table 4.7 indicate that the null hypothesis of at most 4 Co-integration equations for the model was rejected at 5% (1%) significance level. The likelihood ratio statistic for the null hypothesis of the existence of at most 4 Co-integration equations was larger than the z critical values at 5% and 1% level of significance implying that 5 co-integrating equations exist. Since all the variables are co-integrated they converge to long run equilibrium. An error-correction model can therefore be specified to link the short-run and the long-run relationships.

#### **4.5 Short run Estimation Results**

The second objective of the study was to analyze the short-run effects of government expenditure patterns on economic growth. This was done by estimation of short-run model. The residuals from the co-integrating regression are used to generate an error correction term (lagged residuals) which is inserted into the short-run model. The specific lagged residual term is LAGRES. The estimates of the short-run model are given in table 4.8.

Results in table 4.8 indicates that in the short run, the overall model fitness was satisfactory. An R squared of 0.8604 implied that 86.04% of the variations in the short run GDP were explained by the short run independent variables. The overall model was statistically significant at 5% level (as indicated by a coefficient of 0.8604 and a P-value of 0.1077). This implied that the independent variables were good joint predictors of short run GDP.



**Table 4.8: Error Correction Model/Short run model**

Dependent Variable: DLNGDP				
Method: Least Squares				
Date: 07/12/13 Time: 20:08				
Sample(adjusted): 1982 2011				
Included observations: 30 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNHEALTH	0.107702	0.081087	1.328215	0.2017
DLNK	-0.156711	0.104752	-1.496021	0.1530
DLNLF	0.453605	0.216083	2.099222	0.0510
DLNORDER	0.013225	0.079404	0.166552	0.8697
DLNTRANS	-0.034262	0.035803	-0.956963	0.3520
DLNEDU	0.314576	0.144353	2.179213	0.0437
DLNDEF	-0.100547	0.051926	-1.936341	0.0696
DLNDEBT	0.078331	0.039777	1.969231	0.0654
DLNAGRIC	-0.060268	0.044266	-1.361493	0.1911
DLAGLNGDP	0.432081	0.115057	3.755375	0.0016
PEV	-0.141490	0.031331	-4.515984	0.0003
LAGRESID	0.842036	0.125925	6.686829	0.0000
C	0.016948	0.024784	0.683818	0.5033
R-squared	0.860410	Mean dependent var		0.107728
Adjusted R-squared	0.761876	S.D. dependent var		0.080543
S.E. of regression	0.039303	Akaike info criterion		-3.336327
Sum squared resid	0.026261	Schwarz criterion		-2.729142
Log likelihood	63.04491	F-statistic		8.732127
Durbin-Watson stat	1.668364	Prob(F-statistic)		0.000045

*Source: Eviews computation*

The short-run results indicate that education expenditure (DLNEDU) has a positive and statistically significant coefficient at 5% level of significance (as indicated by a coefficient of 0.3145 and a P-value of 0.0437). The coefficient of 0.3145 implies that an increase in education expenditure by one unit leads to an increase in GDP by 0.3145 units. The findings agree with Mudaki and Masaviru, 2012) who concluded that public

expenditure on education is highly significant and positive determinant of economic growth. This could have been as a result of positive contribution of free primary and secondary education in building of human capital. The social pillar of vision 2030 requires the government to prioritize its spending on education since doing so will have positive effect on growth.

The short-run results indicate that public debt expenditure (DLNDEBT) has a positive but statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of 0.0783 and a P-value of 0.0654). The coefficient of 0.0783 implies that an increase in public debt expenditure by one unit leads to an increase in GDP by 0.0783 units. The findings differ with those of Maingi (2010) who noted that expenditure on public debt made economic growth to decline. This study recommends that the government should try and minimize the debt burden while at the same time improve government performance through proper supervision and regulation. This will minimize diversion and embezzlement of public funds and ensure all projects funded via public debt yield positive returns.

