AN EMPIRICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN BUDGET DEFICITS AND ECONOMIC GROWTH IN KENYA (1975-2012)

BY

SIMEO ODHIAMBO OKELO

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DECLARATION

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CANDIDATE

Signature----------Date----------

Okelo Simeo Odhiambo
PG/PHD/019/2007

This Thesis has been submitted with our approval as the University Supervisors

Signature----------Date----------

Dr. Momanyi Gideon
Department of Economics, School of Business and Economics
Maseno University

Signature----------Date----------

Prof. Lucas O. A. Othuon
Department of Psychology, School of Education
Maseno University

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DEDICATION

To my late father Joseph Okelo, my loving mother Rusalia Akoth, My Wives Theresa and Sarah, my Daughters Shirley, Stacy, Elma, and Ema, My sons Brian, Ignatious,Vianney and Jazzel. Thanks for your inspiration.

ABSTRACT

Budget deficit has become a striking and institutionalized feature of most economies of the world. The Kenyan government has continued to reduce inflation (below 10%) and to develop sound fiscal policy that spurs growth. However, from 1970s to 2012, the government continued to experience high and unsustainable budget deficits and dwindling economic growth. Past empirical studies on the relationship between budget deficits and economic growth have come up with mixed results, being either positive or negative. The purpose of this study was to determine the relationship between budget deficits and economic growth in Kenya. The specific objectives were to: determine the impact of budget deficits on private sector investment in Kenya; examine the main determinants of Kenya's budget deficits; and establish the relevance of Ricardian Equivalence Hypothesis for Kenya. Underpinning theories of the research anchored on the Keynesian, Neoclassical and Ricardian propositions. Correlation research design was used. Saturated sample of time series secondary data for a period of 38 years (1975-2012), purposively selected were used. Modeling technique that incorporates co-integration and error correction method was adopted to validate the models for policy formulation. The models were estimated using Ordinary Least Squares method. The results indicated a positive and significant relationship between lagged budget deficits and economic growth at 1% level with elasticity coefficient of 0.00146 (p= 0.007) and R^2 of 96%, congruent with the Keynesian's assertion that government expenditure spurs economic growth. There was a positive relationship between budget deficits and private investment with elasticity coefficient of 0.0083 (p=0.0000). This supports the crowding-in hypothesis. The main determinants of budget deficits were foreign exchange rate and lagged inflation (positive relationship) as well as terms of trade (negative relationship). In testing the relevance of Ricardian Equivalence Hypothesis, a significant negative relationship was established between national savings and budget deficits with elasticity coefficient of -0.0087 (p=0.0177), hence non relevance of Ricardian Equivalence Hypothesis for Kenya. The study concludes that budget deficits spur economic growth when lagged one period. It is recommended that the government should incur budget deficits over one period lag to increase economic growth and private investment. The government should also pursue stable macroeconomic policies that would influence budget deficits. The government should encourage the culture of savings. The study findings may be useful to government policy makers and also be a source of information to academicians and potential investors. Further research should examine specific expenditures that affect budget deficits in Kenya.

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ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
AD	Dickey Fuller
CPI	Consumer Price Index
DW	Durbin Watson
ECM	Error Correction Model
GDP	Gross Domestic Product
IFS	International Financial Statistics
IMF	International Monetary Fund
LDCs	Less Developed Countries
OLS	Ordinary Least Squares
REH	Ricardian Equivalence Hypothesis
SAP	Structural Adjustment Programs
SSA	Sub-Saharan Africa
UN	United Nations

OPERATIONAL DEFINITIONS OF TERMS IN THE STUDY

GDP (LCU)	GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current local currency.
Gross Domestic Savings	GDP less final consumption expenditure (total consumption).
Inflation (CPI) Rate	The annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used.
Foreign exchange Rate	The exchange rate determined by national authorities or to the rate determined in the legally sanctioned exchange market. It is calculated as an annual average based on monthly averages (local currency units relative to the U.S. dollar).
Private Investment	Gross outlays by the private sector (including private nonprofit agencies) in additions to its fixed domestic assets.
Population	The total number of both male and female in the country.
Capital	Outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress
Interest rate	This is the lending interest rate adjusted for inflation as measured by the GDP deflator.
Budget/Fiscal Deficits	Refers to the excess of expenditure over available revenue or resources equivalent at a given point in time.
Terms of trade	This is the ratio of imports to exports at a given point in time

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Budget deficit has become a striking and institutionalized feature of most economies of the world. It has occupied center stage in recent policy deliberations in many developed, developing and transitional economies as concerns other fiscal dimensions, such as high unemployment, inadequate national savings, high public debt burdens and looming crisis in the financing of pension and health care systems (Carrere and Jaime (2007). Developed nations like United States of America experienced large budget deficits in the mid-eighties and have been occupied with ways of maintaining prudent fiscal policy to achieve sound economic growth (Taylor, 2012). In the African context budget deficits have been phenomenal and have been contributory to macroeconomic volatility (M'Amanja, 2006). The pursuit for economic growth and stability of developing countries in recent times has brought the issues of budget deficits into sharp focus. Although the principal issues of budget deficits are not certainly new, the development of budget deficits in the past decades have led to renewed interest. Therefore, a government fiscal operation is recognized as a tool for economic management and plays a very important role in stimulating economic growth (Saleh, 2003). Fiscal deficit (budget deficit) as defined by Tanzi and Howell (1997) essentially refers to the excess of expenditure over available revenue or resources equivalent at a given point in time. According to Sill (2005), the expenditure of an entity, which exceeds the earning or income it has, is termed as budget deficit and in absence of financing from external sources the deficits is carried forward to the next financial year.

Several studies have therefore looked at the relationship between economic growth and budget deficits. Adam and Bevan (2005), Fiani (1991), Brauninger (2002), Easterly and Rebelo (1993), De Castro (2004), Mauntford and Unilg (2005), Hsieh and Lai (1994) and Perotti (2004), argue that there is a positive relationship between economic growth and budget deficits. On the other hand the findings of Gemmel (2001) and M'Amanja and Morrissey (2006), contradict most of the earlier evidence on the impact of budget deficits on economic growth, as their results reveal significantly negative effect of budget deficits on economic growth. However, not only did these studies arrive at conflicting results and conclusions, perhaps due to the methodologies adopted in analyzing their research data, but more importantly, the time frame considered in many of them was rather short. In addition, the contexts of these studies were different from Kenya. Most of these studies used cross sectional data which do not reflect the uniqueness of a country (Adam and Bevan, 2005). Others used data that were not tested for stationarity and did not use the most recent development in econometrics like error correction method (ECM) and co integration which the current study employs. The current study uses larger study period spanning 1975 to 2012, specific to Kenya and recent data analysis technique of co integration and error correction model that ensure reliability and validity of the study outcome.

The effects of fiscal operations can be felt through policies, which provide signals to direct private sector investment to the most desired sectors as well as projects, and program, which are undertaken by the public sector, especially, for infrastructural development. Such projects and programs, when undertaken in the economic and social sectors can contribute significantly to the overall level of economic growth (Nelson & Singh, 1994). Although increased government

involvement in the economy may crowd-out private investment (Fisher, 1991) by the neoclassical school, public spending may help develop infrastructure that supports private investment. Consequently, the Keynesians argue that an increase in the government spending stimulates the domestic activity and crowds-in private investment. Darrat (1989) asserts that excessive government expenditures over revenues help in laying the ground for development of private sector through the provision of legal infrastructure that ensures physical and intellectual property rights. The government also helps by undertaking investments that intensify the physical and human capital infrastructure in the country. One of the controversial issues between Keynesians and Neoclassical economists is on the effectiveness of fiscal action in stimulating economic activity. The driving force behind economic policy lies in the macroeconomic objectives which are price stability, employment, economic growth, balance of payments surplus and equity (Chowdhury & Hossain, 1998). The economists generally believe that budget deficits are harmful (crowding out) for the total functioning of the economy and other studies have found positive (crowding in) relationship between budget deficits and economic growth. Other studies support excessive government expenditure (Darrat, 1989), to be contributory to economic growth hence crowding in private sector investment. This inconsistency in findings necessitates the current study so that appropriate fiscal policy can be formulated.

According to Easterly and Rebelo (1993) fiscal deficits have been blamed for the variety of ills that beset developing and industrial countries. These ills include over indebtedness, high inflation, volatile exchange rate and poor investment and growth performance. Scholars have attributed the persistent deficits to a number of factor including declining tax revenue resulting from the recession and increase in debt services on public debt (Olomola and Olagunju, 2004). Fiscal deficits affect macroeconomic variables such as interest rate, inflation, consumption,

investment and poor terms of trade and exchange rate which serve as medium through which budget deficits affect economic growth (Cebula, 2000). Empirical studies such as Ariyo (1993), Kouassy (1996), Osoro (1979), Olivera (1967), Heller, (1980), Sejjaaka and Kasekende (1996) and Egwaikhede *et al* (1994) have discussed the salient determinants of budget deficits, the basis on which the current study relies using Kenyan time series data from 1975-2012.

There has been a multiplicity of empirical studies that have tested the effects of budget deficits and debt crowding out – usually geared out to verify the validity of debt-neutrality thesis of Ricardian Equivalence Hypothesis (REH) of Barro (1974).The REH is an economic theory that suggests, it does not matter whether a government finances its spending with debt or tax increase, the effect on total level of demand in an economy being the same. These studies have looked at the effect budget deficits have on national savings, consumptions, output, inflation, exchange rates and interest rates (Rafael *et al,* (1997), Barro (1991), Barro and Sala-i-Martin (1991), Koeddijk *et al* (1994) and Wheeler (1994). These studies have come up with conflicting results as regarding the relevance of Ricardian Equivalence Hypotheses with some accepting it while others rejecting it. Moreover, no known study in Kenya has concentrated in testing this important hypothesis that exposes the behavior of citizens as regarding national savings when the government resorts to taxation as conduit of financing her expenditure.

Budget deficits in Kenya have been phenomenal since independence (1963-2012). The period 1963 – 1974 could be termed as the golden period of Kenya. The country experienced a remarkable economic growth (an annual average of 6.5%) and macro-economic stability. This impressive performance was attributed to consistency of economic policy, promotion of smallholder agricultural farming, high domestic demand, and expansion of the market for domestic output within the East African region. Generally, the economy maintained a

manageable external balance during the first decade and was in surplus for most years (Economic Survey, 1974 and 1975). However, the period from 1975 to 2012 experienced volatile budget deficits together with inconsistent economic growth. Table 1.1 gives insight into the position of Kenya's average annual GDP growth and budget deficits as a percentage of GDP from 1975-2012 (Appendices 1, 2,3,4,5 and 6).

Table 1.1 Budget Deficit (BD), Annual Gross Domestic Product (GDP) Growth and Budget Deficits (BD) as Percentage of Gross Domestic Product.

Year	Budget deficit (Million Kshs.)	Annual GDP Growth (%)	BD as Percentage of GDP
1975-1979	955l	5.403537	4.686349
1980-1984	3271.6	2.787253	7.704789
1985-1989	3188.2	5.661751	3.423305
1990-1994	7257.2	1.563378	4.747801
1995-1999	44079.6	2.924712	8.028637
2000-2004	12269.4	2.592647	1.976733
2005-2009	15528.2	4.698564	1.094737
2010-2012	67728	4.912936	2.245593

Source: World Bank Data (1975-2012)

It is evident from Table 1.1 that the Kenya government incurred annually abnormally, huge budget deficits in the period 1975-2012, while experiencing inconsistent economic growth at the same time. The period 1975 – 1979 was quite unstable and could be termed as the doom period (5.4% growth rate and 4.7% budget deficits as percentage of GDP) of Kenya as it was marked by drought and an oil crisis. The first drought and oil crisis led to a worldwide recession, poor export performance and resulted in a 33% decline in terms of trade. The annual average GDP fell to 5.4% with a budget deficit as percentage of GDP of 4.7%. The prevailing situation therefore called for increased external borrowing, especially from the International Monetary Fund (IMF),

the World Bank and other commercial sources. The coffee boom of 1976 – 1978 temporarily alleviated the situation of the imbalance of payments and economic decline (Ngeno, 1991).

In 1980-1984, the country was again plagued with drought and an oil crisis that triggered the need for the importation of foodstuffs. These crises affected the terms of trade and balance of payments position of the country and therefore the need to control imports and resort to heavy borrowings from commercial sources and credit from IMF and World Bank, bilateral and multilateral donors in order to finance the budget deficits. These loans however, were obtained on hard terms and hence the increased cost of servicing. For instance, the debt service ratio that stood at 14% in 1975 went up to 28% in 1982. The GDP growth further declined to 2.8%, while the budget deficits as percentage of GDP widened significantly to 7.7%. The attempted coup *de tat* of 1982 resulted in capital flight that further aggravated the budget deficit. Generally, the period of 1982-85 marked unsatisfactory performance of the economy and the balance of payments, which necessitated the need for external financing (Development Plan, 1985).

In the period 1985 – 1989, GDP growth improved markedly to 5.7%, with a decline in budget deficit as percentage of GDP to 3.4%. During this period, the government announced a package of fiscal measures aimed at providing impetus to the private sector and enhancing it's complementarily role to the government's efforts of revitalizing the economy. The economy improved a bit after the coffee boom of 1986 and the lower oil prices. However, the increased importation over the period further aggravated the balance of payment problem and necessitated large capital inflows. The government declared its commitment to pursuing a domestic borrowing policy that would not crowd out the private sector. The role of fiscal policy was

articulated in Sessional Paper No. 1 of 1986, on "Economic Management for Renewed Growth". The paper proposed a reduction in the budget deficits to a level not exceeding 2.5% of GDP. The documents also emphasized sectoral reforms, which were preceded by the Budget Rationalization Program (BRP), introduced in 1985. Tax revenues were projected to rise to 24% of GDP by 1999/2000 fiscal year (Economic Survey, 1986).

In the period 1990-1999, the country embarked on the structural adjustment programs having realized her structural weaknesses. The reforms were undertaken as part of the IMF, World Bank and other multilateral and bilateral agency programs. The reforms were in the nature of economic stabilization and trade liberalization. The specific policies included; reduction of public expenditure, maintenance of positive interest rates and realistic exchange rates, price decontrol, movement towards uniform tariffs, and reduction and eventual removal of quantitative import restrictions. Despite the fact that Kenya began to liberalize her economy in the 1990s, the government control of the economy remained pervasive. During the period 1990-1994, GDP growth plummeted to 1.6%, with increased budget deficits as percentage of GDP of 4.7%. In the period 1995-1999, budget deficits increased to the worst state of 8% of GDP, with a slight improvement in GDP growth to 2.9%. During this period, the country was gearing towards a new regime of multi-party system of government.

Between the year 2000 and 2012, Kenya continued with her structural reforms like privatization of state owned enterprises, civil service reform which aimed at thinning the number of those employed in the public sector and improving efficiency and delivery of services by those not retrenched. These reforms however, have not proved successful, as the country has been

experiencing a rise in the stock of debt, poor debt repayment level and declining economic growth to 2.6% during the period 2000-2004 coupled with 2% decline in budget deficits as percentage of GDP. For instance in the year 2000, Kenya registered a negative growth rate of 0.3%, with the outstanding external debt amounting to Kshs.163 billion. During this period, the country was suspended from the quick disbursing funds mainly from the IMF and World Bank due to its non-commitment in the implementation of structural adjustment programs. However, GDP growth improved from 4.7% in the period 2005-2009 to 4.9% in the period 2010-2012, with a sharp drop in budget as percentage of GDP to 1.1% and 2.2% respectively, showing remarkable increase in revenue collection and improvement in fiscal discipline. From the above discussion on the relationship between budget deficits and economic growth, it remains inconclusive as regarding the relationship between budget deficit and economic growth. It is also apparent that budget deficits in developed and developing economies like Kenya remain a macroeconomic problem to growth and development and hence the thrust of the current study using Kenya's macroeconomic data from 1975-2012, to help guide appropriate policy formulation on the subject.

1.2 Statement of the Problem

The government of Kenya has been committed to a stable macroeconomic environment aimed at mild inflation and development of sound fiscal policy. However, in the late 1970s, the government continued to experience high, persistent and unsustainable deficits of 4.7% as percentage of GDP and GDP growth of 5.4% in the period 1975-1979. The government ran high budget deficits mainly through establishment of state enterprises, due to the fact that private sector was poorly developed and therefore unable to provide the necessary resources for development. In the 1980s and 1990s, however, there was a shift towards the private sector to

foster development and budget rationalization program mainly by divestiture in non-strategic parastatals and civil service reform. Despite the fact that economic reform programs adopted emphasized demand management through fiscal restraint, budget deficits have been phenomenal to Kenya's economy along with dwindling economic growth. In the period 2010-2012, budget deficits as percentage of GDP stood at 2.2% with GDP growth of 4.7%. The studies that have been done in both developed and developing nations have come up with inconclusive results regarding the relationship between budget deficits and economic growth. Some studies have found a positive relationship while others have revealed a negative relationship. Not only do these studies yield conflicting results and conclusions, perhaps due to methodologies adopted in data analysis, but more importantly, the time frame considered in many of them were rather short and the context of these studies were different from Kenya. More so, the past studies also used cross-sectional data which are not country specific. These emerging limitations have left a significant knowledge gap in the literature, thereby warranting the need for a more systematic examination of the relationship between budget deficits and economic growth in Kenya.

1.3 Research Questions

The following research questions were formulated for empirical testing to help realize the objectives of the study.

(i) What is the relationship between budget deficits and economic growth?

(ii) What is the impact of budget deficits on private sector investments in Kenya?

(iii) What are the main determinants of budget deficits in Kenya?

(iv) What is the relevance of Ricardian Equivalence Hypothesis in Kenya?

1.4 Objective of the Study

The objectives of the study were to:

(i) Determine the empirical relationship between budget deficits and economic growth in Kenya.

(ii) Determine the impact of budget deficits on private sector investment in Kenya

(ii) Examine the main determinants of budget deficits in Kenya

(iv) Establish the relevance of Ricardian Equivalence Hypothesis for Kenya

1.5 Scope of the Study

The study mainly focused on the relationship between budget deficits and the growth of Kenya's economy, using time series data from 1975-2012, a period of 38 years. The study, however, incorporated some macroeconomic fiscal variables in the models that were estimated since the fiscal deficits affect growth in various channels.

1.6 Significance of the Study

There is no comprehensive country specific study, which investigates the relationship between government budget deficits and economic growth in Kenya and yet the findings of such studies are required to enhance informed policy decision-making on the subject matter. The rising magnitude of budget deficits has become of great concern to economists and other interested parties (the business fraternity). In particular, there is increasing concern about the possible unfavorable effects of persistent and large government deficits on some macroeconomic aggregates like unemployment, inflation exchange rate volatility and poor terms of trade. This study therefore would be useful in highlighting the theoretical and empirical understanding of the

relationship between budget deficits and macroeconomic variables for informed policy formulation.

The study would also be beneficial to the government policy makers by providing information on fiscal deficits management and, be furnished with the best policy prescriptions in taming budget deficits or finding sustainable budget deficits. The government would learn the best policy mix in the management of budget deficits and ensuring economic growth. Finally, the study is of great importance as a source of information and reference for further research by academicians and potential investors.

1.7 Theoretical Framework

The theory on the relationship between budget deficits and economic growth borrows heavily from the Keynesians propositions that government intervention in economic activity can help spur long term growth by ensuring efficiency in resource allocation, regulation of markets, stabilization of the economy, and harmonization of social conflicts. Among the mainstreaming analytical perspectives, the neoclassical (Roll, 1973 and Gee, 1991) view considers budget deficits as detrimental to investment and growth, while in the Keynesian paradigm, it constitutes a key policy prescription. Theorists subscribing to Ricardian Equivalence Hypothesis assert that budget (fiscal) deficits do not really matter except for smoothing the adjustment to expenditure or revenue shocks. While the neoclassical and Ricardian schools (Barro, 1974) focus on long run, the Keynesian view emphasizes the short run effects. The financing of any level of fiscal deficits whether through taxation or borrowing involves the absorption of real resources by the public sector that otherwise would be available to the private sector (the absorption of domestic

resources will be delayed, of course, if foreign borrowings or unemployed resources are available). From a purely static allocative point of view, this absorption would improve overall efficiency of the social return (benefit) when public expenditure exceeds its private opportunity costs. However, the classical economists hold the view that government operations are inherently bureaucratic and inefficient and therefore stifle rather than promote growth. It seems then that as to whether government's fiscal policy stimulates or stifles growth remains an empirical question. Economic theory reveals that the nature of the tax regime as means of increasing government revenue base can be detrimental or foster growth (Todaro, 1985). A regime that causes distortions to private agent's investment incentives can retard investment and growth while the regime that leads to internalization of externalities by private agents may induce efficiency in resource allocation and foster growth. Similarly, with the nature of government expenditure, excessive spending on consumption at the expense of investment is likely to deter growth (Keynes, 1936). While public expenditure may displace private sector output (the crowding out effect), it may also improve private sector productivity (the externality or public good effect). The net impact on aggregate output of the crowding-out effect of public expenditure clearly depends on the relative marginal productivities of the public and private sectors. The higher the level of public expenditure, the greater the inefficiency and the lower the level of output. A large budget deficit has considerable effect on national savings and could crowd out private investment. Low investment harms future productivity because each worker has less capital with which to work in the future. The crowding out is caused through higher interest rates as firms that want to borrow for investment projects compete for that smaller pool of available funds. In the process, they bid up the interest rate that they are willing to pay. The higher interest rate

dissuades some firms from undertaking their investment projects, with net results that investment declines hence growth (Pechman, 2004).

Moreover, Government deficits create a short fall in private capital formation by reducing the pool of saving available for private sector borrowers, thus "crowding out" private capital formation. When the deficits are not used for investment purposes, there is bound to be reduction in the total capital formation. An important feature of government borrowing is that, it is insensitive to interest rates. This implies that, the government will borrow whatever it needs to finance its deficit no matter what the interest rate because its budget deficits are always financed. As a result, deficits reduce the funds available for private capital formation. Faced with a higher required return, firms become more selective in choosing projects and cut back their investment and hence the crowding out effect and reduction of capital formation below the socially optimal level. The crowding out effects of public spending on the private sector may eventually offset its beneficial effects on growth (Blinder and Solow, 1975).

The externality effect of public expenditure, in contrast, enhances growth by raising private sector productivity. Here, a higher level of such expenditure could achieve a high growth rate. In the recent endogenous growth literature (Lewi, 1954, Todaro, 1985 and Barthan, 1993), the focus has been on the stock of public infrastructure (or the level of services that flows from it) as a productive input. Another broad fiscal variable that could have implications for growth is budget policy, in the sense that the level of public revenue relative to that of expenditure, that is, the budget balance, may have growth effects that are separate from those related to the absolute level of either taxation or public expenditure. One type of the effects stems from the stability

implications of budget imbalances. Another type is related to a possible behavioral response from the private sector that may be triggered by such imbalances. If the private sector regards budget deficits (even if financed by debt) simply as taxes delayed, then it may choose to increase its own savings to neutralize the public dissaving, thus leading to an unchanged level of national savings (Ricardian Equivalence Hypothesis). Alternatively, fiscal deficits might not induce a response in private sector savings, in which case national savings would be reduced and growth hampered (Tanzi & Howell, 1997).

