THE EFFECTS OF PUBLIC CAPITAL EXPENDITURE ON ECONOMIC GROWTH IN KENYA

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A thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Economics School of Business and Economics of Moi University

2014

DECLARATION

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DEDICATION

This thesis is dedicated to my loving Dad Nahashon Matundura who has always been supporting me in guidance, encouragement and financially.

ACKNOWLEDGEMENT

I would like to acknowledge the Almighty God for enabling me to reach this far. I also acknowledge my supervisors Dr. Mark Korir and Dr. Vincent Ngeno who helped me in every step of the way to the completion of this research thesis.

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Abbreviations and Acronyms

ADF Augmented Dickey Fuller

ARDL Autoregressive Distributed Lag (Modelling)

DOP Degree of Openness

EAAC Ethics and Anticorruption Commission

GDP Gross Domestic Product

GE Government Expenditure

GNP Gross National Product

GOK Government of Kenya

HAC Heteroskedasticity and Autocorrelation Consistent

IMF International Monetary Fund

KIPPRA Kenya Institute of Public Policy and Research

LAPSSET Lamu Port Southern Sudan – Ethiopia Transiport

MTP Medium Term Policy

NARC National Alliance Rainbow Coalition

NICs Newly Industrialized Countries

OECD Organization of Economic Corporation and Development

OLS Ordinary Least Squares

VAR Vector Autoreggression

VECM Vector Error Correction Method

Abstract

The government of Kenya has been spending massive amount of funds to the various Ministries in order to achieve economic development. The education, health, infrastructure and agriculture sectors have been receiving the largest amount of funds. Despite the increased government spending, there are conflicting results on the effects of government spending on economic growth. This research presents a critical analysis on the effects of major public capital expenditure on economic growth in Kenya. The specific objectives of the study were: establishing the effects of public capital expenditure on education, infrastructure, health and agriculture on economic growth in Kenya. The study adopted a causal relationship approach and relied on secondary data from the Ministry of National Treasury and Kenya Bureau of Statistics with the data spanning from 1980 to 2011 for all variables. There were four hypotheses under this study and it was hypothesized that increased expenditure will not increase GDP. The study employed Johansen cointegration test and the Error Correction Method (ECM) in the empirical analysis to evaluate the relationship among the variables. The data was subjected to stationarity test and necessary smoothening was done. The short run and long run relationship with three cointegrating equations revealed that the coefficient of expenditure on infrastructure was statistically significant and positively related to GDP at 5% level of significance. The coefficient of expenditure on agriculture was positively and significantly related to the expenditure on education. The government should therefore increase the percentage amount allocated into these three sectors. Expenditure on health did not spur economic growth over the long run period therefore expenditure in this sector should be rationed. It was also noted that the government programs like Lamu Port and New Transport Corridor Development to Southern Sudan and Ethiopia (LAPSSET) to foster increased investment in infrastructure and hasten delivery of goods and services is strongly recommended.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The Kenyan economy has stabilized and could again be in a position for a takeoff. Inflation has declined to below the 5 percent target, and expectations are anchored at a lower level for the rest of 2013, the international reserves have climbed to over US$ 5b (over four months of import cover), public debt to GDP level has declined to below 45 percent, and credit has started to flow back to finance economic activities. The optimism of Kenya's economy is reflected by high volumes of trading in the fixed income securities and equities market. GDP growth in 2012 was 4.6 percent, and is projected to grow to 5.7 and 6 percent in 2013 and 2014, respectively. Despite the optimism, risks do remain. The economy is still vulnerable to exogenous shocks as the large current account deficit threatens macroeconomic stability, the real appreciation of the shilling is eroding Kenya's competitiveness and stifling the export sector, which is supposed to be at the center point for poverty reduction (Randa *et al*. 2013).

After independence, Kenya promoted rapid economic growth through public investment, encouragement of smallholder agricultural production, and incentives for private often foreign industrial investment. Gross domestic product (GDP) grew at an annual average of 6.6% from 1963 to 1973. Agricultural production grew by 4.7% annually during the same period, stimulated by redistributing estates, diffusing new crop strains, and opening new areas to cultivation. During 1964 and 1974 the economy grew by an average of 6.6% due to massive private investment. At that time Kenya competed favourably with some of the newly industrialized countries (NICs) of East Asia like South Korea (Republic of Kenya, 1974).

Between 1974 and 1990, however, Kenya's economic performance declined. Kenya's inward-looking policy of import substitution and rising oil prices made Kenya's manufacturing sector uncompetitive. The government began a massive infringement in the private sector. Lack of export incentives, tight import controls, and foreign exchange controls made the domestic environment for investment even less attractive. In the period 1991 to 1993, Kenya had its worst economic performance since independence. Growth in GDP stagnated, and agricultural production shrank at an annual rate of 3.9%. Inflation reached a record 100% in August 1993, and the government's budget deficit was over 10% of GDP. As a result of these combined problems, bilateral and multilateral donors suspended program aid to Kenya in 1991 (Republic of Kenya, 1985).

According to the World Bank (2013), throughout these first three decades of independence, Kenya's parastatals, partly from a lack of expertise and endemic corruption, largely inhibited economic development. In 1979, a presidential commission went as far as saying that they constituted "a serious threat to the economy"; a decade later, they had still not furthered industrialisation or fostered the development of a Black-Kenyan business class. The backbone of the country's private-sector success was provided by Asian Kenyans; during the colonial period, they had created the country's internal market, and then dominated internal trade. Post-independence, and particularly after being pushed out of its retail stronghold after its "Africanisation", those who stayed in Kenya transferred their dominance to the more advanced sectors of its commerce and industry, easily out-competing Western multinationals in notable instances.

In 1993, the Government of Kenya began a major program of economic reform and liberalization. A new minister of finance and a new governor of the central bank undertook a series of economic measures with the assistance of the World Bank and the International Monetary Fund (IMF). As part of this program, the government eliminated price controls and import licensing, removed foreign exchange controls, privatised a range of publicly owned companies, reduced the number of civil servants, and introduced conservative fiscal and monetary policies. From 1994 to 1996, Kenya's real GDP growth rate averaged just over 4% a year.

In 1997, however, the economy entered a period of slowing or stagnant growth, due in part to adverse weather conditions and reduced economic activity prior to general elections in December 1997. In July 1997, the Government of Kenya refused to meet commitments made earlier to the IMF and World Bank on governance reforms As a result, the IMF suspended lending for three years, and the World Bank also put a $90 million structural adjustment credit on hold. The Government of Kenya took positive steps on reform, including the 1997 establishment of the Kenya Anti-Corruption Authority, and measures to improve the transparency of government procurements and reduce the government payroll. In 2000, the IMF signed a $150 million Poverty Reduction and Growth Facility, and the World Bank followed suit shortly after with a $157 million Economic and Public Sector Reform credit (Republic of Kenya, 1985).

The NARC government had foreseen creation of 500,000 jobs per year, reducing poverty from 56.8 per cent to about 51.8 per cent level, achieving a GDP growth rate of about 10 per cent per year, taking the inflation rate to below 5 per cent and increasing domestic savings among other

positive targets in the year 2002 (Republic of Kenya, 2003). Guided by the strategy, important policies were devised among them strengthening of the institution of governance, rapid economic growth, and rehabilitation of physical infrastructure and enhancing human capital among the poor.

The economy then grew by 0.5 percent in 2002 and by 2007 it had culminated to a growth rate of 7.1%. Owing to post election violence in 2008 which swayed the country and erratic rainfall patterns, the economy registered a lower growth rate of 1.7 per cent. By 2009 the government had increased the public developmental expenditure especially on roads and the economy regained by 3.2 per cent (Republic of Kenya, 2008). In the budget estimates of 2009/2010 a higher amount was allocated to capital infrastructure development aimed at increasing economic development.

Vision 2030 is aimed at making Kenya a globally competitive a prosperous nation by the year 2030. This will happen by transforming Kenya into a middle income industrialized country providing high quality of life for her citizens. The Vision rests under three pillars, the political, social and the economic pillars. The economic sector aims to improve the prosperity of all Kenyans through an economic development programme, covering all the regions of Kenya. It aims to achieve an average Gross Domestic Product (GDP) growth rate of 10% per annum beginning in 2012. To achieve this target, Kenya is continuing with the convention of macro-economic stability that has been established since 2002. It is also addressing other key constraints, notably, a low savings to GDP ratio, which can be alleviated by drawing in more remittances from Kenyans abroad, as well as increased foreign investment and overseas

development assistance (ODA). It was also found necessary to deal with a significant informal economy employing 75% of the country's workers. The informal sector is being supported in ways that will raise productivity and distribution and increase jobs, owner's incomes and public revenues (Republic of Kenya, 2007).

The political pillar, this aims to realise a democratic political system founded on issue-based politics that respects the rule of law, and protects the rights and freedoms of every individual in Kenyan society. It hopes to transform Kenya into a state in which equality is entrenched. The social pillar, through this strategy, Kenya aims to build a just and cohesive society with social equity in a clean and secure environment. This strategy makes special provisions for Kenyans with various disabilities (PWDs) and previously marginalized communities. The graph of GDP growth since 1980 is as shown in the figure 1.1 that follows:

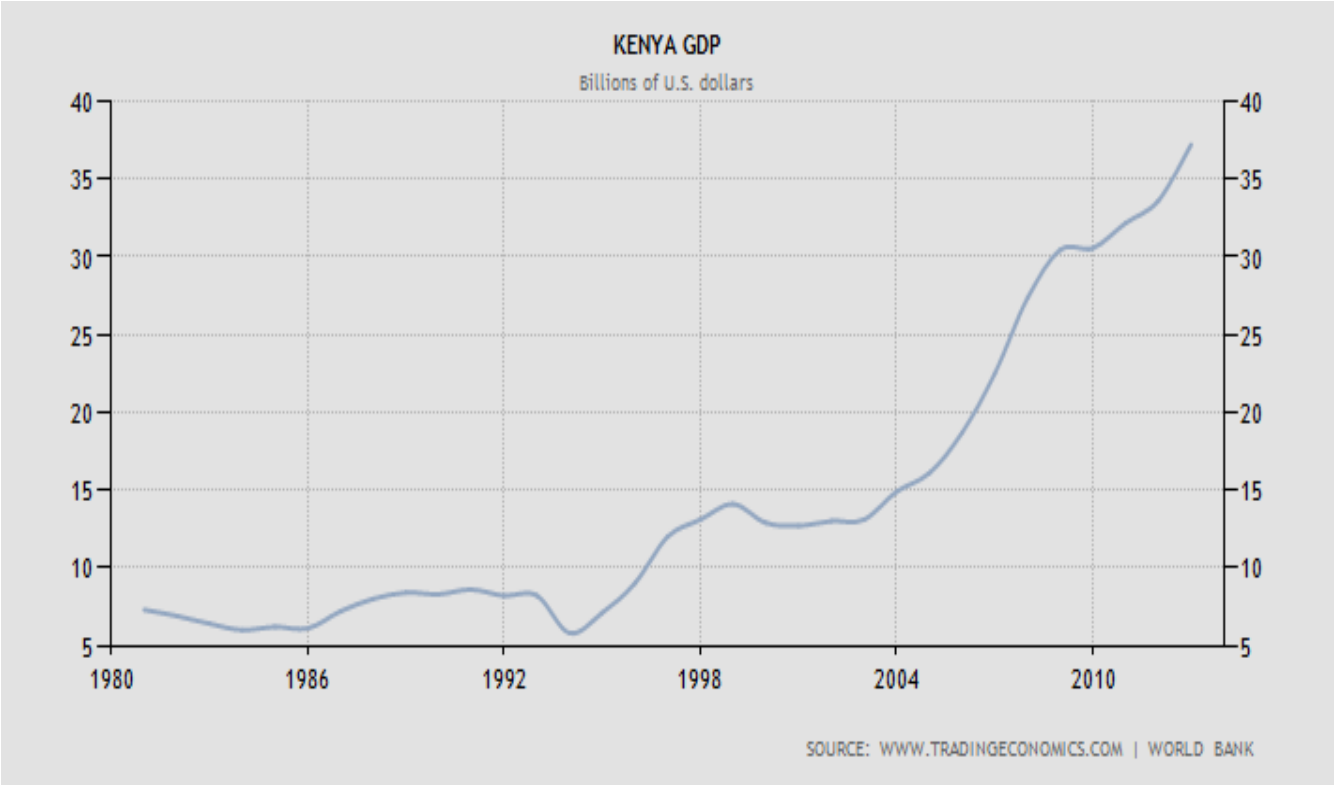


Figure 1.1 Economic Growth

Source: World Bank, 2014

As it can be depicted from the graph above economic growth has been increasing annually since 1980. During and after 1992 the graph shows structural breaks this is attributable to large amount that was spent in the general election fueling high rate of inflation. There is therefore need to keep this upward trend by securing the sectors which contributes positively to Kenya's GDP.