The short-run results indicate that healthcare expenditure (DLNHEALTH) has a positive but statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of 0.1077 and a P-value of 0.2017). The coefficient of 0.1077 implies that an increase in health care expenditure by one unit leads to an increase in GDP by 0.1077 units. This agrees with the study by Maingi (2010) and that of Mundaki and Masaviru (2012). The positive effect is because allocation of more funds to health sector for both

hospital infrastructure and medical inputs improves health status leading to increase in productivity. However, the effect on real GDP is insignificant because public expenditure on health are small proportion of total government spending and increase in health spending does not necessarily translate to improved health due to inefficiencies in the sector.

The short -run results indicate that expenditure on public order and safety (DLNORDER) has a positive but statistically insignificant coefficient at 5% level of significance (as indicated by a coefficient of 0.0132 and a P-value of 0.8697). The coefficient of 0.0132 implies that an increase in public order and safety expenditure by one unit leads to an increase in GDP by 0.0132 units. The results agree with those of Mudaki and Musaviru 2012 who concluded that expenditure on public order and safety positively but weakly matter for economic growth.

The short-run coefficient of Private capital (DLNK) was negative and statistically insignificant at 5% level (as indicated by a coefficient of -0.1567 and a P-value of 0.153). This agrees with Keynesian theory that public spending may crowd out the private sector affecting growth negatively. The short-run results also indicate that the first lag of GDP (DLAGLNGDP) has a positive and statistically significant coefficient at 5% level of significance (as indicated by a coefficient of 0.4320 and a P-value of 0.0016). The coefficient of 0.4320 implies that an increase in first lag of GDP by one unit leads to an increase in real GDP by 0.0.4320 units. This implies that higher levels of GDP leads to

increased GDP in future periods. Post election violence (PEV) had negative effect on both short-run and long-run growth.

The short-run coefficients for public spending on agriculture (DLNAGRIC), transport and communication (DLNTRANS) and defence (DLNDEF) were negative and statistically insignificant at 5% level of significance. This implied that an increase in public spending on agriculture, transport and communication or defence lead to a decrease in short-run growth. However, they remain important pillars of economic growth and the adverse findings could have been as a result of corruption, embezzlement of funds and inefficiency in all sectors. The government should thus increase funding to anti-graft and anti-corruption agencies to arrest those who embezzle public funds.

The error correction term (LAGRES) measures the speed of adjustment to the long run equilibrium in the dynamic model. It has the expected sign and is statistically significant at 5% level of significance (as indicated by a coefficient of 0.842036 and a p-value of 0.000). This result implies that there is a positive gradual adjustment (convergence) to the long run equilibrium. The coefficient of 0.842 implies that 0.842% of the disequilibria in short run GDP achieved in one period are corrected in the subsequent period.

## **CHAPTER FIVE**

### **5.0 CONCLUSION AND POLICY IMPLICATIONS**

#### **5.1 Introduction**

This chapter draws conclusions in light of the objectives of the study and gives appropriate policy implications. Further, it points out the potential limitations of the study as well as highlight areas for further research.

#### **5.2 Conclusion**

The paper sought to examine the impact of public expenditure on economic growth in Kenya with a view of establishing which specific components of government expenditure have significant impact on economic growth. The study determined the long run and short run relationship between different components of public expenditure and real GDP.

Based on the empirical results, the conclusion was that composition of government expenditure matters for economic growth in Kenya. The long-run results showed that expenditure on public debt transactions, health, education, public order and safety as well as lagged GDP had positive impact on economic growth. However, only public debt transactions expenditure was significant in influencing long term growth while expenditure on health, education, public order and safety had a weak positive effect on economic growth. Expenditure on agriculture, defense and transport and communication had negative but insignificant influence on growth. Post election violence was also found to have a negative and significant effect on economic growth.

In the short run, it was possible to conclude from the study that public expenditure on education has a positive and significant effect on GDP growth. Other components of government expenditure that positively influenced growth are expenditure on public debt transactions, public order and safety and health sectors. However, the effect of these three components was found to be insignificant. Public expenditure on agriculture, transport and communication and defense were all found to have an insignificant but negative effect on economic growth.

### **5.3 Policy Implications**

The following policy implications can be drawn from the empirical results.