In conclusion, the relationship between growth and fiscal deficits revolve around three pertinent issues such as; excessive domestic borrowing by the government which crowds out private sector investment and push up interest rates; the accumulation of public debts; and the fear that the government may resort to money printing or seigniorage, leading to inflation tax. These effects operate through three channels: First, high budget deficits may lead to higher real interest rates in financial markets, which may reduce investment and growth. Second, high deficits may increase risk premiums on interest rates, particularly by raising the inflation risk and default risk premium. High interest rates risk premiums may discourage private investment. Third, high budget deficits may signal a high tax burden in future, which may discourage current aggregate expenditures and therefore private investment (lensink and Hermes, 2001).

CHAPTER TWO

LITERATURE REVIEW

This chapter presents the reviewed theoretical and empirical literature relevant to the study on the relationship between fiscal deficits and economic growth, private investment and budget deficits, main determinants of budget deficits and the impact of budget deficits on savings (Ricardian Equivalence Hypothesis) and other policy variables affecting growth of an economy. The discussion of the empirical literature is arranged into sub-themes which are congruent with the objectives of the study.

2.1 Theoretical Literature

There is no agreement among economists on analytical ground or the basis of empirical results whether financing government expenditure by incurring a budget deficit is good, bad or neutral in terms of real effects, particularly on investment and growth. Generally, there are three schools of thought concerning the economic effects of budget deficits: Neoclassical, Keynesian and Ricardian. Among the mainstream analytical perspectives, the neoclassical view considers budget deficits to be detrimental to investment and growth, while in the Keynesian paradigm, it constitutes a key prescription. Theorists persuaded by Ricardian equivalence assert that budget deficits do not matter except for smoothening the adjustment to expenditure or revenue shocks. While neoclassical and Ricardian schools focus on the long run, Keynesian view emphasizes the short run effects.

2.1.1 The Neoclassical View

The neoclassical economists express the growth of an economy using production function to define marginal product and to distinguish allocative efficiency which is the defining focus of economics. Aggregate production functions are estimated to created a framework in which to distinguish how much of economic growth to attribute to changes in allocation (e.g. to accumulation of capital) and how much to attribute to advancing technology. According to Barro (1990), fiscal policy in major macroeconomic models adversely affects the behavior of private agents and savings decisions. Increasing government spending will increase the aggregate demand for goods and services and money demand in the money market leading to an increase of interest rates while markets tend towards equilibrium. The increased interest rates affect negatively the level of private investment. The component of revenue deficits in budget deficits implies a reduction of government savings or an increase in government dis-savings. In the neoclassical (Roll, 1973 and Gee, 1991) perspectives, this will have a detrimental effect on growth if the reduction in government saving is not fully offset by a rise in private saving, thereby resulting in a fall in the overall saving rate. Apart from putting pressure on the interest rate, this will adversely affect growth. The neoclassical economists assume that markets clear so that full employment of resources is attained. In this paradigm fiscal deficits raise lifetime consumption by shifting taxes to the future generations. If economic resources are fully employed, increased consumption necessarily implies decreased savings in a closed economy. In an open economy, real interest rates and investment may remain unaffected, but the fall in national saving is financed by higher external borrowing accompanied by appreciation of the domestic currency and a fall in exports. In both cases, net national saving falls and consumption

rises accompanied by some combination of fall in investment and exports. The neo-classical paradigm assumes that the consumption of each individual is determined as the solution to an inter-temporal optimization problem where both borrowing and lending are permitted at the market rate of interest. It also assumes that individuals have finite life spans where each consumer belongs to a specific generation and the life spans of successive generations overlap. The budget deficits could therefore crowd out private investment. Aschauer (1989) provides empirical evidence showing that higher capital spending lowers private investment and hence budget deficits may be factored in production function to determine its effects on growth.

2.1.2 Keynesian View of Fiscal Deficits

The Keynesian (Keynes, 1936) view in the existence of some unemployed resources, envisages that an increase in autonomous government expenditure, whether investment or consumption, financed by borrowing would cause output to expand through a multiplier process. The traditional Keynesian framework (Mead 1975; Robinson, 1978; Love, 1991; Hunt, 2002 and Rapley 2002) does not distinguish between alternative uses of the fiscal deficit such as between government consumption or investment expenditure, nor does it distinguish alternative sources of financing the fiscal deficits through monetization or external or internal borrowing. In fact, there is no explicit budget constraint in the analysis. Subsequently elaborations of Keynesian paradigm envisage that the multiplier-based expansion of output leads to a rise in the demand for money and if money supply is fixed and deficit is bond financed, interest rates would rise partially offsetting the multiplier effect. However, the Keynesians argue that increased aggregate demand enhances the profitability of private investment and leads to higher investment at any given rate of interest. The effect of a rise in interest rate may thus be more than neutralized by

the increased profitability of investment. Keynesians argue that deficits may stimulate savings and investment even if interest rate rises, primarily because of employment of hitherto unutilized resource. However, at full employment, deficits would lead to crowding out even in the Keynesian paradigm. In the standard Keynesian analysis, if everyone thinks that a budget deficit makes them wealthier, it would raise the output and employment, and thereby actually make people wealthier. Unlike the loanable funds theory, the Keynesian paradigm rules out any direct effect on interest rate of borrowing by the government. According to Keynesians, budget deficits result in an increase in domestic production, which makes private investors more optimistic about the future course of the economy and invest more. This is known as the crowding-in effect. Eisner (1989) is an example of this group, who concludes that budget deficits have not crowded out investment but instead crowds in private investment when spent on infrastructure and other developmental programs/projects.

2.1.3 Ricardian Equivalence Hypothesis

According to Ricardian Equivalence Hypothesis, budget deficits are viewed as neutral in terms of their impact on growth. It is an economic theory that suggests that when a government tries to stimulate demand by increasing debt-financed government spending, demand remains unchanged. This is because the public will save its excess money in order to pay for future tax increases that will be initiated to pay off debt. The financing of budgets amounts only to postponement of taxes. The deficits in any current period are exactly equal to the present value of future taxation that is required to pay off the increment of debt resulting from the deficit. In other words, government spending must be paid for, whether now or later, and the present value of spending must be equal to the present value of tax and non-tax revenues. Budget deficits are a

useful device for smoothing the impact of revenue shocks or for meeting the requirements of lumpy expenditures. These are financed through taxes which may spread over a period of time. However, such budget deficits do not have an impact on aggregate demand if household spending decisions are based on the present value of their incomes that takes into account the present value of their future liabilities. Alternatively, a decrease in current government savings that is implied by budget deficits may be accompanied by an offsetting increase in private savings, leaving the national saving and, therefore, investment unchanged. Then, there is no impact on the real interest rate. Ricardian equivalence requires the assumption that individuals in the economy are foresighted, they have discount rates that are equal to government' discount rates on spending and they have extremely long time horizon for evaluating the present value of future taxes. In particular, such a time horizon may well extend beyond their own lives. In this case, they save with a view to making altruistic transfers to take care of the tax liabilities of their future generations (Rangarajan & Srivastava, 2005). As was advanced by Barrow (1989), an increase in budget deficits, say, due to an increase in government spending must be paid either now or later. Hence, a cut in today's taxes must be matched by an increase in the future taxes, leaving interest rates, thus private investment unchanged. In other words, in anticipation of the future tax increase, consumers save rather than spend the income from tax cut, and the reduction in tax leads to an equivalent increase in saving. This school of thought holds that taxpayers see through the inter-temporal veil, and realize that the present discounted value of taxes depends only upon real government spending-not on the timing of taxes. This foresight gives rise to a "Say's law for deficits: the demand for bonds always rises to match government borrowing. As a result, deficits fail to stimulate aggregate demand, and in fact have no real effects, hence Ricardian Equivalence Hypothesis (O'Driscoll, 1977).

2.2 Empirical Literature

2.2.1 Relationship between Budget Deficits and Economic Growth

A few studies are available as regards the relationship between budget deficits and economic growth. Goher and Wali (2011) aimed at verifying the impact of government budget deficits on investment and economic growth in Pakistan, using time series of twenty-nine years stretching between 1980 and 2009 and found that fiscal profligacy has seriously undermined the growth objectives thereby adversely impacting on physical and social infrastructure. Easterly and Rebelo (1993) and Grier and Tullock (1989) examined the impact of budget deficits on economic growth, using a regression analysis with cross-sectional time series data drawn from some developed and developing countries. Broadly, the evidence, particularly from cross-country data, suggests that the response by private sector savings to public sector dissaving does not completely neutralize the latter. Researchers have found positive relationship between budget deficits and economic growth. Adam and Bevan (2005) did a study to examine the relation between fiscal deficits and growth for a panel of 45 developing countries and found a possible non-linearity in the relationship between growth and the fiscal deficit for a sample of developing countries. Based on a consistent treatment of the government budget constraint, it finds evidence of a threshold effect at a level of the deficits around 1.5% of GDP, a range over which deficit financing may be growth-enhancing hence (1991) did a study on the relationship between budget deficits and economic growth in Morocco, using time series data from 1970-1990). He used OLS estimation method that provided evidence that growth remained high despite large budget deficits. However, he used shorter time period and OLS to estimate the growth model thereby coming up with unreliable estimates not useful for policy formulation. Keho (2010) examined

the causal relationship between budget deficits and economic growth for seven West African countries over the period 1980-2005 and came up with mixed results. In three countries, it did not find any causality between budget deficits and growth, while in the remaining four countries; deficits had adverse effects on economic growth. However, his data ignored country specific uniqueness having used cross sectional time series data. More so the time period was less than the recommended thirty years and above. Therefore, this study employs recent development in econometrics of error correction model and co integration with larger data period of over thirty years.

Huynh (2007) did a study on the relationship between budget deficits and economic growth by collecting data from the developing Asian countries for the period of 1990-2006 and concluded that there was negative impact of the budget deficit on the GDP growth and that crowding-out effects surfaced as the budget deficit burden increased. Martin and Fardmanesh (1990) did a cross sectional study of the middle income countries and developing economies. He found the correlation between budget deficits and economic growth to be significant and negative only for middle-income countries but positive for developing economies, suggesting complementary of public expenditure with private investment. His finding contrasts that of Taylor (2012), who analyzed the interaction between the primary fiscal deficit, economic growth and debt for the period 1961-2000 of USA. He used OLS estimation technique and data that were not subjected to stationarity test and hence produced spurious results. He found a strong positive effect on growth even when possible increases in the interest rate are taken care of. Based on cross-country regressions of a large sample of developing countries, Aizenman and Marion (1993) present empirical evidence that suggests that, to varying degrees, there is a significant and

negative correlation between growth and uncertainty in a number of fiscal variables, such as levels of revenue, public expenditure, and budget deficits. The uncertainty in a variable is measured in the model employed by the standard deviation of the residuals from a first order autoregressive process of that variable. Nelson and Sing (1994) used data on a cross section of 70 developing countries during two time period, 1970-1979 and 1980-1989, to investigate the effects of budget deficits on GDP growth rates. They estimated the relationship between growth (GDP growth rate) and the public policy variables using ordinary least square (OLS) method. Their study concluded that the budget deficits had no significant effect on the economic growth of those nations in the 1970s and 1980s. Easterly and Schmidt-Hebbel (1993) studied ten developing countries and provided the evidence that fiscal deficits and growth are self-reinforcing and that good fiscal management preserves access to foreign lending and avoids the crowding out of private investment. They found a negative effect of fiscal deficits on economic growth. However, cross sectional conceal the uniqueness of a country and did not use the recent econometric techniques were not used. This was also confirmed by Gemmel (2001) who studied the nexus between deficits and economic growth whose study also revealed significantly negative effect of budget deficit on economic growth. Therefore, the current study uses time series data specific to Kenya and recent development in econometrics (co integration and error correction model).

These studies have come up with mixed results since some have found positive relationship between budget deficits and economic growth (Easterly and Rebelo,1993), Grier *et al* (1989), Kouassy and Bhooun (1994), Adam and Bevan (2005), Fiani (1991), and Keho (2010)) while others have revealed negative relationship (Goher *et al* (2011), Huynh (2007), Aizenman and Marion (1993), Easterly and Schmidt-Hebbel (1993) and Gemmel (2001)). In addition the

contexts in which these studies have been done are different, both in developed and developing countries. Most of these studies have used cross sectional data hence ignored country specific unique features. The study by Koussy and Bhooun (1994) was however, longitudinal but it did not use the most recent econometric method of error correction which guarantees a valid model for policy formulation. Other studies used short period of study (Huynh, 2007 and Goher *et al* 2011). The current study uses a larger time period and most recent econometric techniques of error correction method and co- integration that ensures valid results for forecasting and policy formulation as concern budget deficits and economic growth in Kenya.

Alam, *et al* (2010), did a study to analyze the long run relationship between social expenditure and economic growth in Asian developing economies. He examined the long run impact of expenditures on social sector such as education, health and social security/welfare along with fiscal deficits/surplus on economic growth in case of ten Asian developing countries. The study concludes that expenditure in social sector can affect economic growth since expenditure enhances productivity by providing infrastructure, education, health, and harmonizing private and social interest. Expenditure composition also plays an important role promoting economic growth: fiscal adjustment that reduces unproductive expenditures and protects expenditure in social sector has proved to be more sustainable and more likely to result in faster growth.

Brauninger (2002), conducted a study on the interaction of budget deficit, public debt and endogenous growth and found that if the deficit ratio fixed by the government stays below a critical level, then there are two steady states where capital and public debt grow at the same constant rate, and an increase in the deficit ratio reduces the growth rates. Therefore, if the deficit ratio exceeds the critical level, then there is no steady growth and capital growth declines

continuously and capital is driven down to zero in finite time. De Castro (2004) investigated the effects of fiscal policy in Spain and found that shocks to government expenditure boost GDP, private consumption and investment, with multipliers close to one in the short term and negative in the medium and long term. Perotti (2004), study of the OECD countries revealed that the effects of fiscal policy on GDP tend to be small and the effects of government spending shocks and tax cuts on GDP and its components have become substantially weaker. Baldacci *et al* (2003), concludes that fiscal policy has to be tailored to country-specific condition to foster growth. This means that uniform approach to fiscal policy in which all countries are counseled to reduce their deficits under all circumstances is not appropriate. Although the fiscal policy works differently, fiscal adjustments can also spur growth in the former. Given that a reduction in 1 percentage point in the ratio of fiscal deficits to GDP led to an average increase in per capita growth at least one fourth of a percentage point in the countries under consideration, it is possible that a reduction in the average deficit in low income countries from 4% of GDP to 2% of GDP could boost per capita growth by about half to one percentage point in fiscally vulnerable countries. Mountford and Unilg (2005) stressed that the best fiscal policy to stimulate the economy is deficit-financed tax cut and that the long-term costs of fiscal expansion through government spending is probably greater than the short-run gain. M'Amanja and Morrissey (2006) using Kenyan data concluded that unproductive expenditure and non-distortionary tax revenue were found to be neutral to growth predicted by economic theory. However, contrary to expectations, productive expenditure has a strong adverse effect on economic growth, while there was no evidence of distortionary effects on growth of taxes. On the other hand, government investment was found to be beneficial to growth. On the same note, the empirical work of Hsieh and Lai (1994) on seven industrialized countries suggests that the relationship between

government spending and growth can vary significantly across time as well as across the major industrialized countries that presumably belong to the same growth club. For most of the countries under study, public spending is found to contribute, at best, a small proportion to the growth of an economy.

These studies have concentrated on the impact of fiscal policy on growth through increased public expenditure especially on productive ventures without focusing on the impact of budget deficits on growth directly. Some studies revealed a positive relationship (Alam *et al* (2010), De Castro (2004), Mounford and Unilg (2005), M'Amanja (2006) and Hsieh and Lai 1994)), while others found negative relationship (Brauninger (2002) and Baldacci 2003)). They mainly support prudent fiscal policies as means of spurring growth, mainly supporting Keynesian multiplier of expansionary fiscal policy and hence ignored the relationship between budget deficits and growth which the current study focuses on. They looked at impact of budget deficits on economic growth from the fiscal point of view and did not focus on budget deficits which result from government expenditure and revenue. The current study focuses on budget deficits using country specific data different from studies that used cross sectional data and may not reveal the unique characteristics of a country.

McCandless (1991) contends that the impact of the budget deficits on economic growth is theoretically explained through the effects of the deficits on the flow of money into the economy and through supply side (infrastructure, education etc.) The more that government expenditure exceeds revenue, the more money will be circulated in the economy. This trend leads to higher employment and output. The World Economic Outlook (IMF, 1996) concluded that during the

mid-1980s a group of countries with high fiscal imbalances had significantly lower economic growth than countries with low to medium budget deficits. Shojai (1999) puts it that deficit spending that is financed by the central bank can also lead to inefficiencies in financial markets and cause high inflation in the developing countries. In addition, budget deficits distort real exchange rates and the interest rate, which in turn undermines the international competitiveness of the economy. The pioneering work of Rao, (1953) has pointed out the beneficial effects of government spending on infrastructure, health, education, and productive development projects. His study also indicated that government spending on productive development projects in developing countries is not as inflationary as it might be assumed because of the greater output growth. Eisner and Pieper (1987) reported a positive impact of cyclical and inflation-adjusted budget deficits on economic growth in the United States and the Organization for Economic Cooperation and development (OECD) countries. Landau (1983) was quite illuminating. He used a sample of 96 developing countries to determine the relationship between fiscal deficits and economic growth. He inferred that big government spending, measured by the share of government consumption expenditures in gross domestic product (GDP), and reduced growth of per capita income lead to large fiscal deficits. Landau (1986) reaffirmed his earlier findings by examining another set of variables influencing economic growth, including per capita income, the structure of production, population and global economic conditions and concluded that fiscal deficit have positive impact on economic growth.

The above studies also did not focus on the impact of budget deficits on growth directly but through its effects on the flow of money into the economy and through supply side, effects of government spending on infrastructure, health, education, and productive development projects.

However, IMF (1996), found negative relationship between growth and budget deficits, while Eisner and Pieper (1987) and landau (1983 and 1986) found positive relationship while using cross-sectional data for developing countries. In summary, literature on the relationship between budget deficits and growth have revealed inconsistent or conflicting results, owing to different methodologies used and the fact that contexts of these studies were different from Kenya. The current study uses large time series data specific to Kenya and recent development in econometrics like error correction method and co integration to find the relationship between budget deficits and economic growth in Kenya.

2.2.2 Impact of Budget Deficits on Private Investment

Blejer and Khan (1984) did a study on the relationship between government policy and private investment in developing countries. He used cross sectional time series data (1960-1982). He estimated private investment model using OLS estimator and found the crowding-out of the private sector to be uncertain as this depends on: one, whether the public sector competes with the private sector over the scarce resources or produce marketable output which competes with private sector output and secondly, the channel through which public debt is financed. They also found that public sector can be complementary to private sector investment, for example, public investment on infrastructure enhances the activity of private investment and raises the productivity of capital. The conclusions drawn from Blejer and Khan are; one, that countries in which the private sector has been allowed to take on a larger role in capital formation have managed to achieve relatively higher rates of investment, two, that the private sector investment in developing countries is constrained by the availability of finances (flow of the credit to the private sector through monetary policy) and the tightening of monetary policy as stabilization

tool would adversely affect private investment. Bahmani (1999) did a study with the help of Johansen Juselius co integration technique to investigate the association between the budget deficits and private investment while using quarterly data for the period of 1947-1992. He found crowding in impact on the real investment, which is validation of the arguments of Keynesian regarding expansionary effect of the budget deficit on the investment. Koussy and Bouabre' (1993), investigated the determinants of fiscal deficits and fiscal adjustment in C*o*̂ d'Ivoire. Their econometric investigation revealed that it was possible for the government to chiefly resort to public investment cuts and tax increases to make fiscal adjustment. In doing so, he argues the government was right for public investment in the short term but wrong for tax rates. Indeed, the regression analysis showed that public investment was positively linked to fiscal deficits, whereas tax revenue was significantly sensitive to public investment in the medium term, which might cause fiscal deficits to increase as a result of public investment reduction. They concluded that C*o*̂ te d'Ivoire's new fiscal policy made sense in short-term, but suffered from shortcomings related to narrow basis of choice of instruments used. In particular, there was no indication of an evaluation of the impact of investment cuts and tax rate manipulation, the main instruments of the latter, on the growth prospects for the country and feedback on fiscal deficits in the medium term. The studies reviewed have come up with inconclusive results on crowding-in or out hypothesis. The results from Blejer and Khan (1984) are uncertain as this depends on: one, whether the public sector competes with the private sector over the scarce resources or produce marketable output which competes with private sector output, two the channel through which public debt is financed. On the other hand, Bahmani (1999) found that budget deficit crowds in private sector investment, and Koussy and Bouabre' (1993), found the crowding effect from

public expenditure not from budget deficits. Blejer and Khan (1984) used cross-sectional data while Bahmani used co integration technique but ignored the error correction model that looks into the long run relationship between variables, to determine the association between private investment and budget deficits. The current study uses country specific data and recent econometric method of error correction model and co integration to determine the effects of budget deficits on private sector investment in Kenya.

Dornbusch and Reynoso (1989) attributed the adverse effects of double digit inflation on private investment not only to increase riskiness to longer-term projects but also an indication of macroeconomic instability and failure on the part of government to manipulate economic policy towards desirable direction, both of which contribute to an adverse investment climate. High and unpredictable inflation therefore distorts the information content of relative prices and increases the degree of risk of longer-term investment hence affect private investment negatively. Green and Villanueva (1991) and Oshikoya (1994) found that a higher inflation rate had negative effects on private investment for 23 developing countries in their pooled time series/cross-sectional study. They pointed out that, high and unpredictable inflation distorts the information content of relative prices and increases the riskiness of longer time investment. The study on the impact of inflation on private investment showed negative expected sign although the study by Green and Villanueva (1991) and Oshikoya (1994) used pooled time series cross-sectional data that ignores country specific uniqueness from which the current study departs. Therefore, the current study uses country specific data to determine the effect of inflation rate on private investment.

Dailami and Walton (1989), Porter and Ranny (1982), exposed that the cost of capital to a large extent controlled by the exchange rate, negatively affect investment as much as the relative cost of the capital goods. This is due the fact that most of the raw materials and intermediate goods are imported by the developing economies. Real devaluation of domestic currency is a key component policy reform that contains element of both demand-side measures. It is a simultaneous expenditure reducing and expenditure switching policy and hence affect both domestic demand and supply hence the investment level in the economy. In the short-run, a real devaluation will reduce private investment through its negative impact on domestic absorption. On the demand side, the expenditure-reducing effect of exchange rate is unambiguously clear. The main demand side effects are a reduction in private real wealth and expenditure, due to the impact of the rise in the overall price level of the real value of private sector financial assets. For these reasons, real devaluation decreases domestic demand, and when firms face sales-binding constraints and the slump in aggregate economic activity, it may induce firms to reduce investment spending. On the supply side, the impact of expenditure-switching aspect of exchange rate policy on private investment may be uncertain. A real devaluation increases the level of foreign prices measured in domestic currency and thus the price of traded goods relative to non-traded goods in the domestic economy. Thus devaluation will have a stimulative effect on private investment in the traded goods sector, and depresses investment in the non-traded goods sector. They further argued that if the price of domestic factor of production-including capital goods-rise more than proportionately to the domestic currency price of final output, devaluation will have a stimulative impact on the aggregate supply and private investment. However, in an economy with a high dependence on non-competitive imported capital goods, real devaluation may affect private investment negatively through a rise in the real cost of imported capital goods.