Economic development is essentially enhanced by the expansion of infrastructural facilities, the improvement of education and health services, encouragement of local investments, low cost housing, environmental restoration, improvement on technology, shifting from subsistence agriculture to mechanized agriculture and exploring in the manufacturing sector. There has been

increased debate among development economists as to the relationship between public expenditure and economic growth in Kenya (Jerono, 2009). Government expenditure has been seen to boost productivity but on the same gasp it has been seen as a predicament. By borrowing to finance public expenditure, the government competes with private investors for capital thereby crowding out private investors.

Keynes (1936) argued that the solution to economic depression was to increase government capital expenditure and the firms to do investment through reduction of interest rates. The neoclassical school however has argued that increased government expenditure may hinder the aggregate performance of the economy. The government increases taxes and borrowing to finance the expenditures. The higher income tax discourages the additional work and investment which reduces income and aggregate demand. Higher taxes also tend to increase production costs and reduce the profitability of firms. Increased government borrowing (from the banks) required to finance its expenditure may 'crowd-out' the private sector and thus reduce private investment (Sachs, 1997).

The mismatch between the performance of Kenya's economy and massive increase in government expenditure over the years raises a critical question on its role in promoting economic growth and development. Some authors contend that the link between public expenditure and economic growth is weak or nonexistent while others have reported varying degree of causality relationship (Onakoya *et al.,* 2012). The question which arises therefore is: what is the relative contribution of the various components of capital expenditure to economic

growth and development in Kenya? This study therefore sought to examine the impact of public capital expenditure on economic growth in Kenya.

1.1.1 Public Expenditure in Kenya

Kenya's wage bill is the greatest threat to its economic growth having steadily risen in excess of ksh.500 billion in the year 2013/2014. It is standing at a high of 12.5% of the GDP compared to the globally recommended average of 7% of the economy's GDP. The high wage bill is as a result of high cost of labour making the country lose its competitiveness as a preferred investment destination. Kenya public sector is viewed as a better employer than the private sector which is attributed to practice of paying high allowances. The salary demands are adding to pressure on Kenya's public bloated wage bill. Various sectors in Kenya are demanding increased salaries through their trade unions. This is more pronounced in the perennial teachers, doctors and nurses strikes (KIPPRA, 2014).

The size and allocation of government expenditure have changed drastically since 1963 in Kenya. The government has been guided in its expenditure by several sesional papers, vision 2030, medium term plans and the constitution. Since 1960s, the country has been able to maintain a high level of investment, much of it financed from domestic savings. The savings investment gap has however expanded over time from about 3.2% of GNP in 1965-69 to 6% in the 1980s. The country has come to rely increasingly on external resources to finance its capital formation (Republic of Kenya, 2002), National Development Plan. The general budget deficit increased from 4.9% of GDP in 1969-73 to 9.4% in 1979-83 and was about 5.0% in 1989-1990.

The government launched the first medium term fiscal expenditure plan to run for the period 2008-2012. In this period, the Medium Term Policy (MTP) aimed at increasing real GDP growth from an estimated 7 per cent in 2007 to 7.9-8.7 per cent by the years 2009-2010; and to double digits by 2012 (Republic of Kenya, 2002). The second phase of Medium Term Policy will range from 2013-2017 period, in line with its priorities, the Kenya 2010 constitution and the long term objective of vision 2030. The theme of this MTP gives priority to devolution, rapid social economic development and build on the success of the first MTP in increasing the scale of economic development through infrastructure development and strategic emphasis on the priority pillars.

1.1.2 Capital and Developmental Expenditure

Public expenditure in Kenya classified in terms of capital expenditure that is all expenditures which promote economic growth and development and recurrent expenditure for the payment of salaries, and consumption purposes.

The recurrent expenditure has been more than the capital expenditure since 1963. This is due to the fact that in 1960s the government was guided by African socialism which stated that there should be effort to eradicate poverty, ignorance and disease. Government had to take over the function of providing for those needs. In the subsequent years, inefficiency, corruption, engulfed government ministries and excessive members of parliament salaries can partly account for the trend (Republic of Kenya, 2008).

This can also be ascribed to structural adjustment programs (SAPs) from the IMF and World Bank which discouraged the government from directly being involved in the economy. By the early 1980s, the public sector had become over extended there had been a creation of massive public ownership sectors. The SAPs advocated for privatization and cost sharing which brought expenditure down. The government complied with World Bank and the IMF conditions by devaluing its currency and ending government controls in order to obtain such loans.

In 2002 and 2008, the development expenditure ratio relatively went down and this is as a result of huge budget outlay to fund the election and settle the internally displaced persons due to the post election violence respectively. After 2002 the development expenditure had an upward trend as the National Alliance Rainbow Coalition (NARC) government embarked on massive infrastructure development as depicted in the strategy for poverty eradication sessional paper of 2002 (Republic of Kenya, 2002). This is the period when massive road infrastructure such as Thika road, bypasses, communication infrastructure, the fiber optic cable installation, construction of most roads in rural areas and education enrolment to foster economic development. The development expenditure remained high as most of the development projects were still underway, high cost of fuel and weakening of Kenyan shilling.

1.1.3 Public Expenditure Trend in Kenya

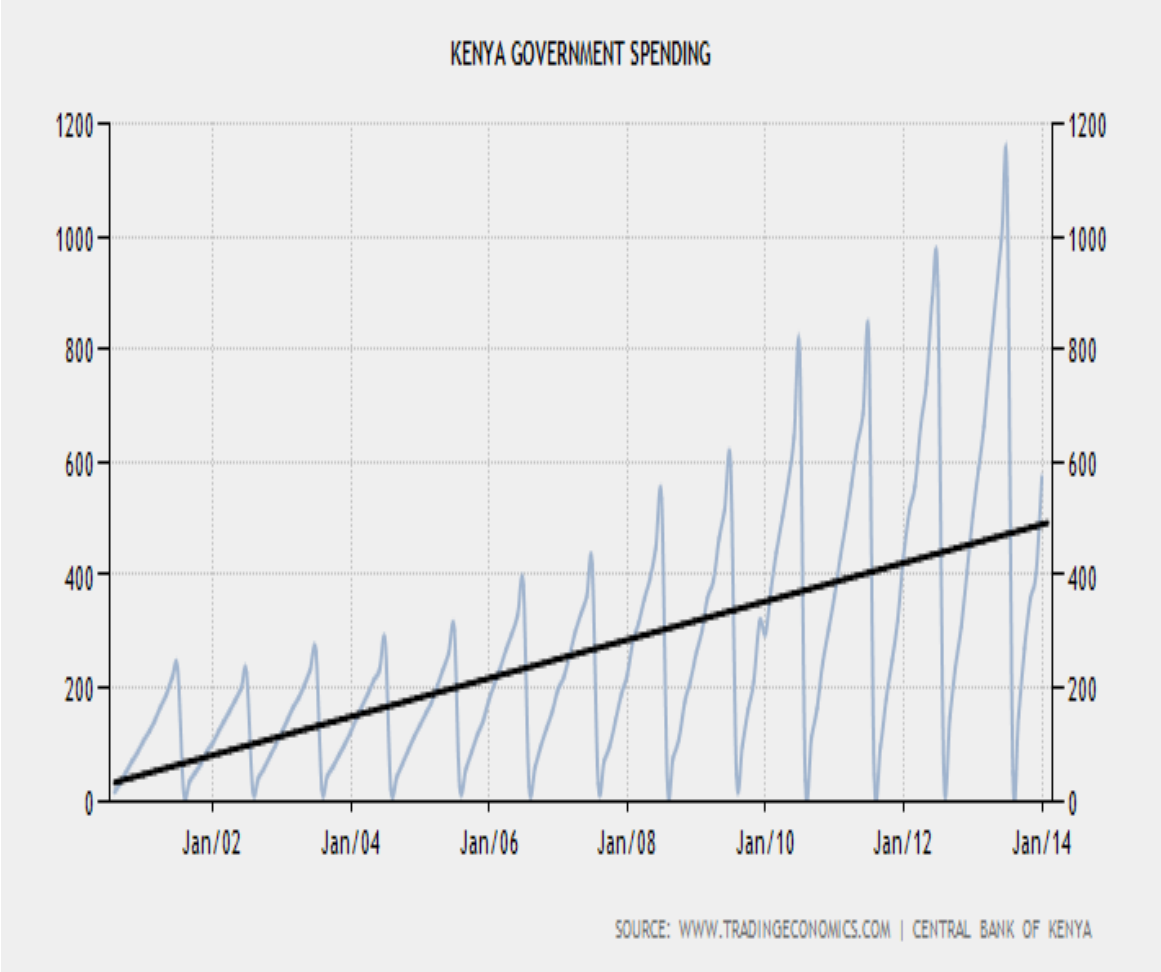


Fig 1.2: Trend of public expenditure, 2000 – 2014

Source: Central Bank of Kenya, 2014

There is an increasing tendency of government expenditure in Kenya since independence. The amount of the public expenditure has been going up in most of the years. From 2000 to 2010 government spending in Kenya averaged Kshs 256.5 billion. In 2011 the budget estimates indicated a total figure of public expenditure of more than one trillion. Figure 1.2 above captures this trend to date, 2014.

1.2 Statement of the Problem

While plentiful studies have been conducted on the role of components of government spending in the long-term growth of economies, no consistent evidence exists for a significance relationship between public spending and economic growth, in a positive or a negative direction. Results and evidence differ by countries, analytical method employed, and categorisation of public expenditures.

The studies done suffer from the heterogeneity of the underlying data set, different estimation techniques, different time periods and different variable measurement techniques which can yield different results (Easterly, 2003).

This study aims at examining the relationship between public capital expenditure and economic growth in Kenya covering the period 1980-2011, this will assist the policy makers on the nature of relationship between public expenditure and economic growth in Kenya and make informed allocation.

The contradicting output of the studies prompted the study which was set to investigate and fill the gap of varying output. This was through thorough diagnostic analysis and an analysis of the extent of cointegration between the variables and investigating the long run and short run relationships between the variables using three stronger statistical checks of data analysis i.e. the Error Correction Model, ECM. This is with the view of finding the conclusive relationship on whether public capital expenditures enhance, or deter economic growth in Kenya on a given time period. However, public expenditure varies depending upon varying nature of fiscal and

monetary policies of various economies. Therefore, the debate over the impact of public expenditure on growth is on-going and left open to further study.

1.3 Objectives of the Study

The general objective of the study was to investigate the impact of public capital expenditure on economic growth in Kenya.

The specific objectives were to:

i) Investigate the effect of capital infrastructure expenditure on economic growth in Kenya.

ii) Investigate the effect of capital educational expenditure on economic growth in Kenya.

iii) Determine the effect of capital health expenditure on economic growth in Kenya.

Iv) Determine the effect of capital agricultural expenditure on economic growth in Kenya

1.4 Research Hypotheses

The following null research hypotheses arose out of the specific objectives above.

H_{O1}: Expenditure on infrastructure does not significantly affect GDP growth.

H_{O2}: Expenditure on education does not significantly affect GDP growth.

H_{O3}: Expenditure on health does not significantly affect GDP growth.