The composition of public expenditure matters for economic growth. Therefore, government should carefully review their spending and reallocate resources to the particular sectors that are likely to stimulate growth. More resources should be channeled to the education sector as it is a one of the key pillar and determinant of economic growth in Kenya. Investment in education is critical in formation of human capital and hence future growth. The government should also increase its expenditure allocation to the health sector as doing this would yield positive results. Investment in healthcare leads to a healthy and more productive population.

High levels of inefficiency, inadequate investment and slow adoption of technology have continually affected government performance. Inefficiency in public expenditure has thus reduced the productive impact of key sectors like agriculture, transport and

communication as well as health sector. This should be addressed through privatization of some of government services to low cost private enterprises. Competitive bidding for provision of goods and services to public sector should also be encouraged in order to keep the cost of production low.

Cases of corruption, misallocation and embezzlement of public expenditure have had adverse effect on growth objectives. The government should ensure public resources are properly managed through proper supervision and regulation for example implementation of performance contracts in various government ministries and parastatals. The government should also empower and increase funding to the Judiciary and Ethics and Anti Corruption Commission in order to arrest and charge those who embezzle public funds.

Though public spending on agriculture, transport and communication and defence was found to influence growth negatively, the government should not cut expenditure on these sectors as they remain important pillars of economic growth. Increased public spending in agriculture will guarantee food security while spending on transport and communication infrastructure improves accessibility therefore creating a favourable environment for private investment by lowering the cost of production. National security and political stability also have positive contribution in enhancing conducive environment for private production and attracting foreign direct investments.

#### **5.4 Limitations of the study**

First, the study assumed that allocation of public expenditure to different is only guided by one objective, that of, maximizing economy welfare while in real life the government aims at achieving multiple objectives including that of social welfare maximization.

Second, the variables used in the model are only expenditure and not necessarily the total impact of government in the economy.

#### **5.5 Areas of Further Research**

Further research should be to establish the impact of proportions of expenditure on GDP growth and compare such results with the current results that seem to dwell on aggregate figures. In addition, disaggregated studies at county level should be conducted. Such studies will attempt to establish the effect of expenditure on the growth of a county.

Further studies should be to disaggregate the expenditure into recurrent and developmental expenditure. The effect of disaggregated expenditure should then be regressed against economic growth.

Studies should also analyze the other factors that determine the functional distribution of government expenditure.