In summary, they postulated that the private investment in LDCs depends on income (GDP), the capital market rate of interest, the official bank rates, budget deficits, balance of payments, inflation rate, the reserve ratio, real wage and real exchange rates. The study on impact of rate of inflation on private investment showed negative expected sign although they used time series cross-sectional data that ignores country specific uniqueness which the current study applies.

A study by Fry (1988), found a positive relationship between real interest rates and real money balance. According to Fry, the major weakness of financial liberalization is its total disregard of adverse effects of high lending rates on borrowing which raises the cost of capital services and therefore lowers investment as was advanced by the neo-classical school of thought. McKinnon and Shaw (1973) advanced the view that there is a positive relationship between private investment and real interest rates in less developed countries (LDCs). They proposed that financial repression interferes with development in several ways: financial intermediaries that collect savings do not allocate them efficiently among the competing uses; savings vehicle is not well developed and the returns on savings are negative or unstable. Firms are therefore discouraged due to poor financial policies that reduce the return to investment or make them uncertain; as a result all these retard growth. They also criticized financial repression on the basis of its assumptions that savings are influenced by interest rates. This ignores the fact that raising interest rates results in two effects namely; income effects and substitution effects. As interest rates go up, people would postpone current consumption and hence boost savings (substitution effect) while on the other hand this would raise the expected income from interest bearing financial assets (income effect). From this point of view, there can hardly be a clear-cut relationship between savings and interest rates. They therefore argue for the liberalization of

interest rate as the avenue through which investment can be boosted and that keeping interest rate below the equilibrium would lead to low investment. They postulated that a high interest rate on deposits results in high saving mobilization which further induces investment. Financial liberalization theories therefore argue for improved growth through financial reforms and trade balance.

Serven and Solimano (1991) concluded that macro-economic stability, commitment to consistent policies, adequate capital inflows guarantees success of structural adjustment programs in LDCs. Schmidt-Hebbel and Mueller (1999), in the analysis of private savings and investment in Morocco found that private investment declined during the period of adjustment mainly due to growing uncertainty on future of structural reforms, proxied by the external debt output ratio. They recommended measures to reduce external and budget imbalances to include; depreciation of the local currency, removal of controls on interest rates, credit and monetary restraint, and fiscal deficit reduction. Tybout and De Melo (1986) used a model by Fry (1980) and Giovannini (1983) to investigate the impacts of financial liberalization on investment in Uruguay. They tested the McKinnon-Shaw hypothesis (1973) and found financial reforms to have induced structural shift in Uruguayan savings and investment. However, these shifts were not entirely as was envisioned by proponents of financial deregulation. Also, the efficiency of financial intermediation improved. Mild evidence for credit allocation was recorded as a result of financial liberalization as small firms increased their leverage and average financial cost relative to large firms, suggested that there may have been improvement in credit allocation hence increase in investment. These scholars had mixed results as regarding SAPs effects on saving and investment. Others found a positive effect (Serven and Solimano (1991), Tybout and De Milo (1986), Govannini (1983), Fry (1988) and McKinnon and Shaw (1973)), while others found

negative effect (Schemidt-Habbel and Mueller, 1999). These studies had inconclusive results and did not use the recent superior econometric techniques of error correction and cointegration that guarantee proper policy formulation which the current study adopts.

Chesang (1991) did a study on private investment in urban housing in Kenya. He found that lagged changes in income and the availability of credit to the urban housing sector to have significant and positive impact on investing in housing. However, his study has a limitation as a true representative of total private investment since it dealt with one category of investment that constitutes at most only 10% of gross investment in the country (Wilson et al, 1991). Mwau (1984) mainly focused on the impact of foreign capital inflows on the Kenyan economy. He found that capital inflows have significant and positive effect on domestic investment, balance of payments and economic growth. In the same year, a study by Koori (1984) revealed that in the competitive market for financial resources, public sector investment crowds out private sector investment. However, for Kenya, he found that public sector investment did not crowd out private sector investment since it relied heavily on other sources of finance like the National Social Security Funds (NSSF), the National Hospital Insurance Fund (NHIF), Postal Bank, Bilateral and Multilateral sources which private sector have no access to. However, the study used ordinary least squares and did not incorporate the recent development of time series analysis of co integration and error correction model and looked at the impact of public expenditure on private investment, not the impact of budget deficits on private investment. These studies totally ignore budget deficits in the models as a factor affecting private investment and did not use the recent econometric techniques of co integration and error correction. The current study treats budget deficits as a variable affecting private investment in Kenya.

Wachira (1991) took the same line of Koori (1984) by analyzing the effects of public investment on private investment in Kenya and found some elements of crowding-out of the private sector in the competing market for financial resources. Mwabu (1989) considered the factors affecting foreign direct investment by applying a step-wise regression technique. He found public investment in infrastructure, lagged foreign direct investment and the deviation of GDP from the trend of potential GDP to be factors affecting the foreign direct investment. The study did not however, specifically look at the impact of budget deficits on private investment but used public expenditure to test the crowding in or out hypothesis. More so, the studies did not use error correction and co integration approaches of data analysis to ascertain their validity and reliability in policy formulation

Owiti (1991) did a study on the same area as Mwabu (1989) and applied both semi-log linear and linear models. He found GDP growth rate and foreign exchange reserves to be positively related to the foreign direct investment whereas balance of payments (proxied by the current account balance) and SAPs (captured by dummy variable) to have negative impacts. A study by Musinga (1992), found that net foreign capital inflows to the private sector and rate of growth of GDP to have significant and positive effect on private investment and that public investment and the current capital stock to have significant and negative impact. In the same year Martin and Wasow (1992), used Kenyan data from 1968 to1988 to assess the determinants of private investment and also to analyze how adjustment policies (or their absence) affect those determinants. They found insufficient and uncertain access to imports to be a major factor behind the decline in private investment. They also found real depreciation of foreign exchange to have

a positive indirect effect on private investment in the medium term because such depreciation relaxes the foreign exchange constraints on imports. However, their studies did not consider budget deficit in their model, hence did not test the crowding in or out hypothesis which the current study emphasizes.

In summary, the literature discussed above shows that the relationship between budget deficits and investment is ambiguous. However, the literature has indicated a number of significant variables that are essential to investigate in order to explain the extent to which literary theories on crowding out or in can explain the effects of the unprecedented budget deficits on private investment in Kenya. It is apparent that economic indicators such as budget deficits, foreign exchange, national savings and inflation rate are relevant to investigate in order to explain their impact on Kenya's economy and come up with their implications on the development of Kenya's private investment and this depends on whether budget deficits crowds in or out private sector investment, the concern of the present study. The reviewed literature has come up with inconclusive results on whether budget deficits crowd in or out private investment. This is not known in Kenya and hence the thrust of the current study to help guide policy formulation regarding private investment in Kenya.

2.2.3 The Determinants of Budget Deficits

Ariyo (1993) characterized the build-up and evaluated the desirability of Nigeria's fiscal deficit profile between 1970 and 1990.The findings suggested that the structure of government expenditure is inherently unsustainable by the country's resource profile. The major cause attributable to this was the phenomenal increase in government expenditure financed through debt raised from both internal and external sources. However, the country has thereof

persistently recorded unsustainable annual deficits. The results also suggested that the Structural Adjustment Programmes (SAPs) implemented in 1986 had so far not been of much assistance in addressing the problem of deficit financing. Ariyo (1996) provides a behavioral explanation for the persistence of huge annual fiscal deficit in Nigeria. The study revealed that the excess expenditure over and above the budgeted estimates was not anchored on any macro-economic target. It also reports large revenue and expenditure variances, which suggest the absence of any positive learning effects over the years. The study attributes the intrusion of the political class, which probably nullified the degree of professionalism of the technocrats as a major cause for the variance.

Further, Yekini (2001) evaluated the structural determinants of government budget deficits (fiscal deficits) in Nigeria from 1970 to 1998. The study adopted a structural quantitative approach to examine the quantitative effects of the level of economic development, growth of government revenue, instability of government revenue, government control over expenditure and extent of government participation in the economy on budget deficits in Nigeria. The model estimation results revealed that, level of economic growth, growth of government revenue, instability of government revenue and control of government over expenditure are good structural determinants of budget deficits in Nigeria. Robinson (1977) however, concluded that a larger government revenue as a proportion of GNP enhances economic growth mostly in poorer developing countries and helps reduce budget deficits. Similar findings were attributed to the study by Ram and Grossman (1986). Osoro (1979) did a study on the relationship between public spending, taxation and budget deficits in Tanzania over the period 1965-1991 and tested the Granger causality between revenue and expenditure. He found no evidence of causal relationship

running from revenues to expenditure but the reverse was true and put to test Friedman's (1973) hypothesis that higher taxes always lead to even escalation in expenditure. His findings support the understanding that increases in expenditures lead to increases in taxes and not the other way round. He further found that one of the major sources behind high growth and persistent deficits in the public sector was growth in public spending by revealing that political reasons determine the level of public spending thereby prompting the adjustments of tax revenues to help bridge the fiscal gap. The studies by Ariyo (1993 and 1996) have come up with: phenomenal expenditure, political intrusion, and found SAPs to have no effect on budget deficits. While Yekini (2001), Robinson (1977), Ram and Grossman (1986) found growth in governmet revenue, extent of government participation and instability in government revenue to be affecting budget deficits, with growth in government revenue affecting budget deficits negatively. Osoro (1979) on the other hand looked at causality between revenue and expenditure and found causality running from revenue to expenditure and not reverse. The current study has not used the same variables, apart from SAPs since deficits arise from revenue and expenditure.

Kouassy (1996) used Ivorian data to find out the effects of inflation on her fiscal variables applying the Aghevli-Khan model. He tried to investigate the amount of time required for a change in the consumer price index to be fully reflected in the fiscal variables. The outcome of his study revealed that as inflation rose extensively, government expenditures adjusted more instantaneously than did the revenues. His investigations were in agreement with theory hence supported the Aghevli-Khan hypothesis that when government expenditure rises concomitantly with inflation, government revenue tended to fall behind in real terms owing to collection lags. He therefore concluded that financing of inflation induces fiscal deficits and further results in

increase in money supply thereby generating further inflation. He concluded that in Cote d'Ivoire expenditure adjusts more rapidly than revenues. Cordoso (1998) studied the relationship between fiscal deficit and inflation using a model of inflationary finance (seigniorage) that differed greatly with other studies. Her research focused mainly on the effects of inflation on budget deficits by incorporating fiscal deficits as a function of virtual deficits that could be observed if inflation was actually zero. She studied the negative relationship between inflation rate and real government expenditure-otherwise referred to as the Patinkin effect or negative Tanzi effect. Her model explains how apparently expansionary fiscal policies end in real deficit that are small and compatible with the small amount of seigniorage that can be collected at high inflation rates. Using her model on Brazilian data for the period 1952-95, she found out that extremely high inflation rates are stable and do not explode into open hyperinflation but would have positive effect on budget deficits.

Fisher (1991) did a straightforward econometric study to examine the relationship between macroeconomic performance and long run economic growth. In his study, he picked up fiscal deficits, inflation rate and external debt outstanding as indicators measuring the macroeconomic performance and executed cross-section regression on 73 developing countries. The result of his study clearly indicated that economic growth has a negative relationship with the fiscal deficit, inflation rate and external debt outstanding. The extent that fiscal budget is considered as a tool to achieve social and economic development described by World Bank, and several international bodies have advocated targeting public spending either through broad or narrow targeting strategies. It is believed that public spending can meet equity objectives with limited resources through targeting. Broad targeting is about directly or indirectly subsidizing services or

commodities consumed mostly by the poor. Sill (2005) also adopted the methodology of Saleh (2003) by taking sample of 94 countries and explored a positive relationship between budget deficits and inflation. This was the same as findings by Vit (2004), based on the quarterly Data collected from Czech Republic economy for the period 1995 to 2002, that the budget deficits resulted in some hurdles inflation, deficit in current account and subsequently these hurdles impeded the growth of the economy. Oladipo and Akinbobola (2011) studied the relationship between fiscal deficits and inflation in Nigeria, using Granger causality pair-wise test. The result showed that there was no causal relationship from inflation to budget deficits, while the causal relationship from budget deficit to inflation exists in Nigeria. Furthermore, the results showed that budget deficit affects inflation directly and indirectly through fluctuations in exchange rate in Nigerian economy. Further, Chimobi and Igwe (2010) investigated the causality between budget deficits, money supply growth and inflation, using Vector Error Correction (VEC) model and pair-wise Granger causality test. The result revealed that inflation and budget deficit have bilateral/feedback causality. This proved that the change that occurred in inflation could be explained by its lag and also lagged value of budget deficit and in the same vein; changes that occur in budget deficit as explained by its lagged and the lagged values of inflation. From these studies, there is conflict of findings regarding inflation and budget deficits. Some scholars (Kouassy (1996), Cordoso (1998), Vit (2004), Chimobi (2010) found a positive relationship. While Oladipo and Akinbobola (2010), using causality, found no causality relationship running from inflation to budget deficit but found causality running from deficit to inflation, while others found negative causal relationship. The finding by Fisher (1991) who used cross-sectional data, that budget deficits have negative relation with inflation is wanting and contradicts economic theory hence the justification of the current study using country specific time series data.

Olivera (1967) conceptualized the two way causality between fiscal deficits and inflation and argued that government expenditure follows the rise of price level more rapidly than government income. He attributes this outcome to a number of factors. First, taxes collected in any given period are partly based to a greater or lesser degree on the level of private income of previous period. Second, some sources of revenue depend upon the exchange rate, which as a rule, lags temporarily behind the internal price changes. Third, price paid by the government tend to be, on the whole, more responsive to inflation than prices of the public utilities. Heller (1980), in a bid to investigate the impact of inflation on fiscal policy in developing countries, found that while the basic Aghevli-Khan (1978) hypothesis is a characteristic of the majority of the countries, it is not universally accepted since it actually had only 60% support in the countries studied. The hypothesis had credence in Latin America with less support in Africa and Asia. He found that the fiscal response to inflation for any given country varied according to the stage of the inflationary process. In the process to higher inflation rate, there appeared to be an accelerated response of expenditure and a lagged response of revenue. He found that expenditure adjusted more rapidly to anticipated inflation than revenue and that an opposite result emerged with respect to unanticipated inflation. He further found that public expenditure on goods and services tended to adjust more rapidly than expenditure on wages and salaries or public investment while corporate income taxes tended to adjust more rapidly than personal income taxes.

Ssejjaaka and Kasekende (1996), in their study on the relationship between government fiscal deficits and inflation under structural adjustment in Uganda over the period 1981-1995, observed that although structural adjustment may be regarded as the most prominent interventionist policy of the 1980s and onwards, some of its key requirements are stabilization, and budget management which form integral components of growth. Over this period, they observed that

although structural adjustment has been put in place, Uganda's budget deficits had been growing, yet inflation had been reduced to single digit. The evidence adduced indicates that there was no relationship between the unsustainable budget deficits and growth of inflation. This weak relationship, they pointed out, was a result of massive donor support for the budget which if withdrawn would lead to unwinding of inflation. They pointed out that the manner in which a deficit is financed determines whether that deficit causes inflation or not. They also found out that there was a strong positive correlation between growth in money supply and inflation and therefore cautioned that heavy dependence on domestic sources to finance the deficits, especially credit from the central bank, could be inflationary. These studies have also come up with mixed results. Olivera (1967), studied causality between budget deficit and growth and found positive relationship. Heller (1980) revealed that stage of inflationary process matter in determining the relation between deficit and inflation and Sseejjaaka and Kasekende (1996), did their study under SAPs and found a negative relationship contrary to theoretical underpinning. The current study analyses the relationship under SAPs using the recent econometric techniques of error correction and cointegration.

Egwaikhede (1994) used ordinary least square estimation method on a macroeconometric model to study the effects of exchange rate depreciation on the budget deficits and inflation in Nigeria over the period 1973-89. They used cointegration tests and the error correction model and found out that domestic money supply, real output, the shadow price of exchange rate, and official exchange rate cannot be ignored in evaluating the proximate causes of inflation in Nigeria. Evidence from the revenue equation revealed that imports influenced by exchange rate significantly explain revenue from import taxes while on the other hand the magnitude of

external debt in local currency, which also depends on exchange rate has a tendency to increase debt service payments and therefore total expenditures, through a feedback mechanism using an error correction term. After testing for internal consistency of the complete model, the impact of exchange rate depreciation was tested on money supply, revenue and expenditure, and inflation. Evidence indicated that exchange rate depreciation can be inflationary as it works via its direct effect on inflation, and through budgetary and monetary effects thereby leading to budget deficits. Hakkio (1996) collected data on Finland and Sweden for a period of 1979-1995 and applied simple regression technique and found a negative relationship between budget deficits and exchange rate which contradict theory, showing appreciation of domestic currency. Therefore, it is imperative to find the relationship between budget deficits and exchange rate using Kenyan data.

A study by Combes and Saadi-Sedik (2006) on how trade openness influence budget deficits in developing countries, using a panel data analysis, with each country having six observations: 1975–78, 1979–82, 1983–86, 1987–90, 1991-94, and 1995–98, found the variable trade openness not significant and negative, suggesting that the two components of observed trade openness may have opposite effects. The weighted variable, , defined as observed trade openness times the terms of trade instability had the expected sign and was significant suggesting that more open countries tend to have higher exposure to external shocks . While in theory, the net effect of trade openness on budget balances is ambiguous, empirically, it is quite clear. Trade openness increases a country's exposure to external shocks regardless of whether this is due to natural openness or to trade-policy induced openness. This, in turn, tends to reinforce the adverse impact of terms of trade instability. Additionally, trade openness affects budget balances directly, and

here the effects of natural openness and trade-policy induced openness go in opposite directions: contrary to natural openness, trade-policy induced openness improves budget balances. This study has shown that, even if trade openness increases a country's exposure to external shocks and thereby adversely affects its budget balances, an outward looking policy strategy should lead to an overall strengthening of its budget balances. Similar study by Nazma and Da costa (1990) on the budget deficit and the trade deficit found a strong and stable relationship between the budget deficit and the trade deficit. Once one allows for the fact that international capital markets may adjust slowly, the total effect estimated from U.S. data is roughly comparable to that obtained from the international comparison. The paper employed a bivariate granger causality approach and quarterly data in an effort to determine whether a causal relationship exists between terms of trade and budget deficit in USA for a period between 1971 and 1983. This test was done using Granger causality test. The results found that trade deficit does not cause budget deficit and recommended more research in terms of variables and methodology. These studies found conflicting results. However, they used different methodologies; cross-sectional and causality. It is therefore crucial to look at the case of a developing economy like Kenya so as to come up with appropriate policies regarding budget deficits.

2.2.4 The Relevance of Ricardian Equivalence Hypothesis

Domenech *et al* (1997) did a study on the effects of budget deficits on national savings in the OECD. They estimated a structural vector autoregressions (VARs) using a panel data of OECD countries, which included national savings and budget deficits both as the ratio of GDP, to test the Ricardian Equivalence Hypothesis (REH). Their results suggested that Ricardian Equivalence Hypothesis did not work in their sample of OECD countries, since private savings

compensated only a small fraction of public dissaving. Their results support the interpretation that the large budget deficits have been a very important factor behind the significant increase in real interest rates in the eighties and nineties. They concluded that the deterioration of public accounts had been responsible for the significant decrease in investment and the higher interest rates observed since the second oils crisis. The long run response of national savings was robust to the exclusion of countries from the sample, consistent with the interpretation that public dissaving and long-lasting deficits seem to be important factors explaining higher real interest rates and lower national saving, with negative effects on welfare and growth in the long run. Barrow and Sala-i-Martin (1991), Barro (1992) and Koedijk et al (1994) have tried to explain the causes of the high levels of real interest rates following the second oil crisis. They have also stressed the influence of public variable on the downward trend in national saving rates observed from the mid seventies onwards, indicating collapse of REH. Masson et al (1995) found that private savings compensates only partially for changes in the government fiscal position and hence collapse of Ricardian Equivalence Hypothesis. Lopez et al (2000) also found that private saving does not fully offset additional government deficits, meaning that government deficits affect investment. However, they found that private sector in industrialized countries is likely to save more in anticipation of higher future taxes or lower transfers accompanying larger government deficits than private sector in developing countries, hence supporting Ricardian Equivalence Hypothesis. Wheeler (1999) did a study on the macroeconomic impacts of government debt, using variance decomposition and impulse response functions derived from a vector autoregressive model. The result supported an extreme form of Ricardian equivalence hypothesis. In his view, wealth falls as government deficits debt rises, that is, an increase in government debt leads to decrease in interest rates, output and the price level. Barro (1974),

proposed an alternative to conventional Ricardian equivalence. This view holds that an increase in government debt does not lead to additional private sector wealth, but instead, the increase in government debt is seen as leading to increase in future tax liabilities of the same present value as the debt. According to Ricardian equivalence hypothesis, because government debt is not viewed as private sector wealth, an increase in government debt does not alter private spending. Hence, changes in government debt do not cause changes in price level, output, or interest rates. His study concludes that shocks to the government have significant and negative impacts on the interest rate, price level, and output. The results support the extreme form of the Ricardian view that, wealth falls as deficit rises. In this case an increase in government debt leads to decrease in interest rate, output, and prices.

The study by Eisner (1994) which examined the relations involving national saving, federal budget deficits and changes in real exchange rates found greater price-adjusted, high unemployment deficits, increase in real monetary base and decline in real exchange rates to be all associated with more subsequent national saving. He found that inflation adjusted deficits contribute, after some modest contemporaneous decline, to substantially higher saving rates and positive shocks to changes in the real monetary base to be related to subsequent higher saving and hence supported REH. The literature on Ricardian Equivalence Hypothesis has revealed inconclusive result since some scholars have supported it (Lopez, 2000, Barro, 1974, and Eisner, 1994) while others have rejected it (Barro 1992 and Koedjik 1994 Barro and Sala-i-Martin, 1991 and Masson, 1995). In the Kenyan context, no known study to the author has ever tested this important theory which test on how citizens respond to government's tax finance that would affect future consumption and hence accelerator principle of investment due reduction in interest (cost of borrowing). Most of these studies have been done in the contest of developed nations

and hence the need to do this study in a developing economy like Kenya, where there is no known study of this kind..