H_{O4}: Expenditure on agriculture does not significantly affect GDP

1.5 Significance of the Study

The purpose of this study was to develop a structure for determining various governmental expenditure in relation to economic growth. This was with a view to assist the policy makers have an empirical way of allocation of public funds to various sectors of the economy. This is more so now that Kenya has counties and devolution of funds and the constant strikes from the teachers, nurses and doctors. This study also contributed to the body of knowledge which exists now by providing empirical evidence specifically on impact of government capital expenditure components on economic growth in Kenya.

1.6 The Scope and Limitations of the Study

The study used time series data for the period 1980-2011. This was the period that the Kenya government had experienced an increment in public expenditure annually. The study was conducted on capital expenditure for the four sectors which receive the major share from treasury. Misappropriation of the funds and corruption were not captured as there general impact might be minimal. With the newly formed Ethics and Anticorruption Commission (EACC) this vice is drastically reducing in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the theoretical underpinning, empirical literature, critique and the conceptual framework.

2.2 Theoretical underpinning

2.2.1 Peacock- wiseman Hypothesis

The Wiseman and Peacock's hypothesis says that there is usually considerable increase in revenue to governments due to the economic developments over the years, thereby leading to an increase in government expenditure. Peacock and Wiseman (2011) conducted a new study based on Wagner's law. They studied public expenditure from 8191 to 1955 in U.K. They found out that Wagner's law is still valid. They further stated that the rise in public expenditure greatly depend on revenue collection. Over the years economic development results in substantial revenue to the governments, this enabled to increase government expenditure. They also stated that there exists a big gap between expectations of the people about the public expenditure and the tolerance level of expectation. Therefore government cannot ignore the demands made by the people regarding various services especially, when the revenue collection is increasing at constant rate of taxation. Finally, they stated that during the period of war, the government further increases the tax rates, and enlarges the tax structure to generate more funds to meet the increase in defense expenditure. After the war the new tax rates and tax structures may remain the same, as people get used to them. Therefore the increase in government revenue results in the rise of government expenditure.

2.2.2 Wagner Theory of Organic State

Adolph Wagner, the German popular economist in the late 19th century made an in-depth study relating to government expenditure. Based on the study propounded, "The law called the law of increasing state activity". The literature opines that growth of public expending was a natural consequence of economic growth. Specifically, Wagner law viewed public expenditure as behavioral variable that positively responds to the dictates of a growing economy (Wagner, 1958). The hypothesis tries to find either a positive relationship between government spending and income and / or a unidirectional causality running from government spending to economic growth. The Wagner law is admired because in many ways it attempts to explain public expenditure and economic growth, (Muhlis and Hakan, 2003) in their examination of Wagner's law of relationship between public expenditure and GDP for the Turkish case over the period of 1965-2000. The law stipulates that as the economy develops over time, the activities and functions of the government increase. According to Adolph Wagner comprehensive comparison of different countries and different times show that among the progressive peoples societies with which alone we are concerned, an increase often takes place in activity both the central government and the local government or the county government, constantly undertake the new functions, while they perform both old and new functions more efficiently and completely. In this way the economic needs of the people to an increasing extent and more satisfactory fashion, are satisfied by the central and the local governments.

The law is faulted because of its inherent assumption of viewing the state as separate entity capable of making its decisions ignoring the constituent's populace who in actual fact can decide against the dictates of the Wagner law.

2.2.3 Musgrave Rostow's Theory

Richard Abel Musgrave (1973) was an American economist of German heritage. The theory asserts that in early stages of economic growth, public expenditure in the economy should be encouraged. The theory further states during the early stages of growth there exist market failures and hence there should be robust government involvement to deal with these market failures Musgrave. This theory is faulted because it ignores the contribution to development by the private sector by assuming the government expenditure is the only driver of economic growth.

2.2.3 Keynesian Theory

Keynes (1936) advocated for government spending to create jobs and employ underutilized capital when an economy is in a recession with high unemployment of labour and capital. Keynes's theory postulates that government spending is needed to increase economic output and advance growth. Though, Stratmann & Okolski (2010) disputed that there are many spending ways for governments, they might not know where goods and services can be most productively employed and therefore spending might not stimulate desired growth when it does not accurately target the projects where it would be most productive. This information problem confounded by a non-progressive political process can inhibit economic growth (Stratmann & Okolski, 2010).

The theory is also contrasted with the classical and neoclassical economic analysis of fiscal policy. Although they agree that fiscal stimulus (deficit spending) could actuate production, these schools saw no reason to believe that this stimulus would exceed the side-effects that "crowd

out" private investment. They argued that the incentive would increase the demand for labour and raise wages and impair the profitability of the firms. Also, such unbridled government expenditure would increase the stock of government bonds and reduce their market price which may lead to high interest rates. Thus, efforts to stimulate the economy would be self-defeating since the rise in the rate of interest would make it more expensive for business to finance fixed investment.

The American Great depression, shortly after the World War II, and the post-war economic expansion (1945–1973) were considered as manifestations of this school of thought. Decisions taken by the profit-seeking private sector operators sometimes lead to inefficient macroeconomic results therefore, the Keynesian economist advocate for active fiscal policy responses by the government to stabilize output over the business cycle. This, in the opinion of Barrow (1990), can be achieved by government investment through the injection of income resulting in larger spending in the general economy. The significant effect of this is stimulation of firm productivity and investment involving still more income and spending.

The Austrian economist Hayek (1989) too criticized Keynesian economic policies for what he called their fundamentally collectivist approach, arguing that such theories encourage centralized planning, which leads to wrong investment of capital which may also result in business cycles boom and doom.

2.3 Empirical Literature

Muritala and Taiwo (2011) examined the trends and effects of government spending on the growth rates of real GDP in Nigeria between 1970 and 2008 using Ordinary Least Square (OLS) technique. The findings show that there is a positive relationship between real GDP as against the recurrent and capital expenditure.

Maingi (2010) conducted a study on the impact of government expenditure on economic growth in Kenya he found out that improved government expenditure on infrastructure and in education facilitate economic growth while government consumption, expenditure on public order and security, salaries and allowances were growth could not spur economic growth. The study is faulted as none of the diagnostic test was conducted.

In addition, thirty-two (32) years' time series data from 1977 to 2008 was reviewed by Nurudeen and Usman (2010) in analysing the impact of government expenditure on economic growth in Nigeria. The study revealed that government total capital expenditure has negative effect on economic growth.

Comparing the relative effectiveness of fiscal versus monetary policies on economic growth in Nigeria, Adefeso and Mobolaji (2010) suggest that the effect of monetary policy is dominant than fiscal policy on economic growth in Nigeria. This result was arrived at having utilized annual time series data during the year 1970 to 2007 and considering GDP, broad money (M2),Government expenditures (G.E) and degree of openness (DOP) as key parameters and error correction and cointegration framework.

Ighodaro and Okiakhi (2010) examined government expenditure which was disaggregated into general administration, and community and social services in Nigeria using time series data for 46 years ending 2007 and applying the Granger causality test. The results showed that government expenditure has negative impact of on economic growth.

The empirical results of a similar study of Iran by Khosravi and Karimi (2010) based on autoregressive distributed approach to cointegration between 1960 and 2006 indicated the existence of long run relationship between economic growth, monetary policy and fiscal policy.

Jerono (2009) conducted a study on the impact of government spending on economic growth in Kenya and found that though expenditure on education had a positive relationship with economic growth though it could not spur any significant change to growth since the expansion of education in Kenya since in 2002 has been remarkably high. The government then hard formulated and implemented free and compulsory primary education. Most students from the humble backgrounds were enrolled in schools. On the higher education, the government chartered several public universities colleges institutions, since then there have been several graduates regrettably, there are few job opportunities for secondary and university graduates, the government has not yet provided enough credit to stimulate the private sector investment. These graduates take time be fascinated in the few government jobs. The study further stated that expenditure only will not stimulate economic growth but issues like political stability, peace in a country should prevail on order to achieve cumulative economic growth.

Chih Hung Liu, *et al*. (2008) investigated the causal relationship between GDP and public expenditures for US federal government covering the time series data 1974-2002, they found in this study that total expenditures does cause the growth of GDP, which is consistent with the Keynesian theory. Liu *et al.,* (2008) examined the causal relationship between GDP and public expenditure for the US data during the period 1947-2002 the estimation results indicated that public expenditure raises the US economic growth.

Koeda and Kramarenko (2008) evaluated the swift scaling-up of expenditure followed by a quick scaling-down of Azerbaijan government expenditure due to upsurge in the crude oil production. The research which relied on the neoclassical growth model suggests that the sharp variations in the fiscal policy pose significant threat to sustainable economic growth.

The study of 30 developing countries between of 1960 and 1970 by Bose *et al.,* (2007) focused on sectoral expenditures. Their results of the research which employed the Seemingly Unrelated Regression technique found only six categories (total investment, investment in education, investment in transport and communication, total expenditure on education, total expenditure on transport and communication and total expenditure on defense) displayed a significant association with growth, using a 10 percent significance level.

Albala and Mamatzak (2004) using time series data covering 1960-1995 to estimate a Cobb-Douglas production function that includes public infrastructure for Chile, found a positive and significant correlation between public infrastructure and economic growth. The study reported

that public investment crowds out private investment. One major weakness of the study was that it omitted impact of important variables such as education and health.

Dar and Amirkhalkali (2002) conducted their research on Government size, factor accumulation, and economic growth: Evidence from OECD countries in the period 1970 – 1999. The study used panel data and concluded that the government size had a negative and statistically considerable impact on economic growth.

Nijkamp and Poot (2002) who conducted a meta-analysis of past empirical studies of public expenditure and growth and revealed that in a sample of 41 studies, 29% indicated a negative relationship between public expenditure and economic growth, 17% a positive one, and 54% an inconclusive relationship.

Were (2001) while conducting a research on effect of external debts on economic growth and investment in Kenya, reported that investment in human capital development to be growth sustaining. But the lagged variable of public investment in human capital unfavorably affected growth. The however, has got the short come of limited time lapse.

The research study of Tanzi and Zee (2000) in their study "Meta-analysis of past empirical studies of public expenditure and economic growth" using time series data found no relationship between government size and economic growth.

Aschauer's (1989) empirical results on whether expenditure on public spending is worth using OLS, indicated that non-military public capital stock is substantially important in determining productivity than the flow of non-military or military spending, military capital bears little relation to productivity, and the basic stock of infrastructure of streets, highways, airports, mass transit, sewers, and water systems has most explanatory power for productivity.

Devarajan *et al.* (1996) used functional categories of public expenditure in their economic growth regressions. The research found out that public expenditure had a negative effect in developing countries but had a positive effect in developed countries. The study had categorized expenditure into productive and non productive categories by taking into account the level of resources invested and output produced by different programs. The study reported that government expenditure on health and transport and communications was growth promoting but found no positive impact of education and military spending on economic growth. However, the findings might be inaccurate since public finance systems have not lived to expectation in developing countries, inaccurate data sent to all policy decision makers, the governments are totally ineffective situations where successes should have been recorded, corruption, cultural background, lack of transparency, poor accountability and probity have hindered growth and development. It is imperative that data in use have not been updated by the relevant government institutions in their respective countries.

Barro (1990) endogenized government spending in a growth model and which analyzed the relationship between size of government expenditure and rates of growth and saving. It was

established from the study that an increase in resources devoted to non-productive government services was associated with little economic growth.

2.4 Critique of the Empirical Literature

Majority of the studies made use of regression analysis, unfortunately diagnostic tests, stationarity test, and cointegration which are very crucial in modeling were glaringly missing. This could put to question reliability of the models so developed. This study employed stationarity test to ensure that the relationship established from the regression analysis were not spurious. In addition co- integration test was done to verify if the relationship hold in the long run. Various diagnostic tests namely autocorrelation, heteroscedasticity, and multicollinearity were done to ensure that the model conforms to the rules of regression analysis.

From the various studies that have been conducted, there are conflicting results on the impacts of government expenditure on GDP growth, in some studies it has prompted the increase in GDP while in other studies there has been a negative relationship. Most of these studies have been done on the western countries and few African countries; the countries have got different government structures and even political administrations. Few studies have been conducted in Kenya and have reported contradicting results as depicted in above literature review. Therefore one becomes inquisitive to study the Kenya case.