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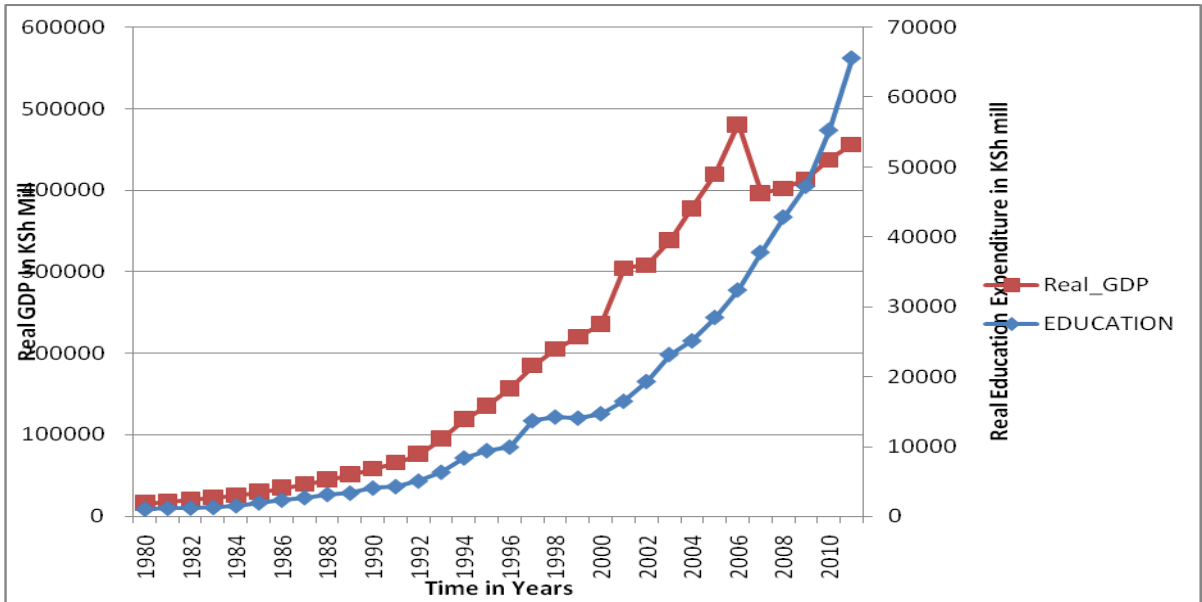
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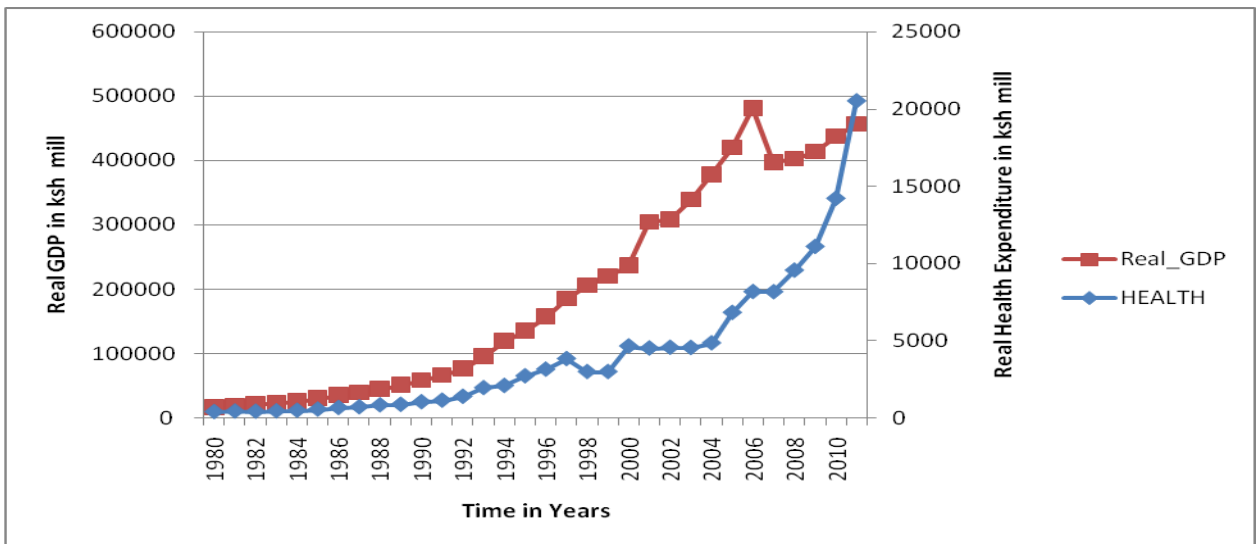
## APPENDICES

### Appendix 1: Trend in Real GDP and real education expenditure



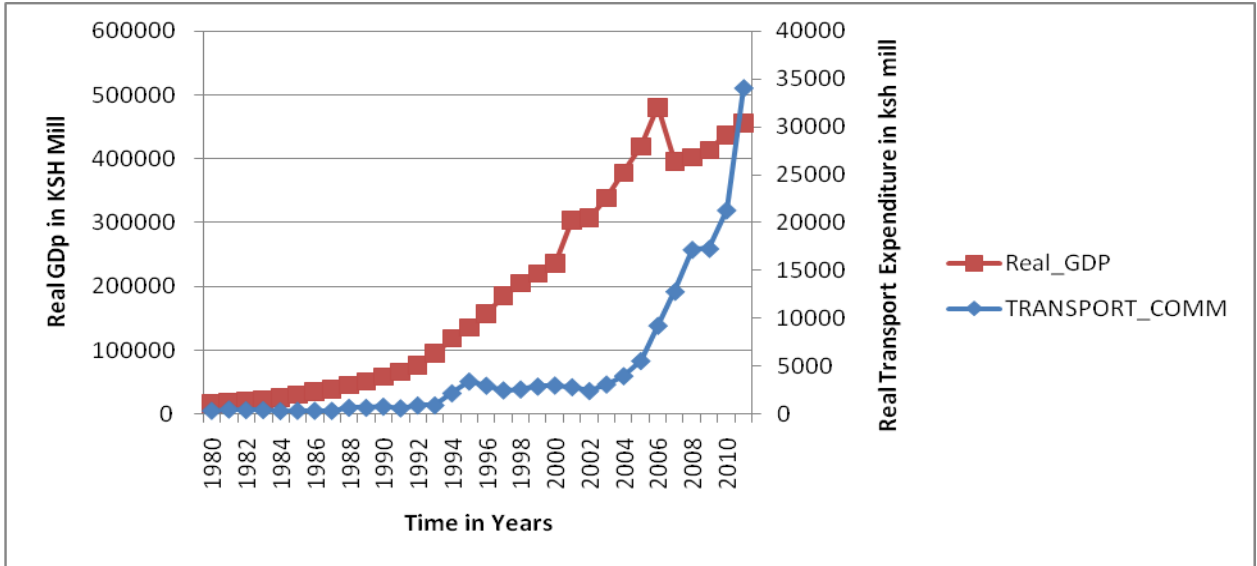
Source: Economic Surveys (Various)