2.2.5 Summary of Gaps in the Literature

As observed above, no studies have been done to comprehensively examine the relationship between budget deficits and economic growth in Kenya. Some related studies, however, have been done on fiscal policy and economic growth in Kenya (M'Amanja & Morrissey, 2005) and private investment and other policy variables. Most of the studies done so far in Kenya, especially on impact of private investment and other policy variable have conspicuously ignored the impact of budget deficits on private sector investment (Mwau (1984), Koori (1984), Mwabu (1989), Chesang (1991), Owiti (1991), Wachira (1991), Musinga (1992) and Martin and Wasow (1992)). The literature reviewed also helps in finding the main determinants of budget deficits in Kenya and the relevance of Ricardian Equivalence Hypothesis has not been established in Kenya. This dearth of economic literature on the comprehensive relationship between Budget deficits and economic growth in our economy leaves a gap worth studying. Moreover, most of the reviewed studies have used cross-sectional data, Kneller et al (1999), Barro (1990) and Ram (1986). These countries differ markedly in their economic structure and cross-sectional data ignore country specific uniqueness. Time series data allows or reveals the causal relationships between variables while cross-sectional analysis identifies correlation but not causation between variables. It is, however, important to note that most of the above empirical studies were based on cross-country analysis on which country-specific recommendations cannot be based and hence the policy relevance of the current study. This study therefore departs from the approaches most of the above scholars have used by employing time series techniques on a larger annual time series data covering the period 1975 to 2012. It uses the most recent development in

econometrics of error correction and co integration to analyze the relationship between fiscal deficits and economic growth using data specific to Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter focuses on the methodological approach used to analyze economic growth, private investment, national saving, and budget deficits equations to help address the objectives of the study. It includes the research design, study area, population/ sample, model specification, data type and sources, time series data analysis, stationarity testing, diagnostic tests results and data analysis and presentation.

3.1 The Research Design

The study used a correlation research design. The correlation method describes in quantitative terms the degree to which variables are related. It involves collecting data in order to determine whether and to what degree a relationship exists between two or more quantifiable variables (Mugenda and Mugenda, 1999). This enabled the establishment of the strength and sign of the relationship between budget deficits and economic growth in Kenya; the impact of budget deficits on private investment in Kenya; establishment of the main determinants of budget deficits in Kenya and testing the relevance of Ricardian Equivalence Hypothesis in Kenya.

3.2 The Study Area

The study was on macroeconomic policy (budget deficits and economic growth) variables and hence focused on the Kenyan economy as a whole.

3.3 Population and Sampling Procedure

The population of the study comprised saturated time series data of the period 1975 to 2012, purposively selected. This was the period when most developing economies experienced volatile growth in budget deficits along with escalating debt repayment burden. The study also takes cognizance of pre-adjustment era (1975 to 1989), adjustment period (1990 to 2000) and post adjustment political economic era of Kenya (2001 to 2012). The period (sample) of study (1975 to 2012) is above the statistically recommended sample size of 30 that ensures the realization of a normal distribution, reliable and valid inferential statistics for policy implications.

3.5 The Model Specification

The study adopted a classical production function that was modified to incorporate other policy variables that affect economic growth like foreign exchange, private investment and inflation and

$$GD_t = \alpha + \sum_{j=1}^{n} \beta_j X_{jt} + \mu_t \quad \text{----------(3.1)}$$

budget deficits. The model that was estimated took the following functional form:

GD_t stands for gross domestic product growth rate

X_j = Exogenous variables and

t = Year of observation

α and β_j are parameters to be estimated

μ_t = random unobserved disturbance with zero mean and a constant variance (Appendix 7)

Based on the priori logic, data accessibility and review of the relevant literature on the relation between economic growth and fiscal variables, the following variables were included in the model to be estimated. These were represented by X_j in the above generalized functional model. The functional model that was estimated for policy implication was generally specified as follows:

GD=f (K, BD, POP, PI, IN, FE, DV,)…...……...…….… (3.2)

GD = Gross Domestic Product Growth rate

K = Investment-Income Ratio (proxy for capital)

BD = Budget Deficits

POP = Population (Proxy for Labour force)

PI = Private Domestic Investment

IN = Inflation Rate

FE = Foreign Exchange rate

(DV) = Dummy Variable (proxy for Structural adjustment program or government policy shift: the value of zero before 1992 and one from 1992

f = Functional Relationship between the variables

In equation (2) the variables should be in rates of growth and hence should be differenced or be estimated in logarithms form. When the dependent variable has been expressed in natural logarithms, the coefficient of any given X is interpreted as a percentage change in the dependent variable given a change in that particular X. In this case, the total differencing of equation (2) therefore resulted to equation three as below:

$$\Delta GD = GD_k dK + GD_{BD} dBD + GD_{PO} dPOP + GD_{PI} dPI + GD_{IN} dIN + GD_{FE} dFE + GD_{DV} .dDV + \varepsilon .(3.3)$$

NB: d represents differentiation term

Where, GDj is the partial derivative of GD with respect to the j^{th} functional argument. Dividing equation (3) through by GD yields the growth equation (4) as below:

$$\dot{\bar{GD}} = \beta_K \bar{K} + \beta_{BD} \dot{\bar{K}} + \beta_{PO} \bar{POP} + \beta_{PI} \dot{\bar{PI}} + \beta_{IN} \bar{IN} + \beta_{FE} \bar{FE} + \beta_{DV} \dot{\bar{DV}} + \varepsilon ....3.4)$$

Where: a bar over each variable indicates the rate of growth while, β_K , β_{BD} , β_{PO} , β_{PI} , β_{IN} , β_{FE} , and β_{DV} are the elasticities of gross domestic product (GD) with respect to Capital (K), Budget Deficits (BD), Population (PO), Private Investment (PI) , Foreign Exchange (FE) , Inflation (IN) and Structural Adjustment Programs (DV) , respectively.

Where also: (β_{1-k}) are the marginal products of the variables in the model specified in equation (4) above. To make the model be estimated, an intercept (β_0) and error term (ε) are added to equation (4) to produce the final model to be estimated using Ordinary Least Squares (OLS) as below:

$$\bar{GD} = \beta_0 + \beta_K \dot{\bar{K}} + \beta_{BD} \bar{BD} + \beta_{PO} \dot{\bar{POP}} + \beta_{PI} \dot{\bar{PI}} + \beta_{IN} \dot{\bar{IN}} + \beta_{FE} \dot{\bar{FE}} + \beta_{DV} \dot{\bar{DV}} + \varepsilon ....(3.5)$$

To capture the elasticities of output or growth rate (GD) with respect to all the regressors, all the variables in the model were log transformed and the final estimable model became as equation (3.6).

$$LogGD_t = \beta_0 + \beta_1 LogK_t + \beta_2 LogBD_t + \beta_3 LogPO_t + \beta_4 LogPI_t + \beta_5 LogIN_t$$
$$+ \beta_6 LogFE_t + \beta_7 DV_t + \varepsilon_t ....(3.6)$$

The error term ‘ ε ’ captures the stochastic disturbances and is postulated to satisfy all the classical assumptions (Appendix 1)

The a priori signs are: $\beta_1 > 0$; $\beta_2 < 0$; $\beta_3 > 0$; $\beta_4 > 0$; $\beta_5 < 0$; $\beta_6 < 0$; $\beta_7 > 0$;

To find out the crowding in or out effects of budget deficits on private investment, the following investment model was adopted from Bahmani (1999) and modified. It is generally specified as:

PI = f (BD, NS, GD, IN, FE, DV, ε)……..…….…… (3.7)

Where: PI= Private Investment

BD= Budget Deficits;

NS = National Savings;

GD = Gross Domestic Product Growth Rate

IN= Inflation Rate

FE= Foreign Exchange Rate

DV= dummy variables.

The estimable private investment model takes the form:

$$LogPI_t = \alpha_0 + \alpha_1 LogNS_t + \alpha_2 LogBD_t + \alpha_3 LogIN_t + \alpha_4 LogFE_t + \alpha_5 LogGD_t + \alpha_6 DV_t + \varepsilon_t \ldots (3.8)$$

The priori signs are: $\alpha_1 > 0$; $\alpha_2 < 0$; $\alpha_3 < 0$; $\alpha_4 < 0$; $\alpha_5 > 0$

To investigate the causes of budget deficits in Kenya, the following general model was formulated on the basis of literature reviewed (Ariyo (1993), Yekini (2001), Ram (1986), Kouassy (1996), Cordoso (1998), Osoro (1979), Heller (1975 and 1980), Ssejjaaka and Kasekende (1996), Koussy and Bouabre' (1993) and Egwaikhede (1994) :

BD= f (IN, GD, TOT, FE, DV, ε)…… ……..... (3.9)

Where: IN = Inflation rate

GD= Gross Domestic product Growth rate

TOT= Terms of Trade

FE= Foreign Exchange ratae

DV= dummy variable

ε = Error Term

The estimable model takes the following form:

$$LogBD_t = \delta_0 + \delta_1 LoogIN_t + \delta_2 LogGD_t + \delta_3 LogTOT_t + \delta_4 LogFE_t + \delta_5 DV_t + \varepsilon_t \text{..(3.10)}$$

To test for Ricardian Equivalence Hypothesis, a model was specified showing the relationship between national savings and budget deficits. Other variables that affect savings were also included in the model such as inflation, interest rates and gross domestic growth rates. The national savings model formulated to test the relevance of Ricardian Equivalence Hypothesis for Kenya was adopted and modified from Rafael *et al* (1997) and Lopez *et al* (2000). This was generally specified as:

NS= F (BD, IN, IR, GD, ε)…… … (3.11)

Where:

NS = Savings

BD= Budget deficits

IN= inflation

IR= Interest rates

GD= Gross Domestic product growth rates

The national savings model that was estimated to test Ricardian Hypothesis took the form:

$$LogNS_t = \phi_0 + \phi_1 LogBD_t + \phi_2 LogIN_t + \phi_3 LogIR_t + \phi_4 LogGD_t + \phi_5 DV_t + \varepsilon_t \text{.....(3.12)}$$

A priori expectations are: $\phi_1 < 0, \phi_2 < 0, \phi_3 > 0, \phi_4 > 0$

3.6 Data Type and Sources

The study mainly employed annual time series secondary data for a period of 38 years namely, 1975 to 2012. In order to facilitate time series analysis, data such as; Gross Domestic Product (GDP), Labor Force (Population Figures), Capital (capital formation), Private Investment, Fiscal deficit, National Savings, Exchange Rate, Inflation and Terms of Trade were obtained from, International Financial Statistics, Development Plans (various issues), Statistical Abstract (Kenya National Bureau of Statistic), Central Bank of Kenya Bulletins, World Debt Tables and economic Surveys (various issues). The variables in the model specified were in real terms and hence did not require any further transformation to validate their use in the regression models.

3.7 Time Series Data

In most cases, time series data lack information and generally follows a trend such that anything that grows overtime would fit any aggregated time series data. These normally result in the problem of spurious regression not suitable for policy implication, where there is a high R^2, but no meaningful relationship between or among the variables. Such a high coefficient of determination (R^2) could be due to the presence of the trend, not a true relationship between or among the variables. Stationarity of the time series data is crucially useful in ensuring that a proper and accurate forecasting of events can be realised. The data that was found non–stationary was therefore differenced before any regression analysis was conducted.

3.8: Stationarity Testing (Unit Root Tests)

Granger and Newbold (1974) recommend differencing the data when spurious correlations are expected. However, differencing all the time series data results in the loss of information about the equilibrium relationship between the variables in levels. The recent literature on co-

integration and stationarity testing provides a more rigorous framework for avoiding spurious regression while retaining long-run information about the equilibrium relationship in the variables at levels. The rationale behind co-integration (Appendix 9) is that economic results are legitimate only when time series are stationary. The series are co-integrated if some linear combination of variable results in a 'white' noise process (a random walk). The Augmented Dickey-Fuller (Dickey & Fuller, 1981) was applied to test if the variables were stationary, I (0) or needed to be of first order difference I (1) or second order difference I (2) to induce Stationarity. The method of estimating error correction model (ECM) with co-integrating series is used to prove a cross-confirmation of the results. The first is a two-step procedure advocated by Engle and Granger (1987), which tests for co-integration at levels stage before considering the dynamic properties. The validity of the second stage dynamic results depends on the appropriate specification at the level stage. The first stage of Engle and Granger explores the levels or the equilibrium part of the ECM to establish an R^2 (appendix 8) that is close to unity at the level stage, significant coefficient, a significant no-zero e.g. DW statistics and ADF tests on the residual from the level regressions. If the variables co-integrate, the coefficient estimates from the regression of these variables in the levels can be interpreted as the long-run multipliers and the short – run error correction model is estimated based on the results of co-integration tests. The second stage involves regressions using stationary time series (variables in difference) and inclusion of the lagged residual variable. This lagged term; RES (-1) is intended to capture the error correction process as agent adjusts for expectations about the equilibrium relationship in the previous period as formulated in equation (3.13):

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p} \phi_i \Delta y_{t-1} + \sum_{i=0}^{p} \delta_i \Delta x_{t-i} \pi ECT_{t-1} + \varepsilon_t \quad \text{..... (3.13)}$$

Where ECT_{t-1} is one period lag of the residual term (disequilibrium) from the long run, ε_t is a white noise error term, and $\beta_0, \phi_i, \delta_i, \pi$ are parameters. Equation 13 can be estimated by the OLS method since all its terms (in first differences) are I(0) and therefore standard hypothesis testing using t-ratios and related diagnostic tests can be conducted on the error term. Theoretically, the coefficient of the one period lag of the disequilibrium term should be negative (i.e. $\pi < 0$) and significant if the disequilibrium is to be corrected in the subsequent period and long run equilibrium restored. Therefore, the coefficient of the error term represents the speed of adjustment to the long run equilibrium i.e. it shows by how much a deviation from the long run relationship is corrected in each period.

3.9 Diagnostic Tests

3.9.1 Stationarity Tests at level and first difference on all Variables

The section first highlights the diagnostic test on all models in order validate their uses for policy formulation. Stationarity tests were performed on all the variables both at level and first difference (Appendix 13 and14). Table 3.1 shows stationarity test at levels using Augmented Dickey-Fuller (ADF) test.

Table 3.1 Stationarity Test Results (in levels), Using Augmented Dickey-Fuller

	ADF	1%	5%	10%	Probability
LNBD	-5.8304	-4.22682	-3.5366	-3.20032	0.0001
LNGD	-1.8236	-4.22682	-3.5366	-3.20032	0.6729
LNIN	-4.91659	-4.22682	-3.5366	-3.20032	0.0017
LNIR	-3.8945	-4.22682	-3.5366	-3.20032	0.0223
LNPOP	-1.67955	-4.22682	-3.5366	-3.20032	0.7402
LNPI	-3.69884	-4.23497	-3.54033	-3.20245	0.0353
LNK	-4.90947	-4.23497	-3.54033	-3.20245	0.0018
LNNS	-4.81722	-4.22682	-3.5366	-3.20032	0.0022
LNFE	-0.63781	-4.22682	-3.5366	-3.20032	0.9705
LNTOT	-4.25776	-4.22682	-3.5366	-3.20032	0.0093

Source: Data Analysis (2014)

Table 3.1 shows the results of the unit root test on the variables in the model at levels. The Augmented Dickey-Fuller (ADF) test which captures a long lag length was used to verify the stationarity of the regression variables (data). Based on the ADF test results, it was concluded that the variables were not all stationary hence the need to difference them so as to induce stationarity. The table also shows the order of integration of the variables used in the model for the Kenyan data (1975-2012. Elbadawi and Soto (1995) points out that such test for non-stationarity also verify whether the series could be represented more appropriately as trend stationary process or difference. The ADF tests exhibited that all the variables were not stationary at levels and hence was the need to difference them in order to induce stationarity at their common base. Table 3.2 presents the results of ADF tests on the variables, after differencing them to make them stationary.

Table 3.2 Stationarity test at first difference

	ADF	1%	5%	10%	Probability
LNBD	-6.81964	-4.25288	-3.54849	-3.20709	0
LNGD	-6.47733	-4.23497	-3.54033	-3.20245	0
LNIN	-7.17046	-4.24364	-3.54428	-3.2047	0
LNIR	-6.76363	-4.24364	-3.54428	-3.2047	0
LNPOP	-6.10807	-4.23497	-3.54033	-3.20245	0.0001
LNPI	-4.11551	-4.23497	-3.54033	-3.20245	0.0134
LNK	-4.81722	-4.22682	-3.5366	-3.20032	0.0022
LNNS	-7.73659	-4.23497	-3.54033	-3.20245	0
LNFE	-4.80974	-4.23497	-3.54033	-3.20245	0.0023
LNTOT	-8.54797	-4.23497	-3.54033	-3.20245	0

Source: Data Analysis (2014)

Table 3.2 indicates that all the variables were stationary as the Augmented Dickey-Fuller tests pointed to the existence of stationarity for all variables at their first difference, that is, the variables followed order one process (integrated of order one, I (1),). Since the study suggested

the use of error correction method (ECM) by Engle and Granger (1987), the long run model was first regressed (Appendix 9) to help in the computation of the residual on which the test for co-integration of the growth model variables was performed and later used in the formulation of the error correction term in the model. A comparison of the computed Augmented Dickey-Fuller (ADF) test results on the residual (-6.60277) with its critical values at 1% (-4.23497), 5% (-3.54031 and10 % (-3.20245) supported the existence of co-integration between the growth in output (G) and its fundamentals. This justified the use and specification of the error correction method (ECM) as in equation 3.13. The error correction term formed (lagged value of the residual) was incorporated in the short-run (dynamic) models (both over parameterized and parsimonious) as in the equation (3.13) to capture the short-run dynamics or disequilibria, where the variables are already made stationary by differencing.

$$LNGD_t = \alpha_0 + \alpha_1 LNK_t + \alpha_2 LNBD_t + \alpha_3 LNPOP_t + \alpha_4 LNPI_t + \alpha_5 LNIN_t + \alpha_6 LNFE_t + \alpha_7 DV_t + \alpha_8 ECT_{t-1} + \varepsilon_t \quad (3.13)$$

3.9.2 Normality Test on all Variables

Normality test was performed on the entire regression variables to investigate the extent to which they could affect the results obtained. The null hypothesis was that the variables were normally distributed. JB tests found all the variables normally distributed except interest rate and capital as shown in Table 3.4. The two variables found not normally distributed had negligible impact on the regression results as was confirmed by JB test on the error term (residual).

Table 3.3: Normality Test on the Regression Variables

Variables	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Probability
DLNGDP	0.005498	0.668041	5.066285	9.33425	0.009399
DLNBD2	0.185957	0.153881	7.446309	30.62425	0

DLNFE	0.037764	1.569309	6.005185	29.10984	0
DLNIN	0.587996	-0.46895	6.772304	23.29448	0.000009
DLNIR	0.496855	0.266152	4.046981	1.896836	0.387353
DLNK	0.009463	-0.119147	4.042865	1.764208	0.413911
DLNNS	0.016076	-0.434929	5.237202	8.882662	0.01178
DLNPI	0.018104	1.002871	3.066098	6.208861	0.04485
DLNTOT	0.78226	0.604167	5.490795	11.81554	0.002718
DV	0.502247	-0.272772	1.074405	6.175201	0.045611

Source: Data Analysis (2014)

3.10: Diagnostic Tests on the Growth Model

To validate the usefulness of growth model for forecasting and policy formulation, several diagnostic tests were executed as below:

3.10.1 Stationarity Test on the Growth Model Residual

This was performed on the residual (Appendix 15) of the static growth model to validate the formulation of the error correction model specified in equation 3.13. The results of the unit root test using Augmented – Dickey Fuller are reported in table 3.3.

Table 3.4: Stationarity Test on the Growth Model Residual Results

	ADF	1%	5%	10%	probability
Residual	-6.60277	-4.23497	-3.54033	-3.20245	0

Source: Regression Results

From table 4.3, the results indicated that the errors in the co-integration regression growth model were stationary hence validated the formulation of the error correction term in the growth model (Equation 3.13).

3.10.2 Normality Test on Growth Model Residual

Figure 3.1 shows the result of the normality test (Appendix 29) on the computed residual of growth model performed using the Jarque-Bera (JB) test. The test (JB) is a direct test of the distribution of error term and the variables. As can be noted, the efficiency and consistency of OLS estimator is on the basis of normality distribution of the error terms.

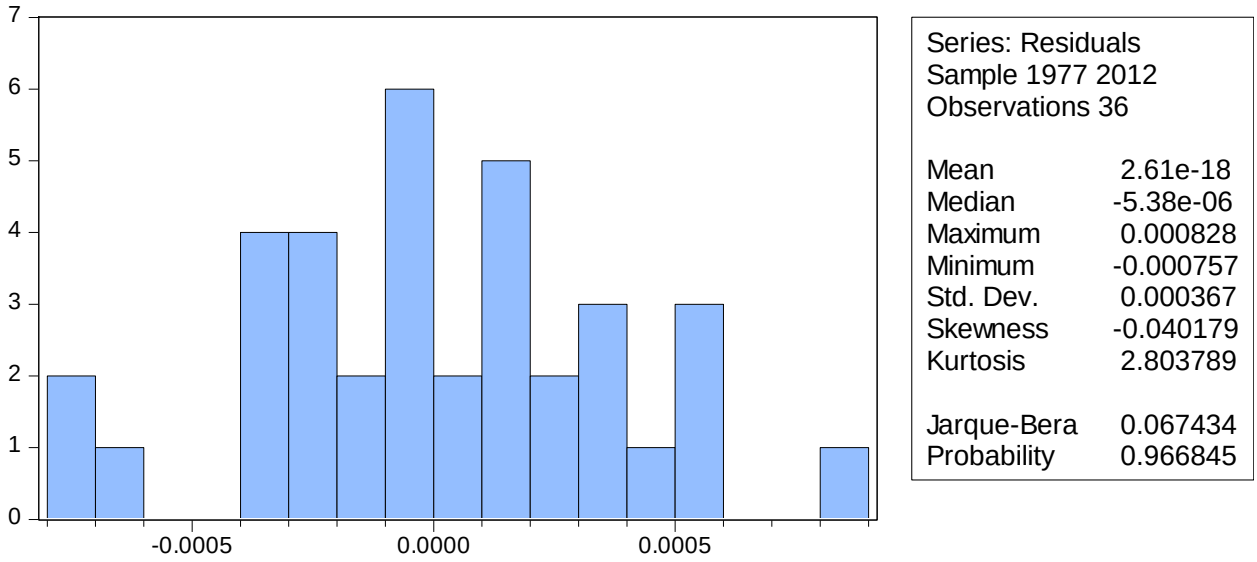

Figure 3.1 Normality test on growth model Residual

The null hypothesis was that the variables were normally distributed. The probability (0.9668) of the JB test is greater than 5%. Consequently, we accept the null hypothesis.

3.10.3 Co-integration Test

From the result obtained, both maximum Eigen test and Trace test indicated three co-integrating equations hence the validity of the model in showing long run relationship among the regression variables.