2.5 Conceptual Framework

The conceptual framework below shows the linkage between independent variables and dependent variable.

Independent variables **Dependent variable**

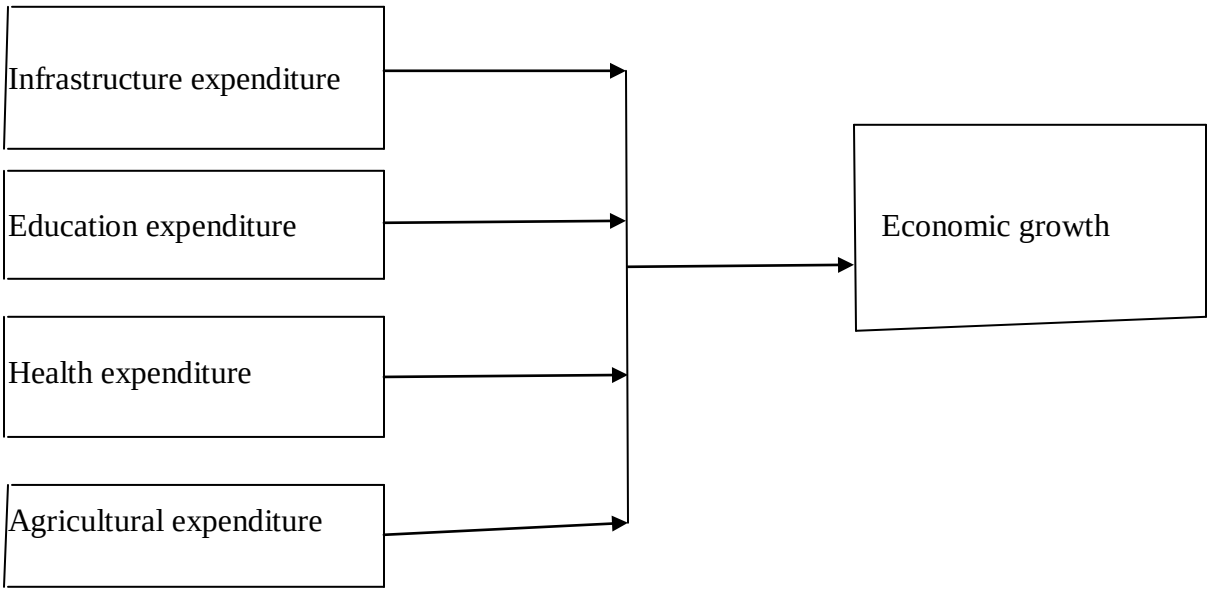


Fig 1.3: Conceptual framework

Source: Author's Conceptual Framework, 2014

The conceptual framework above illustrates the linkage between the different study variables. Growth in GDP in Kenya is affected by a number of factors more so public spending components. The interaction of the main determinants of economic growth i.e. the public capital spending on education, agriculture, health and infrastructure is as shown above.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter focused on the research design, target population of the study, sample design, data collection procedures, the theoretical framework and data analysis techniques.

3.2 Research Design

Building on the existing theoretical and empirical literature, this study perceived a causal relationship between government capital expenditure and economic growth in Kenya. Therefore, the descriptive design was adopted to investigate the impact of government expenditure on economic growth within the context of Kenya economy. Empirical econometric approach was adopted in analyzing data. The relevant time series data were extracted from the Kenya Bureau of Statistics. Based on the perceived causal relationship between the identified variables of the research, Vector Error Correction Method was to establish the relationship among the variables.

3.3 Area of Study

The study focused on the impacts of government capital expenditure on Kenya's GDP. Consequently, Kenya was the geographical area of study. The country is the regional hub for trade and finance in East Africa and the natural entry point in the region. The country has got a market based economy with a liberalized foreign trade policy which makes it a destination point for investors. It is the most industrialised country in east and Central Africa and agriculture is the backbone of the country.

3.4 Sampling Method

The sample under study constituted four ministries i.e. Transport and Infrastructure, Education, National Health and Agriculture Livestock and Fisheries sectors which have been receiving a great amount of the budget share. Therefore the study adopted descriptive sampling method.

3.5 Data Sources

The research used secondary data which was extracted from the Ministry of National Treasury Kenya, Ministry of Agriculture Livestock and Fisheries, Ministry of Transport and Infrastructure, the Ministry of Health and the Kenya National Bureau of Statistics.

3.6 Data Analysis

The study employed both descriptive and inferential statistics in analysis. E-views was used since it time series data analysis was done. The standard deviation was used to show the extent to which the above variables differed. Darling normality test or A^2 statistic and Quantile – Quantile (Q-Q) plot was used to test normality of the data. The p value of each variable was calculated to establish the significance in the model in which threshold for rejecting null hypothesis was set.

3.6.1 Models of Data Analysis

The Keynesian model of economic growth as a function of public expenditure is given as;

$GDP_t = f(GEXP_t)$……...……. (3.1)

Where;

GDP_t = Economic growth

$GEXP_t$ = Government expenditure in all sectors of the economy

Subscript t = it the time period for the data 1980-2011

Maingi (2010) defined total public expenditure as a function of summation of all individual government expenditure in all components.

$GEXP_t$ = f (government expenditure in all components) ……..... (3.2)

This study employed both models and the Error Correction Model in data analysis.

The government expenditure GEXP is defined by the four components in the study;

$GEXP_t = f [(EXPE_t \ EXPH_t, EXPF_t, EXPA_t), Ut]$..... (3.3)

Since,

$GDP_t = f (GEXP_t)$ according to the Keynesian,

Hence the model under study was derived as:

$GDP_t = C_t + \beta_O EXPE_t + \beta_1 EXPH_t + \beta_2 EXPF_t + \beta_3 EXPA_t + U_t$…….... (3.4)

Where;

C_t = Intercept of the regression line. It depicts any level of economic growth that exists at zero government expenditure level

GDP_t = Economic growth

$EXPE_t$ = Capital expenditure on education in shillings

$EXPH_t$ = Capital expenditure on health in shillings

$EXPF_t$ = Capital expenditure on infrastructure in shillings

$EXPA_t$ = Capital expenditure on agriculture in Kenya shillings

U_t = Error term (causes of economic growth not explained by variables in the model)

β_O, β_1 and $\beta_2 > 0$ are regression coefficients

3.6.2 Definition and the Measurement of Variables

Economic Growth (GDP)

This is the increase in gross domestic product. It captures the total value of goods and services produced in a given economy for a specified period of time in monetary terms. It was calculated as the total value of goods and services produced annually at current prices in million Kenyan shillings.

Expenditure on Health (EXPH)

This is the total amount of government capital expenditure in Kenyan million shillings that goes to the Ministry of Health. It included the amount the government spends in construction of hospitals building structures, equipping the hospital institutions with equipment, drugs, the training of doctors and nurses and any amount spent on health sector apart from issuing of salaries\ to the workers.

Public Expenditure on Infrastructure (EXPF)

This is the total amount of government capital expenditure in Kenyan million shillings that is paid to the Ministry of Transport and Infrastructure. It captured the amount spent on activities such as the construction of air and seaports, construction of highways, fiber optic cable connection lay outs and construction of roads like the Thika super highway in all parts of the country.

Public Expenditure on Education (EXPE)

This is the total government capital expenditure that is injected into the Ministry of Education in Kenyan million shillings. It consisted the expenditure the government incurs to fund learning institutions by paying construction of infrastructure such classrooms, lecture halls, offices and purchase of learning equipment. It also included expenses on scholarships whether local or abroad.

Public Expenditure on Agriculture (EXPA)

This is the total amount of government capital expenditure in Kenyan million shillings that is allocated to the Ministry of Agriculture, Livestock and Fisheries. It captured the amount spent on activities such as, building of government warehouses, purchasing of farm machineries and inputs, subsidizing of farm inputs like fertilizers and seeds.

3.6.3 Stationarity Test

In econometrics, a unit root test tests whether a time series variable is non-stationary using an autoregressive model. A well-known test that is valid in large samples is the augmented Dickey–Fuller test. Non stationary data as a rule are unpredictable and cannot be modeled. The results obtained by using non stationary time series may be spurious. In order to obtain consistent, reliable results, the non stationary data needs to be transformed into stationary data. In contrast to the non stationary process that has a variable variance and a mean that does not converge, or returns to a long run mean over time, stationary process reverts around a constant long term mean and has a constant variance independent of time.

Economic macro variables variables like GDP typically exhibit a random walk, loosely known as a unit root process in time series literature. A stochastic variable Y is said to follow a random walk without a drift if its value at a time t can be mathematically expressed as the sum of its value at a time t-1 and a random shock, or white nose, (with zero mean and constant variance):

$Y_t = Y\rho_{t-1} + \varepsilon_t$,……..…….3.5

where ρ is the constant term.

If ρ=1, the random walk test gives rise to a unit root process (Gujarati, 2004). The Dicky and Fuller (1979) and the Augumeted Dickey and Fuller (ADF) methodologies are popular methods of testing the presence of unit root (that is absence of stationarity). To see the logic behind these two tests, consider the following first order autoregressive process, AR(1):

$Y_t = \rho Y_{t-1} + \varepsilon_t$, $-1 \leq \rho \leq 1$.....……. (3.6)

Subtracting the Y_{t-1} from both sides of equation 3.6 gives the first difference form of the random walk model:

$Y_t - Y_{t-1} = \rho Y_{t-1} + \varepsilon_t - Y_{t-1}$

$\Delta Y_t = (\rho-1) Y_{t-1} + \varepsilon_t = \alpha Y_{t-1} + \varepsilon_t$..... (3.7)

Where $\Delta Y_t = Y_t - Y_{t-1}$ is the first difference of the random variable Y at time t; $\alpha = \rho - 1$ and ε_t is the white at time t. Equation 3.6 is restricted in the sense that it ignores possible presence of a constant term that may cause the series Y_t to drift away from the origin. Introducing a constant term gives random walk model with a drift:

$\Delta Y_t = Y_t + \alpha Y_{t-1} + \varepsilon_t$…….……..…….. (3.8)

Finally, the model can be presented in a manner that allows for a drift as follows:

$\Delta Y_t = \beta_1 + \beta_{2t}\, \alpha Y_{t-1} + \varepsilon_t$ ..... (3.9)

For each of the equations the standard Augumented Dicky-Fuller procedure tests the null hypothesis that $\alpha = 0$, that is $\rho = 1$ against the alternate that $\alpha < 0$, that is $\rho < 1$. Rejection of the null hypothesis implies that the series is stationary. If the null hypothesis is not rejected, one concludes that the series has a unit root, meaning that it is non- stationary. The τ (tau) statistic, whose critical values were developed by Dicky Fuller (1979), is used to test the null hypothesis. Therefore the Augumented Dickey-Fuller test for non – stationarity was used in this study.

3.6.4 Granger Causality Test

Correlation does not necessarily imply causation in any meaningful world. Granger (1969) approach to the question of whether x causes y is to see how much of the current y can be explained by the past values of y and then see whether adding past values of x can improve the explanation. y is said to be Granger caused by x if x helps in the prediction of y or equivalently if the coefficients on the lagged x's are statistically significant. Note the way causation is frequently the case, x granger cases y and y granger causes x. It is important to note that the statement x granger causes y does note granger imply y is the effect or result of x. Granger causality measures precedence and information content but does not by itself indicate causality in the more common use of the term.

In this study, it was predicted that the composition of government expenditure predicts the economic growth. On the same note the economic growth (GDP levels) can as well influence the government expenditure and this can lead to our model suffering from simultaneous bias. The

study conducted the causality test to know the direction of causation. The procedure the study followed was to test for granger causality of economic growth, GDP on government expenditure variables, GE by running a linear equation with GDP as dependent variable and GE as the independent variable, and then the F-test was done for the joint significance of the variables.