### Appendix 2: Trend in Real GDP and real Health expenditure



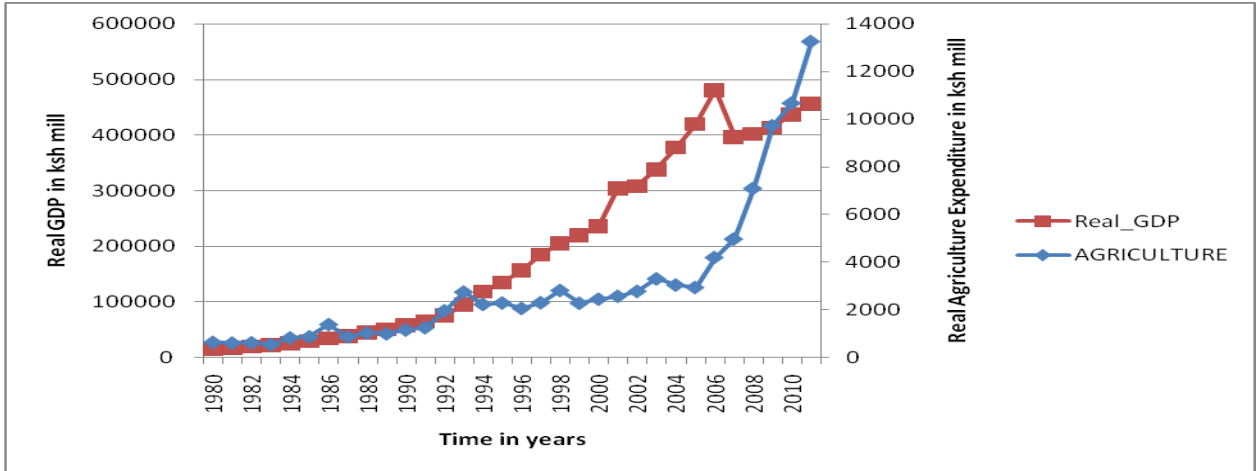
Source: Economic Surveys (Various)