Table 3.5 Co-integration Test on Growth Model

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.8459	221.0795	159.5297	0*	65.4588	52.3626	0.0014*
At most 1 *	0.7739	155.6207	125.6154	0.0002*	52.0354	46.2314	0.0108*
At most 2 *	0.6878	103.5853	95.7537	0.013*	40.7491	40.0776	0.042*
At most 3	0.4692	62.8362	69.8189	0.1588	22.1651	33.8769	0.5949
At most 4	0.4073	40.6711	47.8561	0.1994	18.3052	27.5843	0.4699
At most 5	0.2843	22.3658	29.7971	0.2786	11.7081	21.1316	0.5767
At most 6	0.2614	10.6577	15.4947	0.2334	10.6065	14.2646	0.1751
At most 7	0.0015	0.0513	3.8415	0.8209	0.0513	3.8415	0.8209

Maximum eigenvalue test indicates 3 cointegrating eqn(s) at 0.05 level
Trace test indicates 3 cointegrating eqn(s) at 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
** Mackinnon –Haug-michelis (1999) p-value
Source: Data Analysis (2014)

Table 3.6 Normalised Equation (Co integrating Equations)

1 Co integrating Equation(s):		Log likelihood	204.1619				
Normalized cointegrating coefficients (standard error in parentheses)							
LNGDP	LNK	LNBD2	LNPOP	LNPI	LNIN	LNFE	DV
1.000000	-6.136731	-0.397157	-8.267094	-0.109309	-0.465613	0.985891	1.011481
	(0.94875)	(0.06811)	(7.82036)	(0.63768)	(0.11422)	(0.74621)	(0.60930)

Source: Data Analysis (2014)

From the co integration equation, the first normalized equation was taken and was shown in Table 3.6. Normalization shows that there is a constant that when multiplied by the coefficients of the variables, the results become 1. In order for the normalized equation to hold, the sign of the coefficients changes and the equation was then written as equation 12 below which shows the long run relationship between growth variable and other regressors.

$$DLNGDP = \underset{(0.94875)}{6.136731} DLNK + \underset{(0.06811)}{0.397157} DLNBD + \underset{(7.82036)}{8.267094} DLNPOP + \underset{(0.6768)}{0.109309} DLNPI +$$
$$\underset{(0.11422)}{0.465613} DLNIN - \underset{(0.74621)}{0.985891} DLNFE - \underset{(0.60930)}{1.011481} DV \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.14)$$

3.10.4 Multicollinearity Test

The existence of multicollinearity (Appendix28) among the explanatory variables of the regression model was suspected owing to the high R^2, but the fact that all the coefficient of the variables were found to be significant at 1% and 5% levels ruled out multicollinearity. More so the absence of multicollinearity was supported by the fact that most of the variables exhibited their expected signs.

Table 3.7 Multicollinearity test

Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	3.37E-07	56.67093	NA
DDLNBD	2.42E-07	3.856659	3.856495
DDLNFE	5.94E-06	1.831530	1.831463
DDLNGDP	0.000310	2.739140	2.736488
DDLNIN	8.85E-09	1.454463	1.454462
DDLNK	5.16E-05	1.271409	1.270632
DDLNPI	3.24E-05	2.219937	2.218303
DDLNPOP	0.000798	2.281681	2.278484
DLNBD	7.17E-07	4.177967	4.159027
DLNFE	8.76E-06	2.704832	2.072862
DLNPI	3.95E-05	4.106587	2.128837
DLNPOP	0.001688	32.94368	3.182724
DV	5.47E-08	5.362409	2.234337
RESID(-1)	0.000673	2.853749	2.851986

Source: Data Analysis (2014)

The null hypothesis was that there is no multicollinearity. It should be noted that, a centered VIF greater than 10 suggests existence of multicollinearity. As per Table 3.7, the centred VIF is less than 10 hence we accept the null hypothesis.

3.10.5 Autocorrelation Test

From Durbin Watson (DW) statistics that was found to be 1.534911, approaching the recommended 2, there was neither autocorrelation nor heteroscedasticity. Moreover, the fact that the data used in regression was de-trended by differencing could be a possible reason of no auto-correlation. The Breuch-Godfray serial correlation LM Test (Appendix 30), a general test for autocorrelation was performed. It suggested the absence of second order correlation as evidenced by LM test statistics (F-statistics of 4.173523 being significant at 5% level). According to Table 3.8 , the observed*R-squared is 10.60053 which is greater than 2 and the probability of the Chi-square is less than 5%, hence , we accept the null hypothesis of no serial correlation as shown in Table 3.8.

Table 3.8 Breusch-Godfrey Serial Correlation LM Test

F-statistic	4.173523	Prob. F(2,20)	0.0306
Obs*R-squared	10.60053	Prob. Chi-Square(2)	0.0050

Source: Data Analysis (2014)

3.10.6 Heteroscedasticity Test

The absence of heteroscedasticity was, however, not surprising, as the problem is quite inherent while dealing with cross-sectional data that the study did not apply. This was supported by autoregressive-conditional homoscedasticity (ARCH) test (Appendix31). The null hypothesis was that there is no heteroscedasticity (homoscedasticity) among the regression variables in the model. In Table 3.9, the observed*R-squared (11.06189) which was greater than 2 and the probability of the chi-square (0.6056) also greater than 5% attest to the absence of heteroscedasticity. The null hypothesis was therefore accepted that the model is homoscedastic.

Table 3.9 Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.750663	Prob. F(13,22)	0.6987
Obs*R-squared	11.06189	Prob. Chi-Square(13)	0.6056
Scaled explained SS	3.725850	Prob. Chi-Square(13)	0.9938

Source: Data Analysis (2014)

The diagnostic tests on growth model were satisfactory and validated the estimation of the parsimonious growth model whose results are reported in chapter 4 for appropriate policy implications.

3.11 Diagnostic Test on the Private Investment Model

The diagnostic tests on dynamic or short run private investment model were performed to ascertain its validity and reliability for policy formulation and forecasting.

3.11.1 Stationarity on Private Investment Model Residual

Unit root test was subjected on private investment model residual (Appendix19) to validate the inclusion of error correction term (ECT) in the private investment model. The results are reported in Table 3.10.

Table 3.10 Unit Root (PI Residual)

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.776625	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.
Source: Data Analysis (2014)

From Table 3.10, the residual of private investment model was found to be stationary at 1%, 5% and 10% critical values of the Augmented Dickey-Fuller, thereby validating its inclusion in the formulation of Error Correction Term (ECT) in the private investment model.

3.11.2 Normality Tests on the Private Investment Model Residual

The null hypothesis was that the variables were normally distributed. From JB test (Appendix35), we accept the null hypothesis since the probability of (0.1944) is more than 5%.

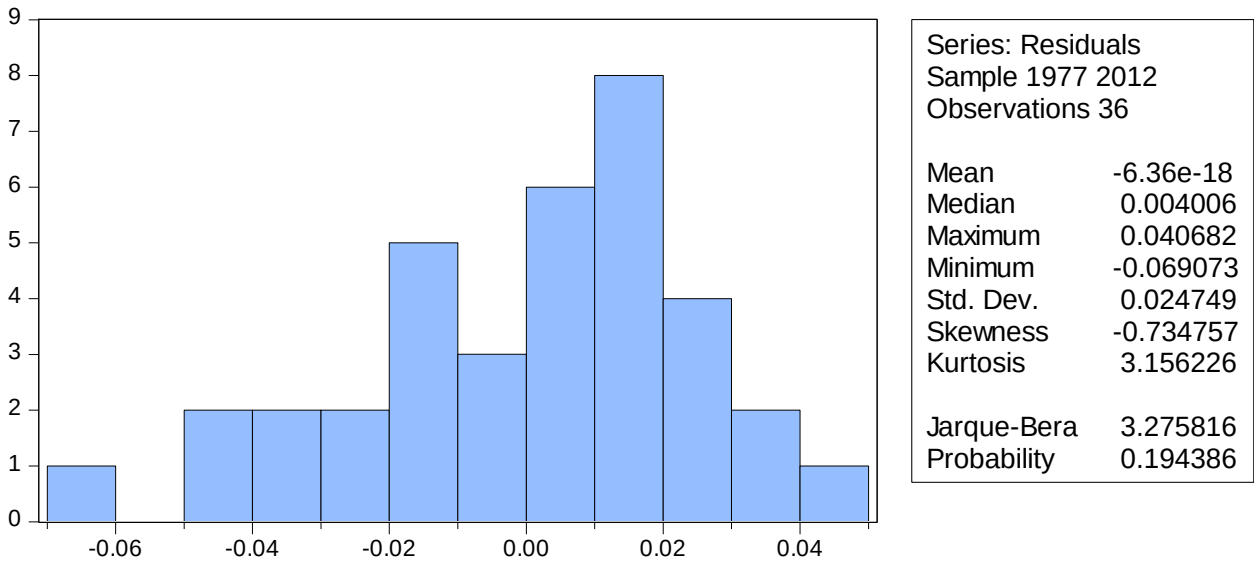

Figure 4.2 Normality of the residual

3.11.3 Johansen Co integration Test

From emerging results, both maximum Eigen test and Trace test indicated three cointegrating equations hence the validity of the model in showing long run relationship among the regression variables.

Table 3.11 Co integration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.7479	147.5064	95.7537	0*	48.2307	40.0776	0.0049*
At most 1 *	0.6701	99.2758	69.8189	0*	38.8090	33.8769	0.0119*
At most 2 *	0.6037	60.4668	47.8561	0.0021*	32.3961	27.5843	0.0111*
At most 3	0.3473	28.0707	29.7971	0.0780	14.9323	21.1316	0.2937
At most 4	0.3016	13.1384	15.4947	0.1098	12.5619	14.2646	0.0913
At most 5	0.0163	0.5765	3.8415	0.4477	0.5765	3.8415	0.4477

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level,
Trace test indicates 3 co integrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Data Analysis (2014)

Table 3.12 Normalized Cointegrating equation

1 Cointegrating Equation(s):		Log likelihood	15.84468		
Normalized cointegrating coefficients (standard error in parentheses)					
LNPI	LNBD2	LNNS	LNGDP	LNIN	LNFE
1.000000	0.649953	-1.865213	-0.018565	-0.509899	0.107294
	(0.08021)	(0.77067)	(1.40579)	(0.13548)	(0.73987)

Source: Data Analysi (2014)

From the co integration equation, the first normalized equation was taken as shown in Table 3.12. Normalization shows that there is a constant that, when multiplied by the coefficients of the variables, the results become 1. In order for the normalized equation to hold, the sign of the coefficients changes and the equation was then written as equation 14 below which shows the long run relationship between private investment and other regressors.

$$DLNPI = -\underset{(0.08021)}{0.649953}\,DLNBD + \underset{(0.77067)}{1.865213}\,DLNNS + \underset{(1.40579)}{0.018565}\,DLNGDP + \underset{(0.13548)}{0.509899}\,DLNIN$$

$$-\underset{(0.73987)}{0.107294}\,DLNFE \quad \text{.....(3.15)}$$

3.11.4 Multicollinearity Test

The null hypothesis was that there is no multicollinearity. Accordingly, a centered VIF (Appendix 34) greater than 10 suggests existence of multicollinearity. As per Table 3.13, the centred VIF is less than 10 hence we accept the null hypothesis of non multicollinearity.

Table 4.13 Multicollinearity Test

Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000118	5.160027	NA
DLNBD2	1.32E-05	1.241597	1.234032
DDLNFE	0.002094	2.090125	2.090063
DLNFE	0.003094	2.552897	1.981052
DDLNIN	4.16E-05	3.816231	3.816214
DLNIN	0.000107	3.627988	3.627844
DDLNNS	0.001413	3.716345	3.714136
DLNNS	0.003363	6.000225	3.426743
DDLNPI	0.002544	2.412002	2.411885
UPI(-1)	0.003126	1.721525	1.721514

Source: Data Analysis (2014)

3.11.5 Test for Autocorrelation (Serial correlation)

From Durbin Watson (DW) statistics of 2.1 close to the recommended 2, there was neither autocorrelation nor heteroscedasticity. Moreover, the fact that the data used in regression was de-trended by differencing could be a possible reason of non auto-correlation. The Breuch-Godfray serial correlation LM Test (Appendix 32), a general test for autocorrelation was

performed and it suggested the absence of second order correlation as evidenced by LM test statistics. According to Table 3.14, the observed*R-squared is 3.7065, which is greater than 2 and the probability of the Chi- square is greater than 5%, hence , the null hypothesis of the absence of serial correlation was accepted.

Table 3.14 Autocorrelation

F-statistic	1.558569	Prob. F(2,28)	0.2281
Obs*R-squared	3.706450	Prob. Chi-Square(2)	0.1567

Source: Data Analysis (2014)

3.11.6 Heteroscedasticity Test

The null hypothesis was that there is no heteroscedasticity (homoscedasticity) among the regression variables in the model. From Table 3.15, the observed*R-squared was 1.64, approaching 2 and the probability of the chi-square of 0.95, greater than 5%, attesting to the absence of Heteroscedasticity (Appendix 33). Consequently, the null hypothesis is accepted that the model is homoscedastic.

Table 3.15 Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.231419	Prob. F(6,30)	0.9630
Obs*R-squared	1.636747	Prob. Chi-Square(6)	0.9499
Scaled explained SS	1.610536	Prob. Chi-Square(6)	0.9518

Source: Data Analysis (2014)

3.12 Diagnostic Test on the Budget Deficits Model

One of the objectives of the study was to establish the determinants of budget deficits in Kenya. This section first highlights the diagnostic test results on the budget deficits model to ascertain its

validity for forecasting and policy formulations such as how to tackle the problem of budget deficits hence enhanced economic growth, time series data from 1975 to 2012.

3.12.1 Stationarity on the Budget Deficit Model Residuals

The test was performed to justify the formulation of the Error correction model (ECM) of the parsimonious budget deficits model. As reported in Table 3.16, the Augmented Dickey-Fuller test statistic of -6.318890 was found to be stationary at 1%, 5% and 10% respectively, qualifying its use in the model.

Table 3.16 Stationarity Test on BD Residual

Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.318890	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

Source: Data Analysis (2014)

3.12.2 Normality test on the residual

The null hypothesis was that the variables in the model were normally distributed (Appendix 38). From Figure 3.3 below, the probability of JB (2.313) was greater than 5% level therefore, we accepted the null hypothesis.

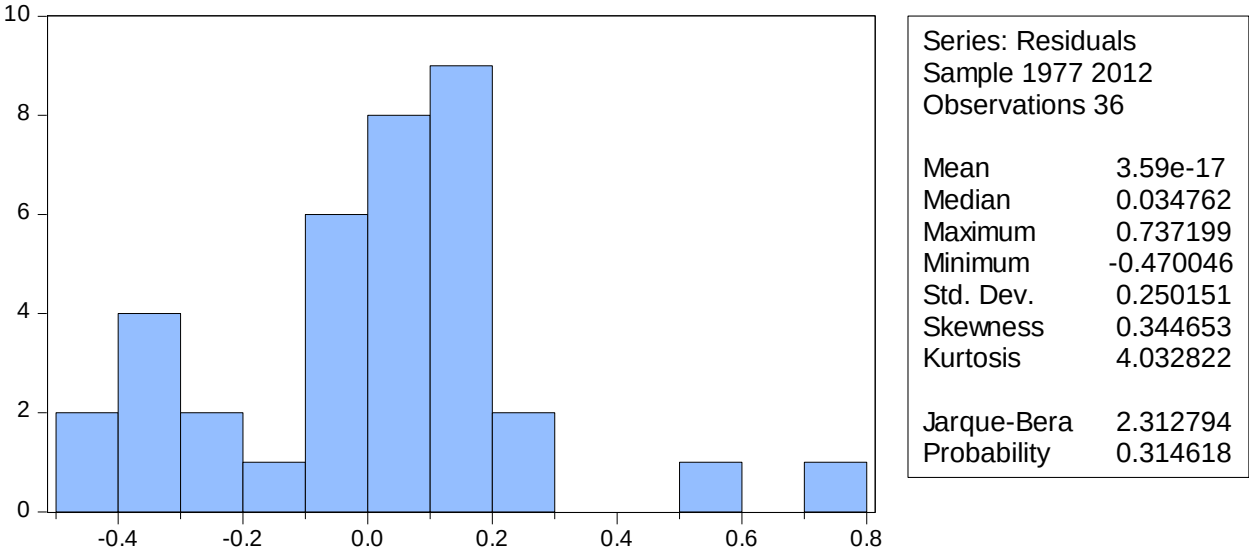

Figure 3.3 Normality of the Residual

3.12.3 Cointegration Test

From the result obtained, both maximum Eigen test and Trace test indicated three co integrating equations hence the validity of the model in showing long run relationship among the regression variables.

Table 3.17 Co integration Test Results

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level							
Hypothesize No. of CE(s)	Eigenvalu	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.77007	121.3347	69.81889	0*	51.44934	33.87687	0.0002*
At most 1 *	0.672614	69.88532	47.85613	0.0001*	39.08153	27.58434	0.0011*
At most 2 *	0.408044	30.80379	29.79707	0.0382*	18.3513	21.13162	0.1173
At most 3	0.286769	12.45249	15.49471	0.1365	11.82826	14.2646	0.1173
At most 4	0.017677	0.624233	3.841466	0.4295	0.624233	3.841466	0.4295

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* notes rejection of the hypothesis at the 0.05 level,
**Mackinnon-Haug-Michelis (1990p-values
(Source: Data Analysis (2014)

Table 3.18 Normalized Cointegration Equation

1 Cointegrating Equation(s):		Log likelihood	-54.02852	
Normalized cointegrating coefficients (standard error in parentheses)				
DLNBD	DLNIN	DLNGDP	DLNFE	DTOT
1.000000	8.018424	-3.460470	6.024928	6.090685
	(0.99522)	(10.5312)	(6.52053)	(1.49194)

Source: Data Analysis (2014)

From the co integration equation, the first normalized equation was taken and was shown in Table 3.18. Normalization shows that there is a constant that when multiplied by the coefficients of the variables, the results become 1. In order for the normalized equation to hold, the sign of the coefficients changes and the equation was then written as equation 3.16 which shows the long run relationship between budget deficits and other regressors.

$$DLNBD = -\underset{(0.99522)}{8.018424}\, DLNIN + \underset{(10.5312)}{3.460470}\, DLNGDP - \underset{(6.52053)}{6.024928}\, DLNFE$$
$$-\underset{(1.49194)}{6.090685}\, DTOT \qquad (3.16)$$

3.12.4 Multicollinearity test (budget deficit)

The null hypothesis was that the variables are not multicollinear (Appendix37). The Table 3.19 indicates that the centered VIF are less than 10. From the rule of thumb, centered VIF of less than 10, implies that there is no serious multicollinearity hence accept the null hypothesis of non multicollinearity.

Table 3.19 Multicollinearity

Variance Inflation Factor

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.015162	6.978333	NA
DDLNBD2	0.001132	3.005813	3.005656
DLNFE	0.180807	1.572735	1.220445
DLNGDP	0.588314	6.144120	1.101836
DDLNIN	0.003294	3.185757	3.185742
DLNIN	0.008880	3.161735	3.161609
DTOT	0.006028	1.553022	1.416622
U(-1)	0.003038	2.771369	2.771322

Source: Own Computation

3.12.5 Serial Correlation Test

The null hypothesis was that there is no serial correlation (appendix39). From Table 3.20, the probability of the Chi-Square is greater than 5% hence we accept the null hypothesis of no autocorrelation.

Table 3.20 Breusch-Godfrey Serial Correlation LM

F-statistic	0.315274	Prob. F(2,26)	0.7323
Obs*R-squared	0.852393	Prob. Chi-Square(2)	0.6530

Source: Data Analysis (2014)

3.12.6 Heteroscedasticity test

The null hypothesis was that there is no Heteroscedasticity (appendix 40).

Table 3.21 Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.477013	Prob. F(7,28)	0.2158
Obs*R-squared	9.708296	Prob. Chi-Square(7)	0.2057

Scaled explained SS	8.905760	Prob. Chi-Square(7)	0.2595

Source: Data Analysis (2014)

From table 3.21, the observed* R-square is 9.69107, greater than 2 and the probability of the Chi-square (25%) is greater than 5%, therefore, we accept the null hypothesis.

3.13 Diagnostic Test on the National Savings Model

To ascertain the validity and reliability of the National Savings model specified, the results of diagnostic tests on the parsimonious model are reported as follows:

3.13.1 Stationarity Test on National Savings Model Residual

From Table 3.22, the Augmented Dickey-Fuller test statistics of -8.552268 was found to be stationary 1%, 5%, and 10% critical values hence validated the formulation of the error correction model in the national savings equation, which was estimated to ascertain the relevance of Ricardian Equivalence Hypothesis using Kenya's data from 1975 to2012.

Table 3.22 Unit Root Test (NS Residuals)

Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.552268	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Source: Data Analysis (2014)

3.13.2 Normality Test on the National Savings Model Residual

The null hypothesis was that the variables were normally distributed. From JB test, we reject the null hypothesis since the probability of (0.0000) was less than 5%.

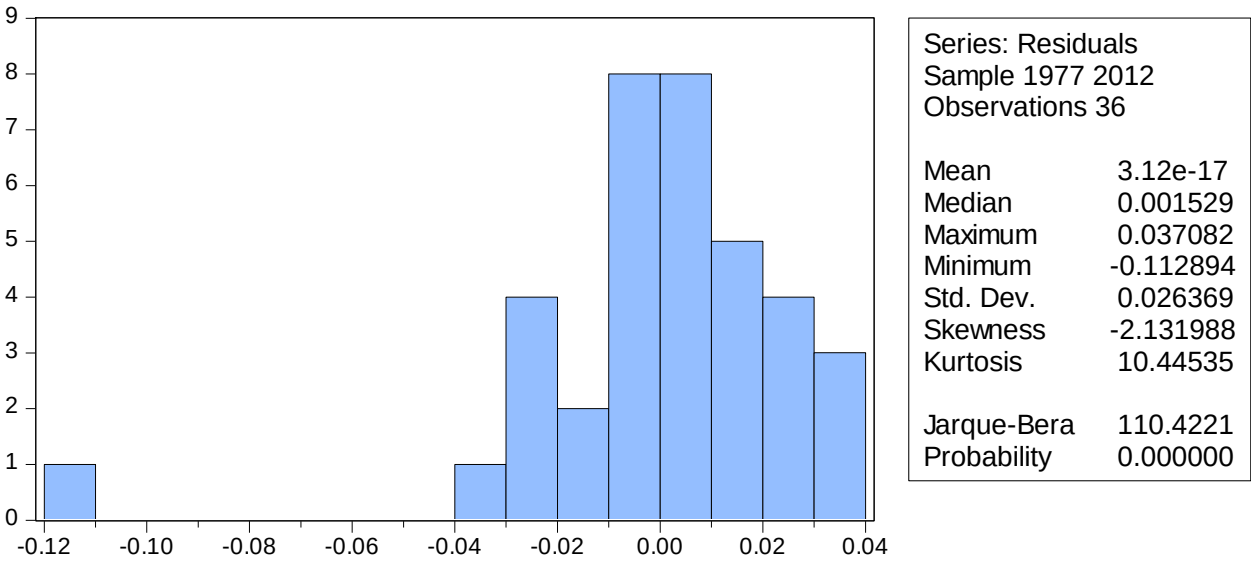

Figure 3.4: Normality Test on Residual

3.13.3 Co-integration test

From the result obtained, both maximum Eigen test and Trace test indicated four co-integrating normalized equations and hence the validity of the model in showing long run relationship among the regression variables.