3.6.5 Co integration Test

The time series variable is said to be integrated of order d, I(d), if stochastic trends or unit roots can be removed by differentiating a series d times and stochastic trend remains after differencing only d-1 times (Lutkepohl, 2007). Accordingly, a variable without a stochastic trend or unit root is said to be integrated of order zero, I(0). A set of variables of same integration order d, are said to be co integrated if a linear combination of the variables exists which is I (0). In econometrics, two or more econometric variables are said to be co integrated if a long run, or equilibrium relationship exist between (or among) them.

In this study Johansen and Juselius test (1990) was used test for co integration. This is predicted on the notion that two or more economic variables are cointegrated if the residuals from the regression or the variables exhibit stationarity i.e. if the residuals are integrated of the order zero I(0). Therefore, the Johansen test was used to establish whether the noise term ε_t is I(0). The regression coefficients were tested for significance using τ (tau) statistic for Y. The null hypothesis is that the variables are not cointegrated, i.e. the residuals from the regression are not I(0). The null hypothesis that the residuals ε_t are not I(0) is rejected if the computed $\boldsymbol{\tau}$ statistic is less than the critical $\boldsymbol{\tau}$ statistic by taking absolute values.

The Johansen cointegration test is admired over Engle-Granger approach because in this VAR framework the test result does not depend on which variable we normalize with regards to, and it is possible for us include to more cointegration relationships. In this test, we exploit that the number of non-zero eigenvalues is at most the rank of the matrix, meaning that we can interpret the number of significant eigenvalues as the number of cointegration relations, (Alemayehu and Ndung'u, 2012).

3.6.6 Diagnostic Tests

Regression diagnostics play a crucial role in finding and validating a good predictive relationship among the dependent variables. The following diagnostic tests were undertaken: heteroscedasticity, autocorrelation, and multicollinearity.

a) Heteroscedasticity Test

The variance of linear regression model should be constant for the linear regression model to hold. If the error terms do not have constant variance, they are said to be heteroscedastic. Breusch-Godfrey test was used to test for the presence of heteroscedasticity. Since each of the heteroscedasticty is somehow different, there is no general rule or method correcting for it. However if x_t is related to the variance, then generally we can transform the regression. For example if the variance is inversely related to x_t then we can multiply both sides of the equation by x_t or its square root. If the variance is related to the time then we can do the same using time, t (Gujarati, 2004). However in this study the content covariance, HAC which also corrects autocorrelation was employed to adjust the problem.

b) **Autocorrelation Test**

Autocorrelation refers to a situation whereby two or more consecutive errors are related. It is a common problem in the time series data. Breusch-Godfrey Serial Correlation Lagrange Multiplier Test, LM Test was used to test for autocorrelation. Montgomery *et al* (2001) notes that, because most regression problems involving time series data exhibit positive autocorrelation, the hypothesis usually considered in the Durbin Watson test is:

H_o: $\rho = 0$

H_1: $\rho > 1$

The solution for autocorrelation is to transform the original autoregressive error term into one with non-autocorrelated error term so as to permit the use of OLS procedures; let:

$Y_t=\beta_1 + \beta_2 X_{2t} + \ldots \beta_K X_{kt} + e_t, \; t=1..$ (4.0)

$e_t = \rho_{et-1} + V_t \qquad (0<|\rho|<1)$

Where both e_t and V_t have zero expected values and the constant variances through time, e_t are autocorrelated but V_t are not. The former defines a standard first-order autoregressive model: ρ is the correlation coefficient between errors in the time period t and errors in the time period t-1. This was done using content covariance (HAC) in the Eviews software.

c) Multicollinearity Test

Gujarati (2004) states that this is a statistical phenomenon in which two or more predictor variable in a multiple regression model are highly correlated and provide redundant information about the response, meaning that one can be linearly predicted from the others with a non trivial

degree of accuracy. Under this situation the coefficient estimates may change erratically in response to small changes in the model or data.

Mathematically, a set of variables is perfectly multicollinear if there exist one or more exact linear relationships among some of the variables. This can be demonstrated in the following manner, holding for all observations *i*, where λ_j are constants and χ_{ij} is the i^{th} observation on the j^{th} explanatory variable. The examination of one issue caused by multicollinearity can be done by examining the process of attempting to obtain estimates for the parameters of the multiple regression equation.

$$Y_i = \beta_0 + \beta_1 X_{1i} + \cdots + \beta_k X_{ki} + \varepsilon_i$$

The ordinary least squares estimates involve inverting the matrix

$$X^T X$$

Where,

$$X = \begin{bmatrix} 1 & X_{11} & \cdots & X_{k1} \\ \vdots & \vdots & \vdots & \vdots \\ 1 & X_{11} & \cdots & X_{kN} \end{bmatrix}$$

If there is an exact linear relationship i.e. perfect multicollinearity among the independent variables, the rank of X (and therefore of X^TX) is less than k+1, and the matrix X^TX will not be invertible. In most researches, perfect multicollinearity is unlikely. Most reseaechers do face a high degree of multicollinearity which exist in the following form having modified above equation with an error term: v_i

$$\lambda_0 + \lambda_1 X_{1i} + \lambda_2 X_{2i} + \cdots + \lambda_{ki} + \nu_i = 0$$

In this case, there is no exact linear relationship among the variables, but the x_j variables are nearly perfectly multicollinear if the variance of v^{u_i} is small for some set of values for the λ's. In this case, the matrix $X^T X$ has an inverse, but is ill-conditioned so that a given computer algorithm may or may not be able to compute an approximate inverse, and if it does so the resulting computed inverse may be highly sensitive to slight variations in the data (due to magnified effects of rounding error) and so may be very inaccurate.

Variance inflation factors, (VIF) and Klein Lawrence R rule of thumb are also usually used to test for multicollinearity. The study used the general rule of thumb and Klein Lawrence R rule of thumb which states that the greater the tolerance value is close to zero the greater the degree of linearity. R^2 values are obtained from auxiliary regression of explanatory variables i.e. taking one independent variable and then regressing it on the other explanatory variables. The procedure is repeated for all variables.

3.6.7 Normality Test

The classical linear regression model assumes that each u_i is distributed normally i.e. it has zero mean and constant variance. The study sought to verify normality assumption using Darling Anderson and Quantile – Quan-tile (Q-Q) plot. The test output conformed to the assumption of Ordinary Least Square (OLS) method i.e. normal linear distribution. For that reason, the regression coefficients of the OLS in the study are Best Linear Unbiased Estimators (BLUE).

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter consists of presentation, analysis and interpretation of the data based on the empirical model developed in chapter three. Data conversion was done and time series properties of the data determined using Augmented Dickey Fuller (ADF) tests before estimation.

4.2 Unit Root Tests Results

Running a regression using non stationary data gives spurious results because estimates obtained from such data will possess non constant mean and variance. The study therefore sought to establish the stationarity of the data or what order they were integrated to make sure that the results obtained were not spurious. Augmented Dickey Fuller (ADF) was used to test for unit roots. The unit roots results of the variables in the model are reported in table 4.1.

Whereby;

GDP = Economic growth

EXPE = Capital expenditure on education in shillings

EXPH = Capital expenditure on health in shillings

EXPF = Capital expenditure on infrastructure in shillings

EXPA = Capital expenditure on agriculture in Kenya shillings

In the preceding analysis

Table 4.1: Results of the Stationarity Test at Level

VARIABLE	INCLUDE IN TEST EQUATION	ADF	CRITICALVALUE			PROBABILY At 1%,5%&10%
			1%	5%	10%	
GDP	INTERCEPT	10.41	-3.662	-2.960	-2.619	0.000
EDUCATION	INTERCEPT	0.9898	-3.670	-2.964	-2.620	0.3311
HEALTH	INTERCEPT	3.587	-3.586	-2.972	-2.625	0.0016
INFRUSTRUCTURE	INTERCEPT	6.084	-3.670	-2.964	-2.621	0.000
AGRICULTURE	INTERCEPT	6.532	-3.662	-2.960	-2.619	0.000

Source: Authors' Computation, 2014

As revealed in the Table 4.1 above, education was non stationary at level, implying that the series needed to be differenced once to avoid the tendency of having spurious regression problem in the estimated equations. The rest of the variables were all stationary at level as indicated. The results of the regression with differences are shown in table 4.2 below.

Table 4.2: Results for Stationarity Test after First Difference on Education

VARIABLE	INCLUDE IN TEST EQUATION	ADF	CRITICALVALUE			PROBABILY 1%,5%&10%
			1%	5%	10%	
GDP	INTERCEPT	10.41	-3.662	-2.960	-2.619	0.000
EDUCATION	INTERCEPT	-8.493	-3.670	-2.964	-2.621	0.000
HEALTH	INTERCEPT	3.587	-3.586	-2.972	-2.625	0.0016
INFRUSTRUCTURE	INTERCEPT	6.084	-3.670	-2.964	-2.621	0.000
AGRICULTURE	INTERCEPT	6.532	-3.662	-2.960	-2.619	0.000

Source: Authors' Workings, 2014

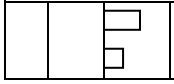
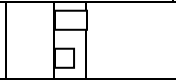
4.3 Diagnostic Tests

The regression diagnostics play a crucial role in finding and validating a good predictive relationship between the variables. The following diagnostic tests were undertaken: heteroscedasticity, autocorrelation and multicollinearity.

a) Autocorrelation

The study employed the use of Correlogram Q-statistic and Breusch-Godfrey Serial Correlation LM Test both tests rejected the null hypothesis of no autocorrelation the regression output for Correlogram Q-statistic is as shown in the table 4.3 below.

Table 4.3: Correlogram Q-statistic Test

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Probability
		0.522	0.522	9.0045	0.003
		0.365	0.128	13.571	0.001

Source: Authors' Workings, 2014

Table 4.3 shows three statistics: (i) the AC (autocorrelation coefficient), (ii) the PAC (partial autocorrelation coefficient) and (iii) a Box–Pierce Q-statistic with its probability. The lines in the graphs of AC and PAC bordering horizontal boxes are approximately two standard error bounds. The research showed that at 2 lags, the hypothesis of no autocorrelation is rejected. It is noted that if there was no serial correlation in the residuals, the autocorrelations and partial autocorrelations at all lags should be zero, and all Q-statistics should be insignificant with large p-values. Therefore autocorrelation had to be removed before any further analysis.

When Breusch-Godfrey Serial Correlation LM Test was conducted using two lags, the test showed that the hypothesis of no serial correlation was also rejected for the model, based on the chi-square-statistic (Obs x Rsquared) of 12.069 with 2 degrees of freedom and a p-value of 0.0024 or the F-statistic of 7.740604 with 2 and 23 degrees of freedom in the numerator and denominator respectively and a p-value of 0.0027 or the coefficients of the residuals are

significantly different from zero. The dependent Variable is the residuals from the variables, the regression results are shown in table 4.4 below.

Table 4.4: Breusch-Godfrey Serial Correlation LM Test

F-statistic	7.740604	Prob. F(2,23)	0.0027	
Obs*R-squared	12.06917	Prob. Chi Square(2)	0.0024	
Variable	Coefficient	Std-Error	t-Statistic	Prob.
C	107427.3	87660.79	1.225488	0.2328
EXPA	-6.458621	35.86518	-0.180081	0.8587
EXPH	-61.41630	35.54621	-1.727788	0.0299
EXPE	-656320	17.57202	-0.037350	0.9705
EXPF	15.16876	14.99412	1.011647	0.3222
RESID(-1)	0.516265	0.267492	1.930017	0.0660
RESID(-2)	0.364576	0.345765	1.054376	0.3027
R-squared	0.687072	Akaike info criterion	27.38732	
Adjusted R-squared	0.567861	Schwarz criterion	28.51596	
Log likelihood	-401.8098	Durbin-Watson stat	1.503736	

Source: Authors' Workings, 2014

Content covariance, HAC was used to correct autocorrelation as shown in table 4.6 which also corrected heteroscedasticity.

b) Heteroscedasticity

Heteroskedasticity is frequently encountered in regression analysis. It is something that needs to be routinely examined for in each model run, since its presence will produce results that results erroneous inferences with our hypothesis tests. This is a common problem to small samples. When testing for it, the residuals should not be serially correlated as any serial correlation will generally invalidate the test for heteroskedasticity. Therefore, autocorrelation test ought to be done and necessary adjustments be made as in the case of this study. The research tested for heteroscedasticity and then corrected it using content covariance, HAC which also corrects autocorrelation. The regression results are shown in table 4.5.