**Appendix 3: Trend in Real GDP and real transport and communications Expenditure**



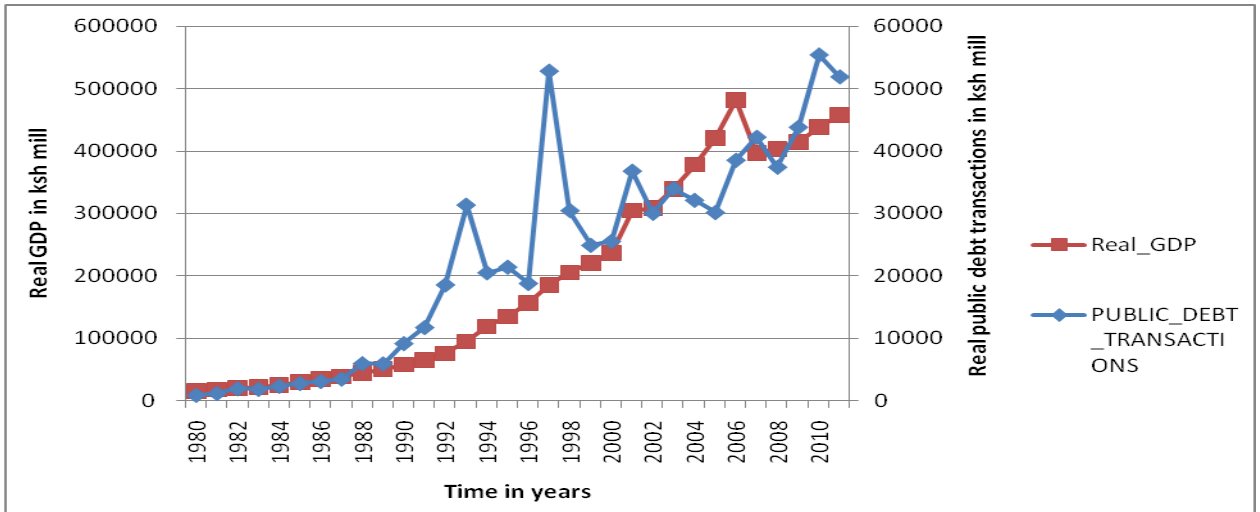
Source: Economic Surveys (Various)

**Appendix 4: Trend in Real GDP and real agriculture expenditure.**



Source: Economic Surveys (Various)

### Appendix 5: Trend in Real GDP and real public debt transaction expenditure



Source: Economic Surveys (Various)



### Appendix 6: Multicollinearity test using Bivariate correlation

		laglnGDP	lnAgric	Lndebt	Lndef	Inedu	Lnhealth	LnK	LnLF	LnOrder	LnTrans	Pev
laglnGDP	Pearson Correlation	1										
	Sig. (2-tailed)											
	N	31										
lnAgric	Pearson Correlation	.908**	1									
	Sig. (2-tailed)	0										
	N	31	32									
Lndebt	Pearson Correlation	.936**	.883**	1								
	Sig. (2-tailed)	0	0									
	N	31	32	32								
Lndef	Pearson Correlation	.955**	.953**	.874**	1							
	Sig. (2-tailed)	0	0	0								
	N	31	32	32	32							
Inedu	Pearson Correlation	.989**	.956**	.936**	.980**	1						
	Sig. (2-tailed)	0	0	0	0							
	N	31	32	32	32	32						
Lnhealth	Pearson Correlation	.977**	.963**	.925**	.981**	.993**	1					
	Sig. (2-tailed)	0	0	0	0	0						
	N	31	32	32	32	32	32					
LnK	Pearson Correlation	.985**	.948**	.936**	.970**	.993**	.993**	1				
	Sig. (2-tailed)	0	0	0	0	0	0					
	N	31	32	32	32	32	32	32				
LnLF	Pearson Correlation	.993**	.935**	.921**	.971**	.992**	.988**	.992**	1			
	Sig. (2-tailed)	0	0	0	0	0	0	0				
	N	31	32	32	32	32	32	32	32			
LnOrder	Pearson Correlation	.984**	.953**	.909**	.986**	.995**	.992**	.986**	.990**	1		
	Sig. (2-tailed)	0	0	0	0	0	0	0	0			
	N	31	32	32	32	32	32	32	32	32		
LnTrans	Pearson Correlation	.924**	.950**	.841**	.968**	.956**	.970**	.958**	.950**	.963**	1	
	Sig. (2-tailed)	0	0	0	0	0	0	0	0	0		
	N	31	32	32	32	32	32	32	32	32	32	
Pev	Pearson Correlation	-0.124	-0.117	-0.244	-0.094	-0.129	-0.126	-0.125	-0.122	-0.116	-0.11	1
	Sig. (2-tailed)	0.505	0.525	0.178	0.61	0.483	0.492	0.495	0.506	0.529	0.551	
	N	31	32	32	32	32	32	32	32	32	32	32
**. Correlation is significant at the 0.01 level (2-tailed).												