Table 3.23 Co integration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.757283	144.5647	69.81889	0*	49.555	33.87687	0.0003*
At most 1 *	0.680748	95.00972	47.85613	0*	39.9621	27.58434	0.0008*
At most 2 *	0.587902	55.04762	29.79707	0*	31.02733	21.13162	0.0015*
At most 3 *	0.467686	24.02029	15.49471	0.0021*	22.06825	14.2646	0.0024*

At most 4	0.054246	1.95204	3.841466	0.1624	1.95204	3.841466	0.1624

Max-eigenvalue test indicates 4 cointegrating eqn(s) at the 0.05 level
Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values
(Source: Data Analysis (2014)

Table 3.24 Normalized Equation

1 Cointegrating Equation(s):		Log likelihood	-83.99952	
Normalized cointegrating coefficients (standard error in parentheses)				
DLNNS	DLNBD2	DLNIN	DLNIR	DLNGDP
1.000000	-0.132997	-0.091205	-0.276095	0.782200
	(0.02376)	(0.04700)	(0.04480)	(0.41803)

Source: Data Analysis (2014)

From the co integration equation, the first normalized equation was taken and was shown in Table 3.24. Normalization shows that there is a constant that when multiplied by the coefficients of the variables, the results become 1. In order for the normalized equation to hold, the sign of the coefficients changes and the equation was then written as equation 3.17 which shows the long run relationship between national savings variable and other regressors.

$$DLNNS = \underset{(0.02376)}{0.132997}\, DLNBD + \underset{(0.04700)}{0.091205}\, DLNIN + \underset{(0.04480)}{0.276095}\, DLNIR - \underset{(0.41803)}{0.782200}\, DLNGDP \quad \ldots\ldots(3.17)$$

3.13.4 Multicollinearity Test

The null hypothesis was that the variables are not multicollinear. Table 4.25 indicates that the centred VIF values are less than 10. From the rule of thumb, centred VIF values of less than 10 imply that there is no serious multicollinearity. We therefore accept the null hypothesis of no multicollinearity.

Table 4.25 Variance Inflation Factors

	Coefficient	Uncentered	Centered

Variable	Variance	VIF	VIF
C	0.000208	8.326584	NA
DDLNIN	5.57E-05	4.674780	4.674759
DLNIN	0.000136	4.204640	4.204473
DLNBD2	1.31E-05	1.128177	1.121304
DDLNGDP	0.007144	1.909474	1.906768
DLNGDP	0.010051	9.109504	1.633624
DDLNIR	2.64E-05	1.918002	1.917924
DDLNNS	0.001129	2.717824	2.716209
UNS(-1)	0.003128	2.657547	2.657110

Source: Data Analysis (2014)

3.13.5 Serial correlation test

From the judgment of the Durbin Watson (DW) that was found to be 1.99 close to the recommended 2, there was neither autocorrelation nor heteroscedasticity. Moreover, the fact that the data used in regression was de-trended by differencing could be a possible reason of no auto-correlation. The Breuch-Godfray serial correlation LM Test (Appendix 36), a general test for autocorrelation was performed and it suggested the absence of second order correlation as evidenced by LM test statistics. According to Table 3.26 below, probability of the Chi- square is greater than 5%. The null hypothesis of no serial correlation was therefore accepted.

Table 3.26 Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.068553	Prob. F(2,25)	0.9339
Obs*R-squared	0.196356	Prob. Chi-Square(2)	0.9065

Source: Data Analysis (2014)

3.13.6 Heteroscedasticity Test

The null hypothesis was that there is no heteroscedasticity (homoscedasticity) among the regression variables in the model. From table 3.26, the observed*R-squared (10.06189) was greater than 2 and the probability of the Chi-square (22%), greater than 5% attesting to the

absence of heteroscedasticity. The null hypothesis that the model is homoscedastic was therefore accepted.

Table 3.27 Heteroscedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.425678	Prob. F(8,27)	0.2310
Obs*R-squared	10.69107	Prob. Chi-Square(8)	0.2198
Scaled explained SS	28.40089	Prob. Chi-Square(8)	0.0004

Source: Data Analysis (2014)

3.14 Data Analysis and Presentation

The above models (Growth, Private Investment, Budget Deficit and National Savings) were estimated using the Ordinary Least Squares (OLS) technique. The non-stationarity of the time series data supported the application of the co-integration method (ECM) in each model as recommended by Engle and Granger (1987) to enable the attainment of improved, efficient and consistent results useful for forecasting and policy formulation (see Equation 13 above). Time series properties of the data were examined by carrying out unit root tests (Dickey Fuller and Augmented Dickey Fuller) as well as Johansen Co integration test. Other diagnostic tests for econometric problems such as autocorrelation, Heteroscedasticity and multicollinearity were performed mainly to ascertain that the models were well specified and valid for policy formulation. The overall significance of the variables in the model was indicated by the coefficient of determination (R^2) (see R-Square formula, Appendix 8).

In conclusion, from the research methodology, the growth model was derived in the context of the general production function but modified to incorporate other policy variables likely to influence economic growth apart from budget deficits which was the focus of the study. Other models; private investment, budget deficits and savings were formulated for the purpose of

answering specific objectives of the study. The next chapter is devoted to presentation and interpretation of the results, based on equations; 6, 8, 10 and 12 that were estimated using Ordinary Least Square (OLS) method. Augmented Dickey-Fuller (ADF) tests were performed to establish the stationary of the variable used in the models. The variables that were non-stationary were differenced repeatedly to make them stationary.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents the results and discussions for each objective represented by the four models, namely: parsimonious growth, private investment, national savings and budget deficits that were formulated in the previous chapter. The chapter begins with the presentation and discussion of covariance analysis of correlations between gross domestic growth rates (GD) and the regressors, followed by discussions of the regression results for every objective.

4.1 The Relationship between Budget Deficits and Economic Growth

The growth model explains the relationship between the budget deficits and economic growth notwithstanding the impact of budget deficits on Kenya's economic growth. First, the covariance analysis results are presented then followed by multivariate regression results on which the policy implication is based.

4.1.1 Correlation of Economic Growth with Budget Deficits and other Variables

From table 4.1, the association between lagged budget deficits, r=0.0036 (p= 0.98) and economic growth is positive but weak and insignificant. This finding is consistent with previous studies (Baldacci *et al* 2003, Carrere and Jaime, 1987 and Alam *et al* (2010). These studies reported a positive relationship between budget deficits and economic growth. However, the outcome contradicts those of Fisher, 1991 and Nelson 1994, who found a negative relationship between budget deficits and economic growth.

Table 4.1 Correlation between Economic Growth and Regressors

Correlation / Probability	DLNGDP	DDLNBD	DDLNFE	DDLNGDP	DDLNIN	DDLNK	DDLNPI	DDLNPOP	DLNBD	DLNFE	DLNIN	DLNK	DLNPI	DLNPOP	DY
DLNGDP	1.000000														
DDLNBD	0.003614	1.000000													
	0.9833	—													
DDLNFE	-0.006434	-0.134422	1.000000												
	0.9703	0.4344	—												
DDLNGDP	0.659398	-0.054945	0.028048	1.000000											
	0.0000	0.7503	0.8710	—											
DDLNIN	-0.121846	0.125600	-0.043539	0.156108	1.000000										
	0.4790	0.4655	0.8009	0.3633	—										
0.1DDLNK	0.160539	0.037520	-0.092303	-0.141819	-0.123799	1.000000									
	0.3496	0.8280	0.5924	0.4093	0.4719	—									
DDLNPI	0.009229	-0.166413	-0.226805	-0.037507	-0.466691	0.292497	1.000000								
	0.9574	0.3320	0.1834	0.8290	0.0041	0.0834	—								
DDLNPOP	0.160881	0.142274	-0.076400	0.174106	-0.011634	-0.076415	0.034162	1.000000							
	0.3486	0.4078	0.6579	0.3098	0.9463	0.6578	0.8432	—							
DLNBD	-0.060336	0.827367	-0.178470	-0.102871	0.084640	0.051017	-0.246473	0.086032	1.000000						
	0.7267	0.0000	0.2977	0.5505	0.6236	0.7676	0.1473	0.6178	—						
DLNFE	-0.160900	-0.034644	0.567172	0.001649	0.029623	0.084462	-0.058019	-0.068957	-0.107589	1.000000					
	0.3485	0.8410	0.0003	0.9924	0.8638	0.6243	0.7368	0.6894	0.5323	—					
DLNPI	0.203727	-0.015188	-0.181261	0.010245	-0.265582	0.173436	0.554354	0.031011	-0.196162	-0.195675	-0.274918	0.485800	1.000000		
	0.2334	0.9299	0.2901	0.9527	0.1175	0.3117	0.0005	0.8575	0.2515	0.2527	0.1046	0.0027	—		
DLNPOP	0.132219	0.114122	0.002393	0.122749	-0.081606	-0.157774	-0.003291	0.619154	0.125158	0.075072	-0.079239	-0.014273	0.027449	1.000000	
	0.4421	0.5075	0.9889	0.4757	0.6361	0.3581	0.9848	0.0001	0.4670	0.6635	0.6460	0.9342	0.8737	—	
DY	0.156447	0.001784	-0.062923	-0.120249	-0.012632	0.056181	0.045178	0.015094	-0.010241	-0.278945	-0.023320	-0.142583	-0.211190	-0.473800	1.000000
	0.3622	0.9918	0.7154	0.4848	0.9417	0.7448	0.7936	0.9304	0.9527	0.0995	0.8926	0.4068	0.2163	0.0035	—

Source: Data Analysis (2014)

Both current and lagged foreign exchange showed negative association with economic growth, r=-0.161 (p=0.73) and r= -0.006 (p=0.97) respectively, but were weak and insignificant. The lagged inflation rate was found to have negative association with economic growth, r=-0.122 (p=0.48) but weak and insignificant. The lagged value of capital showed positive association with economic growth, r=0.160 (p=0.35) but was insignificant. Both current population and lagged population showed positive association with economic growth, r=0.13 (p=0.23) and r=0.16 (p=0.35) respectively, but were insignificant. Also, both current private investment and lagged private investment exhibited expected positive sign, r=0.20 (p=0.23) and r=0.009

(p=0.96) respectively but were not significant. This supports the outcome by Alam *et al* (2010). The covariance analysis has exhibited the direction of association between economic growth and its regressors pair wise. However, for purpose of policy formulation further multivariate analysis that looks at the joint effect of regressors on the regresand is necessary for policy formulation regarding the relationship between economic growth and budget deficits.

4.1.2: Discussion of the Multivariate Dynamic Economic Growth Model

The model focuses on the main objective of the study namely, the relationship between budget deficits and economic growth in Kenya, using data from 1975 to 2012. Table 4.2 reports the parsimonious model (Appendix 12). The error correction model was formulated using residual from static model (Appendix10). The static model has a negative Adjusted R-square since it was regressed using untransformed data (data in levels). The residual from the static model was tested for stationarity (Appendix 15) and used in formulating one period lagged error correction term (ECT-1) that was included in the over parameterized model (Appendix11). From over parameterized model results, a parsimonious model (Appendix) results (error correction model results) were generated that depict the best fitted results for the dynamic specification and policy formulation as shown in Table 4.2.

Table 4.2: Multivariate Dynamic Economic Growth Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.013170	0.0006	22.68421	0.0000
DLNBD(-1)	0.001463	0.0005	2.970117	0.0071
DLNFE(-1)	-0.034070	0.002437	-13.97799	0.0000
DLNGDP(-1)	0.984716	0.017599	55.95139	0.0000
DLNIN(-1)	-0.000612	9.41E-05	-6.505535	0.0000
DLNK(-1)	0.011002	0.007184	1.531466	0.1399
DLNPI(-1)	0.042075	0.005690	7.394580	0.0000
DLNPOP(-1)	0.145685	0.028247	5.157643	0.0000
DLNBD	-0.001522	0.000847	-1.797264	0.0860
DLNFE	-0.022885	0.002959	-7.733970	0.0000
DLNPI	0.045743	0.006286	7.277615	0.0000
DLNPOP	0.157443	0.041084	3.832211	0.0009
DV	0.001685	0.000234	7.204609	0.0000
ECM(-1)	-0.985816	0.025948	-37.99216	0.0000

R-squared	0.994999	Mean dependent var	0.012503
Adjusted R-squared	0.992044	S.D. dependent var	0.005188
S.E. of regression	0.000463	Akaike info criterion	-12.23353
Sum squared resid	4.71E-06	Schwarz criterion	-11.61772
Log likelihood	234.2036	Hannan-Quinn criter.	-12.01860
F-statistic	336.6948	Durbin-Watson stat	1.534911
Prob(F-statistic)	0.000000		

Source: Data Analysis (2014)

The results from a parsimonious growth model (short-run or dynamic), shown in Table 4.2 were summarised as in equation 4.1 (standard error in parenthesis**)**:

$$
\begin{aligned}
&DLNGDP_t = \underset{(0.0006)}{0.01317} - \underset{(0.0005)}{0.0015}\,DLNBD_{t-1} - \underset{(0.0024)}{0.0341}\,DLNFE_{t-1} + \underset{(0.0176)}{0.9847}\,DLNGDP_{t-1} \\
&- \underset{(0.0001)}{0.0006}\,DLNIN_{t-1} + \underset{(0.0072)}{0.0110}\,DLNK_{t-1} + \underset{(0.0057)}{0.0421}\,DLNPI_{t-1} + \underset{(0.0282)}{0.1457}\,DLNPOP_{t-1} - \\
&\underset{(0.0008)}{0.0015}\,DLNBD_t + \underset{(0.00296)}{0.0229}\,DLNFE_t - \underset{(0.0063)}{0.0457}\,DLNPI_t - \underset{(0.0411)}{0.1574}\,DLNPOP_t + \underset{(0.0002)}{0.0017}\,DV \\
&- \underset{(0.0259)}{0.9858}\,ECM_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.1)
\end{aligned}
$$

From the regression results, it was noted that most of the variables exhibited their expected signs and were significant at 1%, and 10% levels respectively. The constant (C) was found positive and significant at 1% level, suggesting that even if all the variables in the model were held

constant, growth would still occur . It showed that 0.0132% of variations in growth rate were due to other factors not included in the model.

The lagged GD showed the expected positive sign and was significant at 1% level. This shows that growth level in the previous period affects the current growth positively and that growth has its own momentum. It showed that 0.985% increase in growth would be due to its own momentum.

The lagged budget deficits were found to have unexpected positive impact on growth of Kenyan economy at 1% level of significance. It shows that 1% increase in budget deficits contributes 0.013170% positive change in the growth of an economy. This indicates that the expenditure that surpassed the revenue could have been put on productive ventures. This finding is consistent with the outcome of the studies that were carried out by Baldacci *et al* (2003), Carrere and Jaime (1987), and Landau (1983 &1986), Ram (1986), Aschauer (1989), Easterly and Rebello (1993), Adam and Bevan (2001), Alam *et al* (2010) and McCandnless (1991). These studies found positive correlation between budget deficits and economic growth rates in agreement with the previous level of budget deficits assuming the expenditure was on infrastructural development and hence crowd-in private sector development that further boosts economic growth. This finding contrasts those of Fisher (1991), and Nelson (1994) that showed a negative relationship between budget deficits and economic growth. They looked at its impact in making loanable funds scarce leading to high interest rates on loans making it hard to invest hence reduced economic growth. However, most of these studies used cross sectional data which ignores country specific uniqueness. The current study has used time series data specific for Kenya and

the most recent econometric techniques like co-integration, error correction and longer sample period that ensure the reliability and validity of data for forecasting and policy formulation.

The inflation rate (IN) that was used to measure the macroeconomic stability of the country further was found to be insignificant and was dropped from the parsimonious model. However, the lagged value of inflation showed the expected negative sign and was found to be significant at 1% level. The regression results show that 1% increase in inflation contributing to 0.000621% decline in growth rate. This could be a case of hyperinflation (above 10%) that raises the interest rate on loanable funds, thereby reducing the demand for investment funds and contributes negatively to the growth of an economy. However, some optimal level of inflation can help spur economic growth especially mild or creeping inflation rate of less than 6% (Dwyer, 1982).

The current level of private investment (PI) was found to have a positive impact on economic growth and was significant at 1% level. This means that 1% increase in private investment increases economic growth by 0.04574%. The previous value of private investment PI (-1) was also found to be significant at 1% level. It showed that 1% increase in previous level of investment would increase current growth by 0.0421%. This supports Keynesians proposition that investment creates positive multiplier hence increased national income. The finding also supports the outcome of the study by Alam *et al* (2010). This could imply that the current investments could be on infrastructure whose impact is felt with a lag and has long gestation period.

The current exchange rate (FE) exhibited a negative sign as was expected and was significant at 1% level. The result indicates that 1% increase in exchange rate contributes to 0.023% decline in

growth rate. In addition, the lagged exchange rate exhibited a negative sign and was also significant at 1% level, showing that 1% increase in exchange rate contributes 0.034% decline in economic growth. The negative relationships were suspect of devaluation of domestic currency, thereby making importation of intermediate products expensive or unaffordable by the investors. On the other hand, devaluation policy aimed at promoting exports that have multiplier effect could help promote economic growth and in the long run reduce budget deficits.

The regression results also showed that the current labour force that was proxied by population (POP) positively affects economic growth rate and was significant at1% level. It indicates that 1% increase in labour-force contributes 0.1574% increase in economic growth. This was an expected sign since economic theory postulates a positive relationship between current labour (POP) and economic growth, labour being a factor of production. It indicated that Kenya's labour-force is productive hence positively affects economic growth. Further, the lagged value of population exhibited the expected positive sign and was significant at 1% level. It shows that 1% increase in labour-force contributes 0.1457% increase in the growth rate. This shows that labour-force contributes positively to economic growth with a lag. The results attest to the fact that developing economies like Kenya are trying to close their human resource gap through improved skills development and also hires foreign expatriates in very needy areas like infrastructural developments.

The dummy variable (DV) that represented structural adjustment program (SAPs), exhibited a positive sign and was significant at 1% level. This indicates that the reforms so far undertaken by the government, such as civil service reform and economic liberalisation, have positively contributed to Kenya's economic growth. The regression result indicates that 1% increase in the implementation of SAPs, leads to 0.00169% increase in growth rate. This is an indication that

implementation of SAPs have yielded fruits of economic growth and are therefore in the right direction.

The lagged residual (the coefficient of ECT) was found to be significant at 1% level and exhibited the expected negative sign. This further confirmed that the model was well specified and also validated the use of the error correction method (ECT). It supported the fact that budget deficits positively stimulates economic growth with one period lag and that there was speed of adjustment of about 0.9858% of variables towards their long-run relationship and further suggested that the variables in the model are co-integrated. It validated that there exist convergence to achieve long run equilibrium.

The R^2 of the regression showed that most of the variables in the model explain 99% of variation in the growth of Kenya's economy. This is supported by the F-Statistics of 336.6948 and F-Probability of 0.000000 that was significant at 1% level, confirming the overall significance of the model.

The diagnostic tests performed showed that the model was quite satisfactory, capable and adequately explains the salient features of the data and therefore consistent with the main implication of economic theory, attesting to the outcome of the robust results. From the results, it can be generally concluded that budget deficits has been contributing factor in promoting growth (Keynesians view), by crowding in private sector since the study found the previous level of budget deficit to be significant at 1% level and that it positively affect economic growth.

4.2. The Impact of Budget Deficits on Private Investment in Kenya

The private investment model aimed at unraveling the impact of budget deficits on private sector investment. First, the covariance analysis results are presented then followed by multivariate regression results on which the policy implications are based. It helps in determining the direction of relationship between private investment and budget deficits.

4.2.1: Correlation of Private Investment with its Regressors

From Table 4.3, the association between current private investment and budget deficits, r=0.19 (p=0.0018) is weak though significant at 99% confidence level. The finding supports those of Blejer and Khan (1984), Bahmani (1999). However, the finding by Wachira (1991) was at variance since it revealed negative relationship between private investment and budget deficits.

Table 4.3: Correlation of Private Investment with its Regressors

Correlation Probability	DLNPI	DLNBD2	DDLNFE	DLNFE	DDLNIN	DLNIN	DLNNS	DDLNNS	DDLNPI
DLNPI	1.000000								

DLNBD	0.192043	1.000000							
	0.0018	-----							
DDLNFE	0.146679	-0.243660	1.000000						
	0.0363	0.1521	-----						
DLNFE	-0.253080	-0.154288	0.621583	1.000000					
	0.0064	0.0689	0.0001	-----					
DDLNIN	-0.275324	0.123233	-0.051824	0.052448	1.000000				
	0.1041	0.4740	0.0130	0.7613	-----				
DLNIN	-0.264585	0.135620	-0.158825	0.048951	0.822972	1.000000			
	0.0189	0.2303	0.0049	0.4568	0.0000	-----			
DLNNS	0.203999	0.020659	-0.132885	-0.193381	0.132276	0.206831	1.000000		
	0.0127	0.9048	0.0398	0.2585	0.4419	0.2262	-----		
DDLNNS	-0.017436	0.070547	-0.060141	0.042121	0.317023	0.400118	0.793403	1.000000	
	0.0096	0.6826	0.0275	0.8073	0.0596	0.0156	0.0000	-----	
DDLNPI	0.577048	-0.259641	-0.161142	-0.038189	-0.426707	-0.306887	0.070166	0.034795	1.000000
	0.0002	0.1262	0.0478	0.8250	0.0095	0.0687	0.6843	0.8403	-----

Source: Data Analysis (2014)

The association between private investment and current exchange rates, r=-0.25 (p=0.006), was negative though significant, while the relationship between private investment and lagged foreign exchange rate showed unexpected positive sign, r=0.14 (p=0.04). The association between private investment and current inflation rate, r=-0.26 (p=0.02) was negative and significant but was not strong. Also, the association between private investment and lagged inflation rate, r= 0.20 (p=0.01), was negative, not significant and also weak.

Lastly, the association between private investment and current national saving, r=0.20 (p=0.01), was positive and significant. On the other hand, association between private investment and lagged national savings r=0.02 (p=0.01), exhibited unexpected negative sign and was significant but weak.

From the correlation matrix, the direction of relationship between private investment and budget deficits has been established to be positive in congruent with study by Blejer and Khan (1984) and Bahmani and Koussey (1999). On the other hand the finding contradicts that of Wachira (1991), who found negative relationship between budget deficits and private investment, hence supports crowding-out hypothesis.