Table 4.5: Breusch-Pagan-Godfrey Heteroskedasticity Test

F-statistic	0.449466	Prob. F (4, 25)		0.7718
Obs*R-squared	2.012694	Prob. Chi-S quare (4)		0.7334
Scaled explained SS	0.778145	Prob. Chi-Square (4)		0.9414
Test Equation: Dependent Variable: RESID^2				
Method: Least Squares				
Included observations: 30				
Variable	Coefficient	Std. Error	t-Statistic	Prob
C	8.75E+10	2.98E+10	2.939391	0.0070
EXPE	1316956	6302764	0.208949	0.8362
EXPH	-9457284	10041335	-0.941835	0.3553
EXPF	5115070.	5196974	0.984240	0.3344
EXPA	-4611731	11516296	-0.400453	0.6922
R-squared	0.067090	Mean dependent var		8.05E+10
Adjusted R-squared	0.082176	S.D. dependent var		8.64E+10
S.E. of regression	8.98E+10	Akaike info criterion		53.43168
Log likelihood	-796.4752	Hannan-Quinn criter		53.50639
F-statistic	0.449466	Durbin-Watson stat		1.536786

Source: Authors' Computation, 2014

As it can be noted from the above regression the Breusch-Pagan-Godfrey chi-squire, 2.012694 is more than the table chi-squire 1.92255 with 4 degree of freedom and a probability of 0.7334. Therefore, the null hypothesis of no heteroskedasticity was rejected which meant that the error

term was heteroskedastic and the standard errors should be adjusted. Content Covariance, HAC was used to correct heteroskedasticity (Gujarati, 2004). After running the equation, E-views re-estimated the equation and adjusted the standard errors. The output regression results are as shown in table 4.6 below.

Table 4.6: Results for Correction of Heteroskedasticity and Autocorrelation

Dependent Variable: GDP

Method: Least Squares

Newey-West HAC Standard Errors & Covariance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	385093.0	164409.2	2.342284	0.0274
EXPA	-31.22065	36.53677	-0.854499	0.4009
EXPH	91.15164	38.27395	2.381558	0.0252
EXPE	6.187289	8.924177	0.693318	0.4945
EXPF	27.29915	17.81823	1.532091	0.1381

R-squared	0.834199	Akaike info criterion	28.28243
Adjusted R-squared	0.807671	Schwarz criterion	28.51596
Log likelihood	-419.2365	Durbin-Watson stat	0.861127

Source: Authors' Workings, 2014

However according to Shrestha *et al.* (2005), "since the time series constituting the ARDL equation are potentially of mixed order of integration, i.e., I(0) and I(1), it is natural to detect heteroscedasticity".

c) Multicollinearity Test

Multicolinearity does not violet any regression assumptions. The only consequence of multicolineality is to make it hard to get coefficient estimates with small standard errors (Gujarati, 2004). The study used the general rule of thumb and Klein Lawrence rule of thumb which states that the greater the tolerance is close to zero the greater the degree of linearity. R^2 are obtained from auxiliary regression of explanatory variables. The regression results are shown in table 4.7 below.

Table 4.7: Multicollinearity Test

Dependent variable	R^2 VALUE	TOLERANCE TOL(1- R^2)
EXPE	0.005	0.995
EXPH	0.09423	0.0577
EXPA	0.863173	0.136827
EXPF	0.8386	0.1614

Source: Constructed from the study data, 2014

Therefore based on the output above, the null hypothesis of non multicolinearity was acknowledged as the tolerance values are statistically significantly different from zero.

4.4 Normality Test

The study dealt with the issue of normality within each variable in two different ways. The Jarcque Bera normality test was not used as it requires a large sample of data than the one under this study. Anderson Darling normality test or A^2 statistic was employed to carry out the analysis.

Table 4.8: Normality Test results

Method	Value	Adj. Value	Probability
Cramer-vonMises W2)	0.298397	NA	(0.1, 0.15)
Anderson-Darling (A^2)	1.742273	NA	(0.1, 0.15)

Source: Authors' Workings, 2014

The underlying null hypothesis is that the variable under consideration is normally distributed. If the probability of obtaining A^2 statistic is high or statistically different from zero then we accept the null hypothesis otherwise reject. To that extend normality test was conducted and the findings are as shown in Table 4.8 below. Based on the above results the study accepted the null hypothesis since the probabilities obtained were statistically different from zero.

Another alternative way of checking for normality which the research also employed is doing so across the different groups. Making this cross group analysis is done by using Quantile – Quantile (Q-Q) plots to determine whether or not the observations follow a normal distribution when analyzed within their group. To make this an analysis in EViews was done. The output displayed

the normal distribution, the straight or line of the best fit line, and the actual observations, the dots, within each group. As we can see in the appendix 1 there existed only minor deviations from the line of the best fit and therefore the research concluded that the assumption concerning normal distributed errors was satisfied.

4.5 Cointegration Analysis Results

The linear combination of one or more of these variables might exhibit a long run relationship. In order to capture the extent of cointegration among the variables, the multivariate cointegration methodology proposed by Johansen (1990) was utilized. The numbers of integrating vectors are presented in table 4.9 below.

VAR Lag Order Selection Criteria

Endogenous variables GDP EXPED EXPH EXF EXPA

TABLE 4.9: VAR Lag Order Selection Criteria

LAG	LOGL	LR	FPE	AIC	SC	HQ
0	-1452.885	NA	1.16e+39	104.1346	104.3725	104.2074
1	-1322.557	204.8001	6.46e+35	96.61125	96.61125	97.04761
2	-1272.985	60.19457*	1.35e+35*	94.85611*	97.47294*	95.65610*

* indicates lag order selected by the criterion

LR: Sequential modified LR test statistic (each at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion SC: Schwarz information criterion

Source: Authors' Workings, 2014

The decision rule usually is to choose the model with the lowest value of the information criteria. This ensures that the error term is not mispecified (Enders, 1995). The results of the Aikaike Information Criteria, Hannan-Quinn information criterion, Sequential modified LR test statistic, Final prediction error and Schwarz information criterion lag selection in table 4.3 point to the use of 2 lags as the most appropriate lag length that would minimize the value of the selection criteria. If the lag length is too short, autocorrelation of the error terms could lead to apparently significant and inefficient estimators. Therefore, one would receive wrong results. Based on the results in table 4.9 the study employed the use of two lags in the subsequent analysis.

4.6 Granger Causality Test

After stationalizing the data, it implied there was a long term relationship between the variables. The study needed the direction of causality; that is, unidirectional causality if GDP growth granger causes public capital expenditure. In this case if the coefficients of GDP were statistically significant from zero and the coefficients of public capital expenditure were not statistically different from zero. Or whether public capital expenditure granger causes GDP growth if its coefficients were statistically different from zero, or whether there was a multidirectional causation if in both case the coefficients were statistically different from zero. Independent causality existed if the coefficients were not statistically different from zero. To that end, the Granger Causality Test was conducted and the findings are as shown in Table 4.10 below. Whereby;

GDP = Economic growth

EXPE = Capital expenditure on education in shillings

EXPH = Capital expenditure on health in shillings

EXPF = Capital expenditure on infrastructure in shillings

EXPA = Capital expenditure on agriculture in Kenya shillings

Table 4.10: Granger Causality Test Results

Null Hypothesis	Obs	F-Statistic	Prob.	CONCLUSION
EXPE does not Granger Cause GDP GDP does not Granger Cause EXPE	27	4.83597 3.32551	0.0182 0.0547	multidirectional Granger causality
EXPH does not Granger Cause GDP GDP does not Granger Cause EXPH	27	9.35588 7.76064	0.0011 0.0028	Multidirectional Granger causality
EXPA does not Granger Cause GDP GDP does not Granger Cause EXPA	27	1O.2723 2.02832	0.0007 0.1554	Unidirectional granger causality
EXPF does not Granger Cause GDP GDP does not Granger Cause EXPF	27	16.7649 1.07630	4.E-05 0.3581	Unidirectional granger causality
EXPH does not Granger Cause EXPE EXPE does not Granger Cause EXPH	27	1.72402 8.92909	0.2016 0.0014	Unidirectional granger causality
EXPA does not Granger Cause EXPE EXPE does not Granger Cause EXPA	27	0.34431 0.61068	0.7125 0.5519	Independent Granger causality
EXPF does not Granger Cause EXPE EXPE does not Granger Cause EXPF	27	0.50123 41.63098	0.6125 0.2185	Independent Granger causality
EXPA does not Granger Cause EXPH EXPH does not Granger Cause EXPA	27	3.84905 1.14132	0.0369 0.3376	unidirectional Granger causality
EXPF does not Granger Cause EXPH EXPH does not Granger Cause EXPF	27	6.53836 2.13391	0.0059 0.1422	unidirectional granger causality
EXPF does not Granger Cause EXPH EXPH does not Granger Cause EXPF	27	2.91368 0.61879	0.0754 0.5477	Independent Granger causality

Rejection of the null hypothesis at 5% significance level

Source: Constructed from the study data, 2014

The tests were significant and it was generally concluded that GE granger causes GDP and GDP granger causes GE as shown from the above table that is, a long term relationship between GE and GDP existed whereby the past values of GDP were used to predict current or future values of GE. Similar test but then in reverse direction were also conducted as shown in the table above.

4.7 Johansen Long Run Cointegration Test

The starting point is to run unrestricted VAR. To take care of non-stationarity of variables and to check whether there exists a long run equilibrium relationship, Johansen cointegration concept was used. This concept basically refers to the condition that even if individual series are non stationary (i.e. are I(1) series), if there exist a linear combination of this I(1) series in the regression equation and is stationary, then the regression is not a spurious regression (Alemayehu and Ndung'u, 2012). The regression output of the research is as shown in table 4.12.

Table 4.11: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.989351	209.9416	76.97277	0.0000
At most 1 *	0.908435	96.38379	54.07904	0.0000
At most 2 *	0.609532	36.61606	35.19275	0.0349
At most 3 *	0.261820	13.10581	20.26184	0.03554
Trace test indicates 3 cointegrating eqn(s) at 5% level of significance level * denotes rejection of the hypothesis at the 0.05 level *** denotes acceptance of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

Source: Authors' Workings, 2014

The number of cointegrating equations using trace statistics criteria. The test found that there are three cointegrating equations. This led to the rejection of the null hypothesis of no co-integration. According to Sulaiman, 2010) the co-integrating equation (s) is chosen from the normalized co-integrating coefficient.

4.8 Empirical results and Discussions

Table 4.12: Vector Error Correction (VEC)

Having established the presence of long run relationship among the variables, vector error correction was run when each of the variables was taken as dependent variable in order to determine the short run and long run relationships. The following output was obtained whereby;

GDP = Economic growth

EXPE = Capital expenditure on education in shillings

EXPH = Capital expenditure on health in shillings

EXPF = Capital expenditure on infrastructure in shillings

EXPA = Capital expenditure on agriculture in Kenya shillings

LD = A variable lagged once

L2D = A variable lagged twice

CONS = constant Term

CointEq1 = Cointegration Equation one

CointEq2 = Cointegration Equation two

CointEq3 = Cointegration Equation theree

In all the subsequent discussions in the analysis which follows:

Table 4.12: Vector Error Correction (VEC) GDP as Dependable Variable

	Coefficient	Std. Err.	T statistic	Prob.
CointEq1	-.0212925	.026308	-0.809	0.164
CointEq2	15.66673	3.700558	4.234	0.000
CointEq3	18.26346	12.68453	1.439	0.147
GDP LD	-.6627415	.2878546	-2.302	0.021
L2D	.3769366	.5583279	0.675	0.399
EXPE LD	-10.45644	4.190997	-2.495	0.012
L2D	-5.187775	4.317699	-1.202	0.225
EXPH LD	-12.17212	.328893	37.01	0.054
L2D	-7.450381	9.348346	0.797	0.418
EXPA LD	-6.133579	7.32623	-0.7826	0.050
L2D	-7.561287	5.183432	1.4587	0.402
EXPF LD	11.67795	3.690772	3.164	0.147
L2D	7.845657	4.76671	1.6459	0.001
CONS	56.4943	11136.29	0.00507	0.097

Source: Authors' Workings, 2014

The error correction part represents the short run relations. It is being used to correct the deviations from the long run equilibrium established.