4.2.2: Discussion of Multivariate Dynamic Private Investment Model

The model aimed testing the crowding in or out effect of budget deficit on private sector investment in Kenya, to help come up with relevant policies regarding the nexus between private sector investment and the level of budget deficit. Table 4.4 reports the parsimonious model (Appendix 18). The error correction model was formulated using residual from static model (Appendix 16). The static model has a negative Adjusted R-square since it was regressed using untransformed data (data in levels). The residual from the static model was tested for stationarity (Appendix19) and used in formulating one period lagged error correction term (ECT-1) that was included in the over parameterized model (Appendix17). From over parameterized model results, a parsimonious model (Appendix 18) results (error correction model results) were generated that depict the best fitted results for the dynamic specification and policy formulation.

Table 4.4: Multivariate Dynamic Private Investment Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.106589	0.010871	9.804780	0.0000
DLNBD	0.008304	0.003638	2.282702	0.0309
DLNFE(-1)	0.232903	0.045755	5.090174	0.0000
DLNFE	-0.235131	0.055621	-4.227388	0.0003
DLNIN(-1)	0.047529	0.006449	7.369471	0.0000
DLNIN	-0.045383	0.010364	-4.378975	0.0002
DLNNS(-1)	-0.197249	0.037587	-5.247752	0.0000
DLNNS	0.201577	0.057991	3.476022	0.0018
DLNPI(-1)	1.089073	0.050442	21.59081	0.0000
ECT(-1)	-1.050084	0.055911	-18.78128	0.0000

R-squared	0.963281	Mean dependent var	0.119874
Adjusted R-squared	0.950571	S.D. dependent var	0.129154
S.E. of regression	0.028714	Akaike info criterion	-4.032705
Sum squared resid	0.021437	Schwarz criterion	-3.592838
Log likelihood	82.58869	Hannan-Quinn criter.	-3.879180
F-statistic	75.78749	Durbin-Watson stat	2.101000
Prob(F-statistic)	0.000000		

Source: E-Views Regression

The private investment regression results in Table 4.4 were summarised as in equation 4.2 (standard errors in parenthesis):

$$LNPI_t = \underset{(0.0109)}{0.1066} + \underset{(0.0036)}{0.0083}\,DLNBD_t + \underset{(0.0458)}{0.2329}\,LNFE_{t-1} - \underset{(0.5562)}{0.2351}\,LNFE_t + \underset{(0.0104)}{0.0454}\,LNIN_{t-1}$$
$$- \underset{(0.0376)}{0.1972}\,LNNS_{t-1} + \underset{(0.0580)}{0.2016}\,LNNS_t + \underset{(0.0504)}{1.0891}\,LNPI_{t-1} - \underset{(0.0560)}{1.0500}\,ECT_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.2)$$

The constant term showed a positive sign and was significant at 1% level indicating that private investment increases by 0.16664% due to other factors apart from the variable in the regression model. This could include other public expenditures incurred by the government such as those on infrastructure and social security not included in the model.

The lagged private investment PI (-1) showed the expected positive sign and was significant at 1% level. This shows that private investment in the previous period affects the current private investment positively and had its own momentum, indicating that 1.0891% increase in private investment was due to its own momentum.

The current budget deficits were found to have a positive effect on private investment at 5% significance level. It indicates that 1% increase in budget deficit increases private investment by 0.0083%. This suggested that budget deficits crowd in private sector investment and that the government is not borrowing heavily domestically from financial institutions leaving interest rates on loanable funds low and affordable to private investors. Alternatively, the excess government expenditure could be on infrastructural developments that create an enabling environment for the development of private investment hence economic growth. However, the previous level of budget deficit was found to be insignificant and was dropped from the parsimonious private investment model. The findings of current study are in congruence with the outcome of the study carried out by Blejer and Khan (1984), Bahmani (1999), and Kouassy (1993) that indicated the crowding in effect of budget deficits on private sector investment. They found that public sector can be complementary to private sector investment especially if the investment is on infrastructure. On the other hand, a study by Wachira (1991), contrasts the outcome of the current study by supporting crowd out hypothesis since he identified some

elements of public expenditure crowding out private sector investment by making borrowing expensive in terms of high interest rates and also due to the fact that the public sector competes with the private sector over the scarce resources or produce marketable output which competes with private sector output. This outcome corroborates the negative relationship that was found between growth and budget deficits although it was not significant. Since the impact of lagged budget deficit on economic growth was found to be significantly crowding-out private sector investment but was insignificant, it was dropped from the model.

Inflation which measures macroeconomic stability was found to be negatively associated with private investment since it makes borrowing to be expensive for investors. It was found to be significant at 1% level and shows that 1% increase in inflation rate would reduce private investment by 0.0454%. This kind of result was expected because inflation in Kenya has been skyrocketing and has been a threat to both domestic and international investors and a manifest of a degenerating economic growth. The lagged inflation rate, however, had a positive effect on economic growth. This suggests that it could be creeping or mild inflation which induces production and growth in an economy. The result is not consistent with theory since an increase in the inflation rate results in the central bank increasing the interest rates to reduce inflationary pressures thereby discouraging private investment. As a variable, it is also influenced by government spending and can be considered as an indicator of government efficiency. High and unpredictable inflation also distorts the information content of relative prices and increases the riskiness of longer time investment which discourages potential investors. This result corroborates the findings of Green and Villanueva (1991) which indicates that a higher inflation rate had a negative impact on private investment for 23 developing countries in their pooled time

series cross sectional study. However, the current study uses time series data and recent econometric method of error correction and co integration.

The level of national saving was found to positively contribute to private sector investment, in contrast to Keynesian principle that savings is a leakage out of the economy and does not add to the circular flow of income hence does not create a multiplier effect in the economy that would further spur investment level. It revealed that 1% increase in national saving would increase private investment by 0.20158%. This could be viewed as a way of enabling private investors to access loans from banks at affordable interest rates since they may not be crowded-out by public sector investment. On the other hand, previous national savings level was found to exhibit the expected negative sign according to Keynes proposition and was significant at 1% level. It showed that 1% increase in previous national savings level would reduce current private investment level by 0.1972%, supporting Keynes (1936) assertion that being a leakage from the circular flow of income in both closed and open economy, savings affect aggregate consumption hence does not support the argument for accelerator principle of investment.

Foreign exchange rates that show the openness of the economy was found to be negatively related to private sector investment. This could be supported by rising inflation level that renders our currency valueless against foreign currencies, making it expensive to import intermediate investment goods into the country. The regression result reveals that 1% increase in foreign exchange reduces private investment by 0.235% and found to be significant at 1% level. The previous level of foreign exchange, however, revealed an unexpected positive impact on private investment and was significant at 1%, indicating that 1% increase in previous foreign exchange would increase private investment by 0.2329%. This could be possible in the case of foreign

direct investment since depreciation of our currency makes it attractive for foreign investors to troop in and invest in our economy.

The lagged residual (ECT) was found to be significant at 1% level and exhibited the expected negative sign. This further confirmed that the model was well specified and also validated the use of the error correction method (ECT). It supported the fact that budget deficits crowd-out private investment and that there was speed of adjustment of about 1.0891% of variables towards their long-run relationships and also suggested that the variables in the model are co-integrated.

The R^2 of the regression showed that most of the variables in the model explain 96% of variation in the growth of Kenya's economy. This is supported by the F-Statistics of 75.7875 and F-Probability of 0.000000 that was significant at 1% level thereby confirming the overall significance of the model. The Durbin-Watson statistic was found to be 2.1 close to the required level of 2.0, a sign of lack of autocorrelation.

The diagnostic tests performed showed that the model was quite satisfactory, capable and adequately explains the salient features of the data and therefore consistent with the main implication of economic theory, attesting to the outcome of the robust results. From the results obtained, it can generally be concluded that budget deficits have been contributory factors in spurring private investment positively by crowding-in private investment through the provision of required infrastructure.

From the private investment model, the current study reveals that budget deficits help spur performance of private investment (crowds-in), especially if expenditure promotes capital formation and creates enabling environment for private sector in terms of appropriate infrastructural development.

4.3: The Main Determinants of Budget Deficits in Kenya

The results of covariance analysis between budget deficits and the regressors are first discussed followed by the results of the multivariate regression, the basis on which policy implications are derived.

4.3.1: The Correlation of Budget Deficits with its Regressors.

The multivariate analysis results are presented on table 4.6. It presents the main determinants of budget deficits that would be crucial in identifying the policy variables that affect the budget deficits level in Kenya.

Table 4.5: Correlations of Budget Deficits with its Regressors

Correlation Probability	DLNBD	DLNFE	DLNGDP	DDLNIN	DLNIN	DTOT
DLNBD	1.000000 -----					
DLNFE	0.154288 0.3689	1.000000 -----				
DLNGDP	-0.038925 0.8217	0.132602 0.4407	1.000000 -----			
DDLNIN	0.123233 0.4740	0.052448 0.7613	0.141337 0.4109	1.000000 -----		
DLNIN	0.135620 0.4303	0.048951 0.7768	0.187147 0.2744	0.822972 0.0000	1.000000 -----	
DTOT	0.235098 0.1675	-0.401940 0.0151	-0.204303 0.2320	0.178083 0.2987	0.156896 0.3608	1.000000 -----

Source: E-Views Computation

From table 4.5, the association between budget deficits and foreign exchange rates, r=0.154 (p=0.37); budget deficits and gross domestic growth, r=-0.039 (p=0.82); budget deficits and inflation rates, r= 0.14 (p=0.43) and budget deficits and terms of trade, r=0.24 (p=0.17), exits as theory postulates but are insignificant. This indicates that some other variables might be

influencing the association between the variables (Maddala, 2005). This necessities further analysis (multivariate) with all variables jointly affecting budget deficits in Kenya.

4.3.2 Discussion of Multivariate Dynamic Budget Deficits Model

This was conducted to find out the main determinants of budget deficits in Kenya on the basis of literature reviewed t o help guide appropriate fiscal policy. Table 4.6 reports the parsimonious model (appendix 26). The error correction model was formulated using residual from static model (appendix 24). The static model has a negative Adjusted R-square since it was regressed using untransformed data (data in levels). The residual from the static model was tested for stationarity (appendix) used in formulating one period lagged error correction term (ECT-1) that was included in the over parameterised model (appendix 25). From over parameterized model results, a parsimonious model (appendix 26) results (error correction model results) were generated that depict the best fitted results for the dynamic specification and policy formulation.

Table 4.6 Multivariate Dynamic Budget Deficits Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383803	0.123135	3.116931	0.0042
DLNBD(-1)	0.947316	0.033647	28.15418	0.0000
DLNFE	1.602995	0.425214	3.769858	0.0008
DLNGDP	-0.847863	0.767016	-1.105405	0.2784
DLNIN(-1)	0.171392	0.057394	2.986226	0.0058
DLNIN	0.164798	0.094234	1.748822	0.0913
DTOT	0.266263	0.077641	3.429402	0.0019
ECT(-1)	-0.915044	0.055121	-16.60057	0.0000

R-squared	0.971514	Mean dependent var	0.114421
Adjusted R-squared	0.964393	S.D. dependent var	1.482142
S.E. of regression	0.279677	Akaike info criterion	0.482768
Sum squared resid	2.190140	Schwarz criterion	0.834661
Log likelihood	-0.689828	Hannan-Quinn criter.	0.605588
F-statistic	136.4223	Durbin-Watson stat	2.023468
Prob(F-statistic)	0.000000		

Source: Data Analysis (2014)

The regression results from a parsimonious (short-run or dynamic) Budget Deficits model, in Table 4.24 were summarized as in equation 4.3 (Standard Error in Parenthesis).

$$DLNBD = \underset{(0.123)}{0.383803} + \underset{(0.034)}{0.9473} DLNBD_{t-1} + \underset{(0.425)}{1.6030} DLNFE - \underset{(0.767)}{0.8479}\, DLNGDP +$$

$$\underset{(0.057)}{0.1714} DLNIN_{t-1} + \underset{(0.094)}{0.1648} DLNIN + \underset{(0.078)}{0.2663} DTOT - \underset{(0.055)}{0.9150} ECT_{t-1} \quad \text{.....(4.3)}$$

The constant term showed a positive sign and was significant at 1% level indicating that budget deficit (BD) increases by 0.384% due to other factors apart from the variable in the regression model. This could include other variables not included in the model. The lagged budget deficit was found to be positively related to the current budget deficit level and was significant at 1% level, indicating that deficit has its own momentum.

The study found a positive relationship between budget deficits and current exchange rate at 1% level of significance. It shows that 1% increase in current exchange rate would increase current budget deficit by 1.603%. This would result in depreciation of the Kenya shillings making it expensive to service debts and also pay for imported intermediate goods. It also shows that exchange rate volatility contributes to unstable and unsustainable budget deficits in an economy like Kenya. This finding supports the outcome of the study that was done by Egwaikhede et al (1994) that exchange rate depreciation can be inflationary as it works via its direct effect on inflation and through budgetary and monetary effects hence the rise in budget deficits in an economy. However, the finding by Hakkio (1996) that foreign exchange affect current budget

deficits contradicts the finding of this study. It shows a case of appreciating exchange rate that makes domestic currency stronger than foreign currency.

The lagged inflation was found to impact positively on budget deficits and was significant at 5% level. It was found that 1% increase in inflation increases budget deficits by 0.171%. This is because during inflation more revenue is required to maintain previous expenditure and this would widen the deficit gap tremendously. The finding supports the study by Kouassy (1996), Oladipo and Akinbobola (2011), Sill (2004), Chimobi and Igwe (2010) and Ssejjaaka and Kasekende (1996) that inflation affects budget deficit positively. They have supported the proposition that the central bank would be obliged to monetize deficit either now or at later periods thereby resulting in the increase in money supply and the rate of inflation, at least in the long run period. However, the inflationary effect of government deficits depends upon the means by which the deficit is financed and the impact of that on aggregate demand.

Terms of trade that measure the openness of an economy was found to positively affect budget deficits and was significant at 5% level, showing that a 1% increase in terms of trade decreases budget deficits by 0.02663%. This was expected in a developing economy like Kenya. Most developing economies export unprocessed or raw materials that command low revenue that may not help finance their ever expanding expenditure on intermediate goods and services needed for furthering production. Such unprocessed goods do not compete favorably in the world market hence earn less revenue from exports that cannot finance the required intermediate products from abroad. The lagged terms of trade also exhibited an expected positive sign and were significant at 1% level, showing Kenya's unfavorable terms of trade as compared to her trading partners, especially developed nations. The trade openness increases a country's exposure to external

shocks regardless of whether this is due to natural openness or trade-policy induced openness. This in turn tends to reinforce the adverse impact of terms of trade instability

The Error correction term (ECT) was found to be significant at 1% level and exhibited the expected negative sign. This further confirmed that the model was well specified and also validated the use of the error correction method (ECT). It supported the fact that the budget deficit in Kenya is affected by the variables in the model and that there was speed of adjustment of about 92% of previous disequilibrium towards their long run relationship.

The R^2 of the regression showed that most of the variables in the model explain 97% of variation in the growth of Kenya's economy. This is supported by the F-Statistics of 136.422 and F-Probability of 0.000000 that was significant at 1% level, confirming the overall significance of the model. The Durbin-Watson statistic was found to be the recommended level of 2.0, showing lack of autocorrelation.

The diagnostic tests performed showed that the model was quite satisfactory, capable and adequately explains the salient features of the data and therefore consistent with the main implication of economic theory, attesting to the outcome of the robust results. From the results obtained, it can be generally concluded that inflation rate, exchange rate, terms of trade and growth rates contribute to persistent budget deficits in Kenya.

4.4 The Relevance of Ricardian Equivalence Hypothesis in Kenya

This model aimed at establishing the relevance of the Ricardian Equivalence Hypotheses (REH) for Kenya, especially through the impact of budget deficits on national saving. It incorporates

some policy variables that affect national savings of a country. Table 4.8 summarises the regression results of the national savings model.

4.4.1: Correlation of National Savings and other Regressors

The results of covariance analysis between national savings and the regressors are first discussed followed by the results of the multivariate regression, the basis on which policy implications are derived.

Table 4.7: Correlation of National Savings with its Regressors

Correlation Probability	DLNNS	DDLNIN	DLNIN	DLNBD2	DDLNGDP	DLNGDP	DDLNIR	DDLNNS
DLNNS	1.000000 -----							
DDLNIN	-0.132276 0.0419	1.000000 -----						
DLNIN	-0.206831 0.0062	0.822972 0.0000	1.000000 -----					
DLNBD	-0.020659 0.0048	0.123233 0.0740	0.135620 0.4303	1.000000 -----				
DDLNGDP	0.035983 0.0050	0.216045 0.0057	0.151694 0.3771	-0.107754 0.5316	1.000000 -----			
DLNGDP	0.081488 0.0366	0.141337 0.4109	0.187147 0.2744	-0.038925 0.8217	0.595063 0.0001	1.000000 -----		
DDLNIR	0.014077 0.0051	-0.409774 0.0131	-0.159151 0.0539	0.223656 0.1898	-0.458222 0.0049	-0.208862 0.2215	1.000000 -----	
DDLNNS	0.793403 0.0000	0.317023 0.0596	0.400118 0.0156	0.070547 0.6826	-0.083978 0.6263	-0.094792 0.5824	-0.048479 0.7789	1.000000 -----

Source: Data Analysis (2410)

From Table 4.7, the association between national savings and current inflation, r=-0.21 (p=0.00) is negative as theory postulates and significant at 1% level but weak. Also, the association

between national saving and lagged inflation, r=-0.13 (p=0.04) is negative and significant at 5% level but also weak.

The association of current budget deficits and savings, r=-0.02 (p=0.000) is negative and significant at 1% but very weak. This conforms to findings of previous scholars (Barro, 1992, Koedjik, 1994 and Sala-i-Martin) who rejected Ricardian Equivalence Hypothesis). The finding is at variant with those of Lopez, 2000 and Eisner, 1994) that supported the relevance of Ricardian Equivalance Hypothesis.

The association between both current and lagged gross domestic growth rates and national savings, r=0.08 (p=0.03) and r=0.04 (p=0.01) respectively was positive as theory postulates and significant at 5% and 1% respectively but very weak.

Lastly, the association between current interest rate and national saving, r=0.01 (p=0.01) was positive but very. The above analysis aimed at determining the direction of association between national savings and its regressors pair wise and therefore, further analysis (multivariate) with all variables jointly affecting national saving on which the policy formulation relies is necessary.

4.4.2 Discussion of Multivariate National Savings Model

The national savings model aimed at testing the relevance of Ricardian Equivalence Hypothesis in Kenya. Table 4.8 reports the regression results. The error correction model was formulated using residual from static model (Appendix 20). The static model has a negative Adjusted R-square since it was regressed using untransformed data (data in levels). The residual from the static model was tested for stationarity (Appendix 23) and used in formulating one period lagged error correction term (ECT-1) that was included in the over parameterised model (Appendix 21). From over parameterized model results, a parsimonious model (Appendix 22) results (error

correction model results) were generated that depict the best fitted results for the dynamic specification and policy formulation as shown in Table 4.8.

Table 4.8 Multivariate Dynamic Savings Model Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.175010	0.014439	12.12098	0.0000
DLNIN(-1)	-0.043937	0.007463	-5.887122	0.0000
DLNIN	-0.034587	0.011665	-2.964953	0.0063
DLNBD	-0.008703	0.003626	-2.400174	0.0177
DLNGDP(-1)	0.337994	0.084521	3.998930	0.0004
DLNGDP	0.288978	0.100255	2.882421	0.0076
DLNIR(-1)	0.013505	0.005139	2.628009	0.0140
DLNNS(-1)	0.949347	0.033608	28.24803	0.0000
ECM(-1)	-0.931551	0.055929	-16.65584	0.0000

R-squared	0.971034	Mean dependent var	0.132388
Adjusted R-squared	0.962452	S.D. dependent var	0.154934
S.E. of regression	0.030022	Akaike info criterion	-3.961444
Sum squared resid	0.024336	Schwarz criterion	-3.565565
Log likelihood	80.30600	Hannan-Quinn criter.	-3.823272
F-statistic	113.1418	Durbin-Watson stat	1.988674
Prob(F-statistic)	0.000000		

Source: Data Analysis (2014)

The results from the dynamic model, shown in Table 4.8 were summarized as in equation 4.4 (standard errors in parenthesis):

$$LNNS = \underset{(0.0144)}{0.1750} - \underset{(0.0075)}{0.0439}DLNIN_{t-1} - \underset{(0.0117)}{0.0345}LNIN - 0.0087\,DLNBD + \underset{(0.0845)}{0.3378}DLNGDP_{t-1} +$$
$$\underset{(0.1003)}{0.28898}DLNGDP + \underset{(0.0051)}{0.0135}DLNIR_{t-1} + \underset{(0.0336)}{0.9493}\,DLNNS_{t-1} - \underset{(0.0559)}{0.9315}\,ECT_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots (4.4)$$

The results show that previous level of savings affect current savings positively and were found to be significant at 1% level (99% confidence level). This shows that 1% increase in previous

level of savings would increase current savings by 0.95%. It further shows that the savings level has its own momentum.

Budget deficit that was meant to test the Ricardian Equivalence Hypothesis was found to be negatively related to national savings and was significant at 5% level (95% confidence level). It shows that 1% increase in budget deficits reduces savings by 0.0087%. This meant a collapse of the Ricardian Equivalence Hypothesis that proposes neutrality of budget deficits on saving, implying that the government has to borrow to finance her developmental expenditure and hence no surplus income to save and at the same time the consumers are myopic and do not worry about the future consumption being determined by present savings as the proponents of Ricardian hypothesis envisage (Barrow, 1974). This finding supports the outcome of the study by Rafael *et al* (1997), Salai-i-Martin (1991), Koedijk *et al* (1994) and Masson *et al* (1995), that found the Ricardian Equivalence Hypothesis not relevant especially in developing economies like Kenya. However, the finding did not support the studies that were carried out by Lopez (2000), Wheeler (1999) and Barro (1974) that found Ricardian Equivalence Hypothesis to be relevant and that consumers being foresighted would save to smoothen their consumption in the future.. The study reveals that most Kenyans are myopic regarding savings which should help smooth their consumption level in the long run.

Inflation rate was found to affect national savings negatively as was expected and was significant at 1% level (99% confidence level). Showing that 1% increase in inflation would decrease savings by 0.044%. The previous level of inflation also exhibited the expected negative sign, indicating that 1% increase in previous level of inflation would decrease current national savings

by 0.035%. During inflation, people would prefer to hold asset portfolio so as to avoid the devaluation of their money and maintain the value of their wealth.