When GDP is dependable variable as shown in table 4.12, at 5% level of significance expenditure on health, education and agriculture all lagged once have a significant effect on the GDP. High capital spending on health, education and agriculture in the short run leads low economic growth as shown by the negative coefficients in table 4.12. This is explained by the high government spending in building of hospitals, purchasing of laboratory hospital equipments and drugs compared to the associated revenue. The findings of the research were in line with the outcome of Were, (2001). According to his study, (External Debt on Economic Growth and Private Investment in Kenya), the public expenditure on health has a negative impact on economic growth because the expenditure does not directly go to investment in the country thereby not supporting economic growth.

Agricultural spending on GDP in short run does not drive economic growth. This is as a result of unpredictable rainfall season in Kenya and sudden change of climate and large amount used for development purposes e.g. drilling of bore holes and development of irrigation schemes in the arid and semi arid part of the country. Spending on education also results in low economic output during this period, this is usually the time that the government is rolling out its projects of purchasing books, construction of various buildings in school there is no revenue in this period and therefore it is economically viable to have the inverse relationship. The results output also shows that GDP can also be determined by its own past variables. High GDP of the one year ago increases the current GDP it therefore means high GNP now will lead to high GDP in the future.
The regression analysis however shows that capital expenditure on infrastructure two years ago is positive and significant to economic growth. This is attributable to the seasonal employment created during the construction of infrastructure and any repair as the need arises. There is

generation of income to individuals in the short run that prompts economic growth. The research output shows that the rate of return to the long run equilibrium one is 2%.

Therefore, in the short run the research recommends percentage increase of the outlays into agriculture, infrastructure, health and education purposely for development like building of hospitals especially in the rural areas of the country and implementation of government projects like free maternity fee in order to have a strong and health labour for the anticipated long term benefits.

Table 4.13: Vector Error Correction (VEC) EXPE as Dependable Variable

	Coefficient	Std. Err.	T statistic	Prob.
CointEq1	.0000555	.0016066	0.0345	0.972
CointEq2	-.8177477	.388382	2.106	0.035
CointEq3	.4818354	1.33127	0.362	0.717
GDP LD	-.0275223	.040329	-0.682	0.363
L2D	.0830982	.0569858	1.459	0.077
EXPE ELD	.6598464	.4398547	1.500	0.134
L2D	.9019028	.4531523	1.99	0.047
EXPH LD	-.0447572	.6642317	-0.067	0.946
L2D	.0509204	.9811302	0.052	0.959
EXPA LD	.8478612	.7689045	1.103	0.270
L2D	.0623807	.544013	0.115	0.909
EXPF LD	.0618659	.3873549	0.160	0.873
L2D	.2161839	.500277	2.314	0.666
CONS	-419.3791	1168.779	0.359	0.720

Source: Authors' Workings, 2014

With expenditure in education as the dependent variable in the short run, expenditure in agriculture for the past one year ago, statistically affect expenditure in education at 5% level of significance as shown in Table 4.13 above. Increased expenditure on agriculture is positively related to increased spending in education. This case is supported by the argument that with

abundant food from agriculture, the population of the country rises. The government has to spend more on free compulsory primary education and cost sharing in secondary education. The rate of return to the general equilibrium was 82%. Therefore it is imperative to increase agricultural spending. In this view the government should foster projects which ensure continuous food supply like the genetically modified crops and irrigation in arid and semi arid parts of our country.

The expenditure on education two years ago had a positive and significant relationship with the current expenditure on education. It implies that present increased expenditure will lead to a higher spending in future in other sectors highlighted are not well developed. Expenditure into this sector should not be delayed as it might result an illiterate population and hence unskilled labour in the economy.

Table 4.14: Vector Error Correction (VEC) EXPH as Dependable Variable

	Coefficient	Std. Err.	T statistic	Prob.
CointEq1	.0014239	.0002782	5.11	0.000
CointEq2	.6828348	.0672478	10.154	0.000
CointEq3	-1.699655	.2305076	-7.375	0.000
GDP LD.	.0007819	.0052348	.149	0.222
L2D	.0061661	.0091355	0.675	0.840
EXPE LD	-.2549357	.0761602	-33.415	0.001
L2D	-.2707809	.0784627	-30.451	0.001
EXPH LD	1.058369	.1150108	9.202	0.000
L2D	.5420574	.1588813	3.341	0.002
EXPA LD	-.5615481	.1331348	-4.2404	0.001
L2D	-.5783043	.0941951	-6.139	0.000
EXPF LD	-.3804172	.0670757	-5.671	0.000
L2D	-.0045777	.0866223	-0.005	0.876
CONS	782.9082	202.3725	3.86	0.000

Source: Authors' Workings, 2014

Another static adjustment in the short run above is when expenditure on health is the dependable variable, from Table 4.14 the variables which are statistically significant at 5% level of significance are expenditure in education, health, agriculture both first

and second lag and expenditure in infrastructure one period ago. It can be shown from the table that the rate of adjustment to long run equilibrium two is 68%.

Educational spending and health spending are depicted as being negatively related. This implies that spending more on education will reduce expenditure on health. This is clarified by the fact that having an informed population will take precautionary measure to various diseases and therefore reducing the amount that they could have spent as hospital bill. Expenditure in infrastructure is inversely related to expenditure in health this is explained by the fact that with development in roads patients will promptly get the services cheaply. A higher spending on agricultural sector will lead to low spending on health. This is economically feasible. The literature behind this is that when populace has enough food its healthy diseases like malnutrition wide spread some parts of the country will be a past case.

The study output shows that for the past two years increasing expenditure on health results to increase expenditure on health for the subsequent year. The economy of the country cannot enhanced by spending on health alone but rather developing the education, agriculture and infrastructure sectors. In this regard, there should be an increment on the amount set aside to invest in infrastructure, education and then on health over the short run period.

Table 4.15: Vector Error Correction (VEC) EXPA as Dependable Variable

	Coefficient	Std. Err.	T statistic	Prob.
CointEq1	-.0021827	.0007927	2.754	0.006
CointEq2	.5280078	.1916285	2.755	0.006
CointEq3	1.086004	.6568514	1.653	0.098
GDP LD.	-.056953	.013917	-4.092	0.000
L2D	-.0355329	.0231829	-1.5327	0.125
EXPE LD	-.1775251	.2170252	-0.818	0.418
L2D	-.5203668	.2235863	2.327	0.019
EXPH LD	.0325645	.3277333	0.099	0.921
L2D	-.4683538	.4840917	0.947	0.323
EXPA LD	-1.253669	.368091	-3.405	0.001
L2D	-.5029701	.2684171	1.874	0.051
EXPF LD	-.4949622	.1911217	2.60	0.010
L2D	.3539413	.2468377	1.434	0.142
CONS	88.4034	576.678	0.153	0.827

Source: Authors' Workings, 2014

Another adjustment in the short run is when expenditure in agriculture is the explained variable from the results of error correction model in table 4.15, the explanatory variables which are statistically significant at 5% level of significance are; GDP, expenditure on infrastructure, agriculture both in the first lag and expenditure on

education in the second lag. It has got low rate of 0.2% return to the general equilibrium in the long run equation two where it is statistically significant.

Agriculture is the backbone of the country and therefore its expenditure should be monitored. There is a significant negative relationship with agricultural expenditure and the GDP. As expenditure in agriculture increases the economic growth goes down. A possible explanation for this negative relationship between agricultural expenditure and the GDP is that inappropriate agricultural policies, perennial droughts, poor methods of farming, inadequate credit and tight government controls on imports and foreign exchange which made Kenya unattractive to investors (Republic of Kenya, 2003).

This study was in line with the study of Ifeanyi *et al*. (2012) and Devarajan *et al.*, (1996)**.** This is contrary to the expectation since agriculture is the mainstay of our economy and therefore should contribute positively to the economic growth. However, various challenges have faced this sector and could be a possible explanation to the inverse relationship (Agricultural Extension and Advisory Services, 2011) they include;

Climate change: The effects of climate change have been felt mostly by the farmers especially due to dependence on rain-fed agriculture. The changing and unpredictable raining seasons has greatly affected their ability to plan their farming activities. Areas which received adequate rainfall now receive insufficient rainfall reducing the land that

can support agriculture.

Poor extension services, the agricultural sector extension service plays a key role in disseminating knowledge, technologies and agricultural information and in linking farmers with other actors in the economy. The extension service is one of the critical change agents required in transforming subsistence farming to a modern and commercial agriculture to promote household food security, improve income and reduce poverty. However there is limited access to extension services in most parts of the country with the National extension staff: farmer ratio standing at 1:1,500. This situation has hindered most farmers from keeping pace with changing technological advances.

Use of outdated technology: Although Kenya has a well-developed agricultural research system, use of modern science and technology in agricultural production is still limited. Inadequate research–extension–farmer linkages to facilitate demand-driven research and increased use of improved technologies continue to constrain efforts to increase agricultural productivity as farmers continue to use outdated and ineffective technologies. This brings the need of extension services that can link research and the farmers.

Kenya's agriculture is mainly rain-fed and is entirely dependent on the bimodal rainfall in most parts of the country. A large proportion of the country, accounting for more than 80 per cent is semi-arid and arid with an annual average rainfall of 400 mm.

Droughts are frequent and crops fail in one out of every three seasons. Kenya's agriculture is predominantly small-scale farming mainly in the high-potential areas. Production is carried out on farms averaging 0.2–3 ha, mostly on a commercial basis. This small-scale production accounts for 75 per cent of the total agricultural output and 70 per cent of marketed agricultural produce.

This list of challenges facing Kenyan agriculture and farmers has hindered this sector in its contribution to the economic growth. So, however much the government might allocate funds to this sector the relationship will still persist.

The study shows that when expenditure on infrastructure increases, expenditure on agriculture reduces. The reasoning behind this is that with good infrastructure agricultural output is easily accessed by industries at low cost. Expenses on agriculture reduces too when educational expenses goes up this can be urged that with good education we have skilled labour engaged in farming to produce high amount of quality products. Therefore the amount spent on infrastructure and education should be increased. The study also shows that agricultural expenditure is explained by its own variables and the relationship is inverse it means that if the government invests now in agriculture it will reduce her expenses in future.

Table.4.16. Vector Error Correction, EXPF as Dependable Variable

	Coefficient	Std. Err.	T statistic	Pr
CointEq1	-.0002094	.0019839	-0.105	0.9
CointEq2	1.244984	.4795992	2.596	0.0
CointEq3	-.2786533	1.643938	-0.167	0.8
GDP LD.	-.0523091	.0473336	-1.105	0.1
L2D	.0354346	.0580211	0.611	0.5
EXPE LD	-.668924	.544161	2.202	0.2
L2D	-1.198176	.6695818	-1.7894	0.0
EXPH LD	1.331282	1.8202363	0.7314	0.2
L2D	.2453885	1.211563	0.202	0.8
EXPA LD	-.4013125	.9494931	0.422	0.6
L2D	-.1299769	.6717824	0.193	0.8
EXPF LD	-.739894	.4783309	1.547	0.1
L2D	.688757	.6177745	1.115	0.2
CONS	-1453.273	1443.284	1.006	0.3

Source: Authors' Workings, 2014

The error correction model in table 4.16 when infrastructure is the dependent variable only expenditure on education lagged two was statistically significant at 5% level of significance. The study shows that when capital education expenditure increases, expenditure on infrastructure decline. The main reason behind this is that education

produces skilled labourers who are involved in infrastructure development at a cheap cost like the case of China which produces a highest number of engineers in the world per year.

Table 4.17: Long Run Cointegration Equations

	VARIABLE	Coef.	Std. Err.	T statistic	Prob.
CointEq1	GDP	1			
	EXPE	Omitted			
	EXPH	Omitted			
	EXPA	-261.6263	272.2467	-0.961	0.237
	EXPF	-710.9628	155.3906	-4.575	0.000
	Cons	497475.4			
CointEq2	GDP	-1.08e-19			
	EXPE	1			
	EXPH	2.78e-17			
	EXPA	0.7881728	0.092105	8.557	0.000
	EXPF	-.4403479	.0560423	-8.733	0.000
	Cons	124.8665			
CointEq3	GDP	-2.17e-19			
	EXPE	6.94e-18			
	EXPH	1			
	EXPA	-0.0273307	0.291438	-0.0937	0.915
	EXPF	-0.9430374	0.180363	-5.2286	0.000
	Cons	1151.299			

Source: Authors' Workings, 2014

The results of cointegration relations reported in Table 4.17 showed that the long run relationship was explained by three cointegrating relations.

Cointegrating Relation I.

$$GDP_{t-2} = 497475.4 - 261.6EXPA_{t-2} - 710EXPF^{*}_{t-2} + \varepsilon_{t-2} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \; i$$
$$(272.2) \qquad\qquad (155.4)$$

Cointegrating Relation II.

$$EXPE_{t-2} = 124 + 0.79EXPA^{*}_{t-2} - 0.44EXPF^{*} + \varepsilon_{t-} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \; ii$$

$$(0.09) \qquad\qquad (0.056)$$

Cointegrating Relation III.

$$EXPH_{t-2} = 1151.3 - 0.03EXA_{t-2} - 0.94EXPF^{*}_{t-2} + \varepsilon_{t-2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots iii$$
$$(0.09) \qquad\qquad (0.18)$$

4.9 Explanation in Long Run Relationship

This long-run equation shows that there are three cointegrating equations as shown in table 4.17 when GDP is taken as the dependable variable, in this case only one regressor was considered significant at 5% significance levels which is expenditure on infrastructure. The second equation shows cointegrating relationship between expenditure on education, expenditure on agriculture and infrastructure all the variables were statistically significant at 5% level of significant. The third cointegrating equation shows the long relationship among expenditure in health, agriculture and infrastructure however, expenditure in agriculture was omitted as it was not statistically significant at 5% level of significance.

The results of cointegration relation one showed that expenditure on infrastructure had a negative and significant dynamic effect on gross domestic product $t = -4.575$and P-value $0.000 < 0.05$. Expenditure on agriculture was omitted as it was not statistically

significant at 5% level of significance. This showed that expenditure on infrastructure played stabilizing role on gross domestic product. These results were consistent with Hussein (2010) in the case of Pakistan who found inflation to be a stabilizing factor on output. The outcome corroborates with the findings of Devarajan *et al*. (1996) but contrasted the findings of Maingi (2010) and Were (2001). The study confirms that expenditure on infrastructure plays a vital role in alleviating deviations of GDP from its long run equilibrium. Therefore the government should consider allocating more funds into this sector to accelerate economic growth.

The results of cointegration relation two showed that expenditure on infrastructure had a negative and significant dynamic effect on expenditure in education t = 8.557 and P-value 0.000 < 0.05. This showed that once more expenditure on infrastructure played stabilizing role on gross expenditure on education. The results further showed expenditure on agriculture had appositive and significant dynamic relationship t statistics of 8.557 with p value of 0.000 < 0.005. This meant that increasing expenditure by one unit increased expenditure on education by 79%. A possible explanation to this case is that in an agricultural dependent economy like Kenya, agriculture plays a significant role on development of education. With sufficient food every Kenyan child will enjoy the fruits of free primary education the government also has to inflate her budget on education to cater for increased enrollment in schools. This study was in line with Ifeanyi *et al.,* (2012), Philips and Weale, (2003), Knight *et al*. (1996) and Hussein (2010). Philips and Weale in their study of education and economic growth have shown that education has facilitated the best practice

technology which is a contributor to economic growth in various countries.

The results of cointegration relation three showed that expenditure on infrastructure had a negative and significant dynamic effect on gross domestic product t = -5.255and P-value 0.000 < 0.05. Expenditure in agriculture was dropped in the explanation as it is statistically insignificant at 5% level of significance. This showed that expenditure on infrastructure played stabilizing role on expenditure on health. Therefore the research study submits that the percentage amount injected into this sector ought to be adjusted upwards because it stabilizes expenditure on health when it oscillates out of its long run equilibrium. Increasing expenditure on infrastructure will reduce expense on health.

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Introduction

This chapter summarizes the discussion of the objectives investigated during the study and draws the conclusions, recommendations and suggestions for further research.

5.2 Summary of the Study

This study examined the effect of government expenditure on economic growth in Kenya for the 1980 – 2011 period. It employed the Johansen approach and VECM in cointegration to examine the long run relationships between public expenditure and economic growth in Kenya. The research established that in the long run there were three cointegration relationships among the variables under the study. Summarizing both long term and short term the study showed that spending on infrastructure exerts a positive and significant effect on GDP due to its role as the stabilizer while capital expenditure on education, agriculture and infrastructure were also significantly related to each other at 5% level of significance, the long run relationship between health and infrastructure was also found significant on the same level.

On the basis of empirical results, the aggregated effect of government expenditure on economic growth, the coefficients were statistically significant and eventually the components stimulate economic growth. The study supports Keynesian (1936) view of government active intervention in the economy using various policy instruments.

5.3 Conclusions

The mutual effect of these components of government expenditure on economic growth is statistically significant as indicated both in short run and the long run cointegration. Therefore, the study submits that there is a long run relationship between government expenditure on infrastructure and economic growth, education, expenditure in agriculture and infrastructure and finally the cointegration relationship among expenditure in health, agriculture and infrastructure. It is however worth noting that these key public expenditure components have a significant effect and are the major drivers of economic growth. Based on the fact that Kenya is a developing country any investment in infrastructure will bring in many economic benefits to the country. The study finally concludes that the components of government expenditure considered in this study are important variables in explaining economic growth in Kenya.

5.4 Policy Implications

Based on findings from the empirical analysis, the study submits the following recommendations:

Capital expenditure on infrastructure has a significant effect on the economic growth in the short run and long run as shown in the study findings above. The proportion of government total expenditure that goes into capital expenditure on this sector should be increased. This will stimulate economic activities in the sector and, perhaps reverse the

negative effect on economic growth as public investment may crowd in i.e. provide for the infrastructure to support the private sector. Therefore the government projects like building of Thika super highway and expansions of infrastructure network should be appreciated while the initiatives like the Kenya, Uganda, Tanzania, Rwanda and Burundi Railway should be encouraged.

The summary of the results revealed that capital expenditure on health is statistically significant. On short run the research shows that this sector relies heavily on infrastructure education and agriculture and improving its expenditure improves the economic growth. The government should develop these sectors, increase the expenditure on health but reduce this proportion during long run because any increment is not associated with much economic growth. The sector deals with human life and therefore expenditure its expenditure should be swift. However, this sector has not been developed fully; there is still need for the government to open up more hospitals especially in the interior parts of the country. The recurrent expenditure on the other side should be addressed as it might indirectly affect capital development. The government should settle the perennial strikes of health workers.

On the education side that it was also established that during the long run run the sector depends on expenditure on agriculture and infrastructure, developing these sectors resulted to an increase on public expenditure in education. The proportion amount should be increased on long run. It is therefore necessary to adopt policies which encourage developmental projects in learning institutions in Kenya. The CDF project

and laptops to primary schools should be welcomed. However, it is vital to adopt policies that will lead to the creation of diversified, dynamic, and competitive sectors capable of absorbing the more educated labor force to translate human capital into higher economic growth to avoid a situation of several jobless graduates like in Nigeria.

The outlays on agriculture both in short term were found to be significant but negatively related to economic growth. The long run results showed that there was a positive and significant relationship between expenditure on agriculture and education. It acts as a deflator to expenditure on education. Agriculture sector is the main economic activity in our country the government should increase the proportion allocated into it in order to improve investment in this sector.

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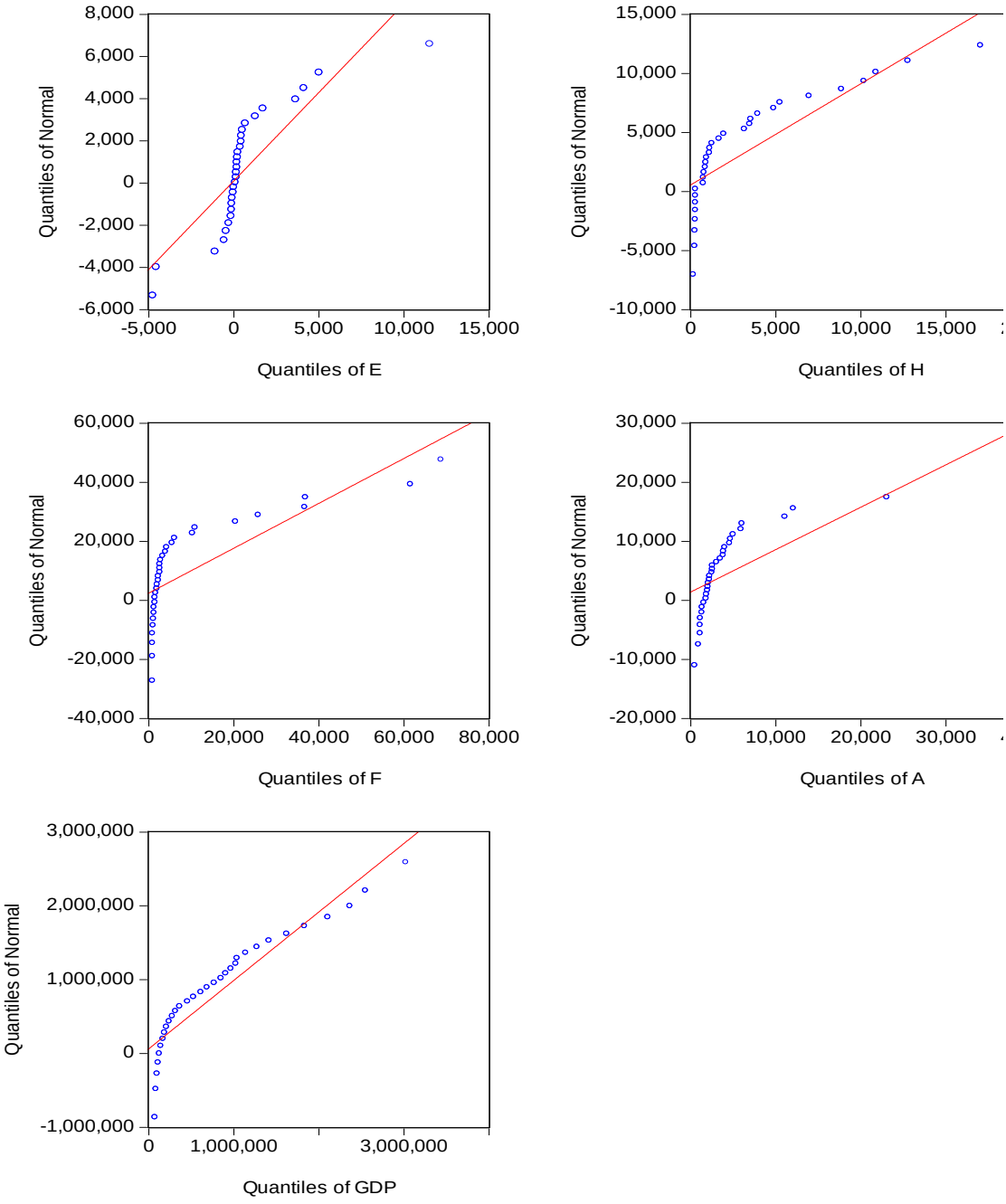
APPENDICES

APPENDIX 1: QUANTILE – QUAN-TILE (Q-Q) PLOT

Source: Authors' Workings, 2014



Source: Authors' Workings, 2014