Interest rate on savings was found to have a positive effect on current level of savings. It shows that the opportunity cost of holding money, the speculative demand for money as was postulated by Keynes (1936) is confirmed by this result. This was found to be significant at 1% level, indicating that a 1% increase in interest rate would increase savings level by 0.088%. The previous level of interest rate was also found to impact positively on current savings and was significant at 1% level (99% confidence level), indicating that 1% increase in interest rate would increase savings by 0.0135%. However, conventional wisdom holds that budget deficits raise interest rates for two reasons. First, if budget deficits depress saving, then interest rates must rise to bring saving and investment back to balance or equilibrium. Second, if budget deficits stimulate aggregate demand, then transaction demand for money may rise. With a fixed stock of money, higher interest rates are necessary to choke off the excess desire for liquidity. Since both requests can occur only if individuals perceive government bond to be net wealth, these observations suggest a test of Ricardian Equivalence Hypothesis. From the positive coefficient of interest rate one might conclude that consumers perceive some fraction of government bonds to be net wealth, but one cannot estimate this fraction. If the coefficient is not significantly different from zero, (Dwyer 1982, Evans (1985, 1987), one cannot reject Ricardian Equivalence, but one also cannot determine whether the estimates are inconsistent with any other conceivable hypothesis of interest.

They have provided evidence suggesting that government budget deficits have no significant effect on interest rates hence support Ricardian Equivalence Hypothesis. In contrast, Felstein

(1980), Allen (1990), Cebula (1991), Liargovas *et al* (1997) and Knot and de Haan (1999) have found that government budget deficits cause high interest rates due to the fear that government debt may crowd out private investment hence reject Ricardian Equivalence Hypothesis, in tandem with the present study. However, these studies were done in the context of developed nations leaving room to test the case of a developing economy like Kenya.

The growth rate was found to be positively related to national savings and was significant at 1% level (99% confidence level) showing that 1% increase in growth rate would increase national savings by 0.290%. This was expected since positive growth would mean more income which according to Keynes would increase savings and consumption level in the economy and further create a positive multiplier effect. The lagged value of growth rate also showed the expected positive sign and was significant at 1% level (99% confidence level). It showed that 1% increase in growth rate increases national savings by 0.348% and would bolster future investment in the economy. In the Keynesian's view, however, saving is a leakage in the economy and would reduce income into the circular flow and therefore in an economy where savings is significant, economic activities are not vibrant because current investment level is postponed and the time value of money overlooked.

The error correction term (ECT) was found to be significant at 1% level and exhibited the expected negative sign. This further confirmed that the model was well specified and also validated the use of the error correction method (ECM). It supported the fact that there is a positive relationship between budget deficits and national savings and that there was speed of adjustment of about 93% of variables towards their long-run relationship. It also suggested that the variables in the model were co-integrated (have long run relationship).

The R^2 of the regression showed that most of the variables in the model explain 92% of variation in the growth of Kenya's economy. This is supported by the F-Statistics of 469.0012 and F-Probability of 0.000000 that was significant at 1% level, confirming the overall significance of the model. The Durbin-Watson statistic was found to be 2.104 which is not far from the recommended level of 2.0, a sign of lack of autocorrelation.

The diagnostic tests performed showed that the model was quite satisfactory, capable and adequately explains the salient features of the data and therefore consistent with the main implication of economic theory, attesting to the outcome of the robust results. From the results, it can generally be concluded that budget deficits have been contributing negatively to national savings in Kenya hence the collapse of Ricardian Equivalent Hypothesis.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter is devoted to summary, conclusions derived from the empirical findings of the study, the policy recommendations, study contribution, limitations and suggestion for further research. It is worth noting that the conclusions and recommendations are based on the specific objectives.

5.1: Summary of Findings

Objective one sought to determine the relationship between economic growth and fiscal deficits using annual time series secondary data (1970-2012. It was found that budget deficits affect economic growth positively with one period lag. Both lagged and current exchange rates were found to have a negative effect on economic growth, the growth level in the previous period affects the current growth positively, inflation rate affect economic growth negatively with a one period lag, both current and lagged private investment affects growth positively, both lagged and current population that proxied labour force affect economic growth positively and dummy variable that represented SAPs affect economic growth positively

Objective two aimed at determining the impact of budget deficits on private investment in Kenya. The result indicated a positive relationship between budget deficits and private investment in Kenya. Lagged foreign exchange affected private investment positively; current foreign exchange affected private investment negatively; lagged inflation affected private investment positively; current inflation affected private investment negatively; lagged national savings affected private investment negatively while current national savings affected private investment positively.

Objective three sought to determine the main determinants of budget deficits in Kenya. The results revealed that current foreign exchange rate affected budget deficits positively; economic growth affected budget deficits negatively; both lagged and current inflation affected budget deficits positively and terms of trade affected budget deficits negatively.

Objective four aimed at finding out the relevance of Ricardian Equivalence Hypothesis for Kenya by testing the impact of budget deficits on national savings. The results indicated a negative relationship. Both lagged and current inflation significantly affected national savings negatively; both lagged and current growth significantly affected national savings positively while interest rates affected national savings positively.

5.2 Conclusions

It can be concluded that budget deficits have been a contributory factor in promoting economic growth in Kenya with one period lag. This supports the Keynesian that budget deficits create positive multiplier effects that ultimately spurs economic growth.

The private investment model revealed crowding-in effect of budget deficits on economic growth, showing that budget deficits have been crucial and complementary in spurring private sector investment in Kenya.

It can also be concluded that the main determinants of budget deficits in Kenya are: foreign exchange rate, inflation and terms of trade. This is congruent to the studies that were reviewed regarding the causes of budget deficits.

Finally, the results failed to support Ricardian Equivalence Hypothesis that proposes neutrality of budget deficits on saving and is therefore not relevant for Kenya. Kenyans are myopic as regards savings.

5.3 Recommendations

Based on the findings of this study, the government should keep on running budget deficits as a way of spurring economic growth. The expenditure should not be spent on wrongly conceived projects and programs that could be deleterious to the economy.

Since the results supported crowding-in hypothesis, the government should support optimal level of budget deficits. This would crowd-in private investment, spur economic growth and make credit accessible to the private sector.

To ensure manageable foreign exchange rate, inflation rate and favorable terms of trade, the government should put in place prudent, sound and firm fiscal policy. This should be complimented with monetary adjustments within the wider context of overall macroeconomic sustainability.

Finally, the collapse of Recardian Equivalence Hypothesis (REH) calls for the government to create enabling macroeconomic environment that would encourage culture of savings. This would take cognisance of investment and economic growth.

5.4 The Limitations and Suggestions for Further Studies

5.4.1 Limitations of the Study

In carrying out this study, the main drawback was the unavailability of some data like labour force and capital that were proxied by population and capital formation respectively. The study was also limited to time series data and the econometric method of co-integration and error correction model.

5.4.2 Suggestions for Further Studies

A study on the impact of specific components of government expenditure like expenditure on military, education, health and social security and welfare and other variables on economic growth and development should be done by future researchers. This would ascertain Keynes' postulation that government expenditure positively spurs growth and development through the multiplier effect, thereby crowding-in private sector investment.

Finally, future researchers may try to investigate how macroeconomic variables would affect budget/fiscal deficit in the context of general equilibrium analysis rather than partial equilibrium framework of this study, and examine the interactions among budget/fiscal deficits and other macroeconomic variables. However, despite these suggestions, this study is not a panacea, but gives insight for further research and also forms a basis for policy formulation and design of pragmatic fiscal policies regarding budget deficits in Kenya.

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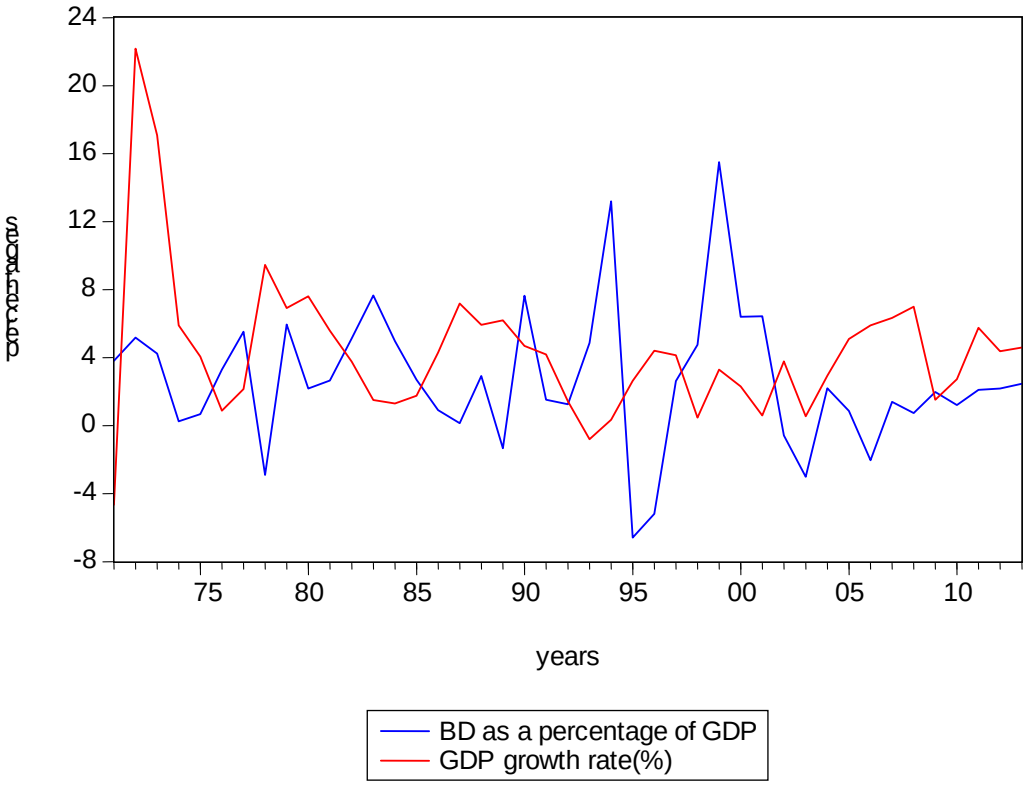
APPENDICES

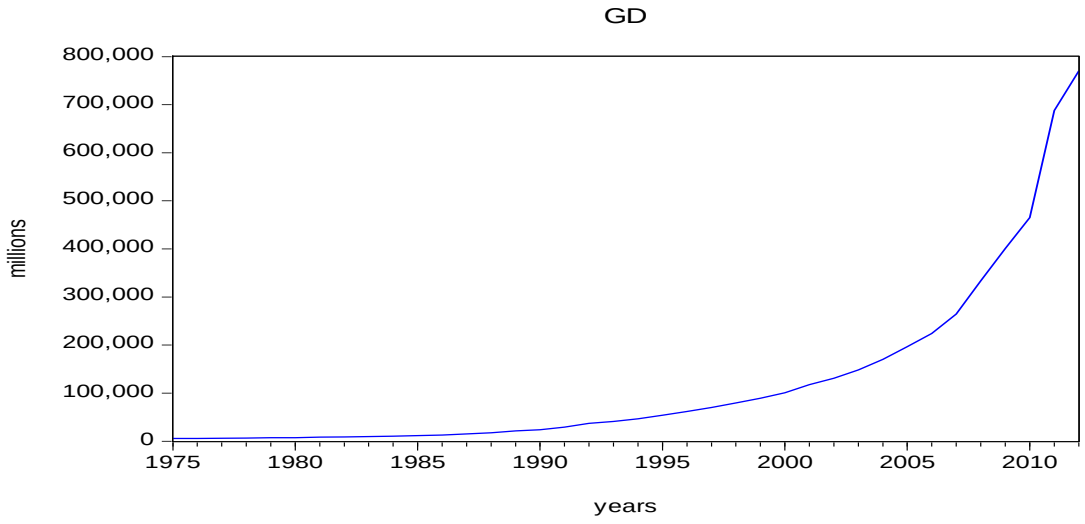
Appendix 1: Trend of Government Expenditure and Revenue and Budget Deficits (Figures in Million Kshs)

Year	Government Expenditure (GEXP)	Government Revenue (GREV)	Budget deficits	GDP growth rate (%)	GDP (LCU)	BD as a percentage of GDP
1975	6082	5292	790	0.882203	23934	3.300744
1976	7885	6280	1605	2.153965	29072	5.520776
1977	8037	9116	-1079	9.453798	37198	-2.90069
1978	12427	9988	2439	6.912494	40994.6	5.949564
1979	13078	12058	1020	7.615226	46604	2.188653
1980	15301	13868	1433	5.591976	53910	2.658134
1981	18251	15066	3185	3.773544	62016	5.135771
1982	21236	16646	5373	1.506478	70247.8	7.648638
1983	22019	18064	3955	1.30905	79592.2	4.96908
1984	22550	20138	2412	1.755217	89242.6	2.702745
1985	25165	24248	917	4.300562	100811.6	0.909618
1986	27978	27812	166	7.177555	117460.2	0.141324
1987	36209	32376	3833	5.937107	131155.8	2.922478
1988	36391	38372	-1981	6.203184	148283.8	-1.33595
1989	54132	41126	13006	4.690349	170404.1	7.632445
1990	51712	48723	2989	4.192051	196433.6	1.521634
1991	58745	55939	2806	1.438347	224230.1	1.251393
1992	82373	69521	12852	-0.79949	264471.9	4.859496
1993	150293	106267	44026	0.353197	333611.3	13.1968
1994	109093	135480	-26387	2.632785	400657.8	-6.58592
1995	138078	162203	-24125	4.406217	465250.7	-5.18538
1996	183592	165512	18080	4.146839	687998	2.627915
1997	183741	147083	36658	0.474902	770313	4.758845
1998	313430	181655	131775	3.290214	850808.2	15.48821
1999	251484	193474	58010	2.305389	906927.6	6.396321
2000	265432	203123	62309	0.599695	967836.9	6.437965
2001	188417	194363	-5946	3.779906	1020221	-0.58281
2002	196563	227613	-31050	0.54686	1035373	-2.99892
2003	213980	189062	24918	2.932476	1131782	2.201661
2004	265813	254696	11116	5.1043	1274329	0.872302
2005	257493	286394	-28901	5.906666	1415725	-2.04143
2006	320405	297785	22619	6.330633	1622567	1.394026
2007	357205	343533	13672	6.993285	1833513	0.745672
2008	450777	409027	41750	1.526949	2107460	1.981058
2009	493772	465270	28501	2.735286	2365453	1.204885
2010	571828	518218	53610	5.764827	2551161	2.101396
2011	682121	617120	65001	4.375934	2985879	2.176947
2012	833400	748827	84573	4.598046	3440115	

Appendix 2: Growth Rate and Budget Deficits as a Percentage of GDP

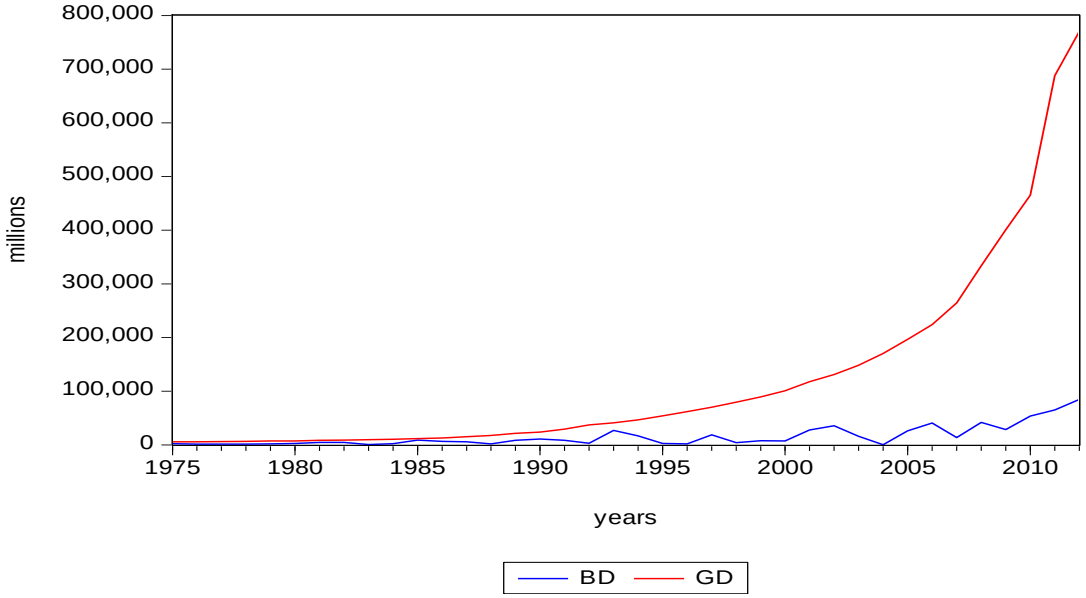


Appendix 3: Trend of GDP



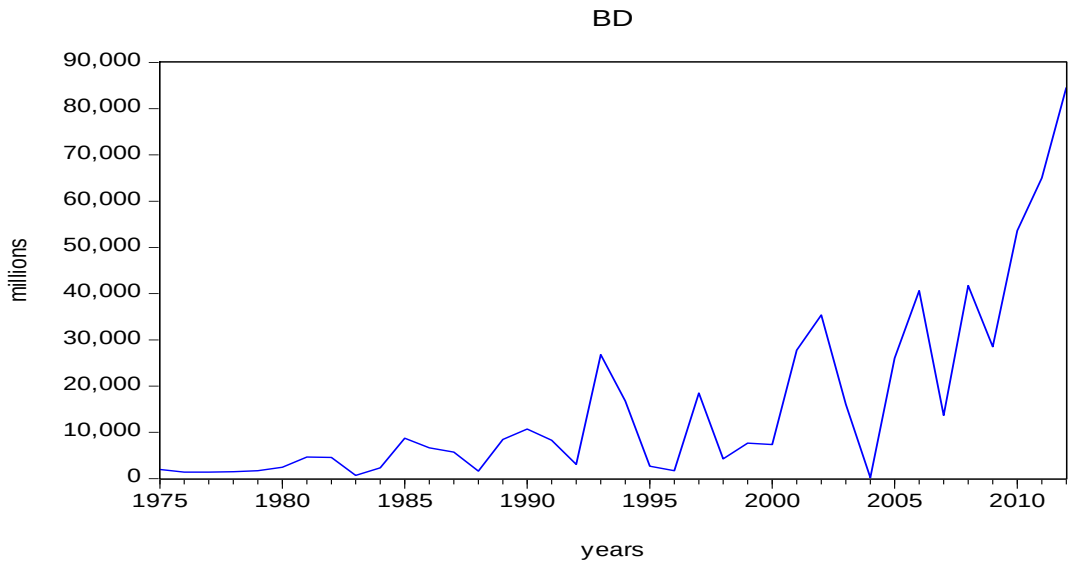
Source: Regression Data

Appendix 4: Budget Deficits and GDP Trend



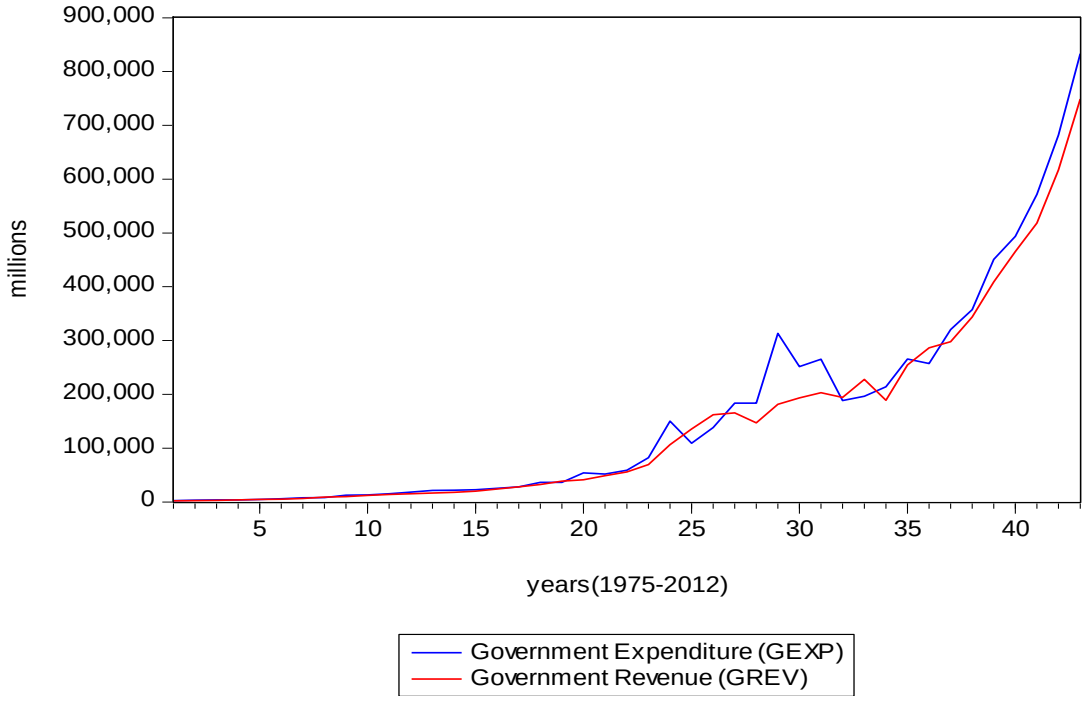
Source: Regression Data

Appendix 5: Trend of Budget Deficits



Source: Regression Data

Appendix 6: Trend of Government Expenditure and Revenue



Source: Regression Data

Appendix 7: Classical Regression Assumptions on the Error Term

As a matter of clarity, let it be assumed that there are two explanatory variables. The relationship is presented linearly as:

(i): $Y = XB + \varepsilon$

Xs are non-stochastic variables whose values are fixed and have full column rank. There is no multicollinearity and other columns cannot be formed from the existing ones, since this would not add any new information not contained in the design matrix. That is, COV $(e_i e_j) = 0$ for $i \neq j$

(ii) Expected value of the error term is zero, $E(e_i) = 0$

(1) There is no autocorrelation, which implies that the error terms for different time

period are not related. In essence there is no Heteroscedasticity. That is

$E(e_i e_s) = 0$, where $t \neq s$

(2) There is no contemporaneous correlation

(3) There is no Heteroscedasticity

(4) The random variable ε is normally and identically distributed with zero mean and variance

That is, $\varepsilon \approx NI\partial(0\sigma^2)$

Appendix 8: Formula for Coefficient of Determination (R^2)

$$R^2 = \frac{SSE}{TSS} = \frac{RSS}{TSS}$$

Where: SSE = Sum of Squares Errors

TSS = Total Sum of Squares

RSS = Regression Sum of Squares

Appendix 9: Order of Integration

Stationary versus Non Stationary Series

There are important differences between stationary and non stationary time series. Shocks to a stationary time series are necessarily temporary. Over time, the effects of the shocks will dissipate and the series will revert to its long-run mean level. As such, long-term forecasts of a stationary series exhibits mean reversion in that it fluctuates around a constant long-run mean, has finite variance that is time-invariant and has a theoretical correlogram that diminishes as lag length increases. On the other hand, a non stationary series necessarily has permanent components. The mean and/or variance of a non-stationary series are time dependent. There is no long-run mean to which the series returns, the variance is time-dependent and goes to infinity as

time approaches infinity and theoretical autocorrelations do not decay but, in finite samples, the sample correlogram dies out slowly (Enders, 1995)

The assumptions of the classical regression model necessitate that both the $\{y_t\}$ and $\{Z_t\}$ sequence be stationary and errors have a zero mean and finite variance. In the presence of non-stationary variables, there might be what Granger and Newbold (1974) call a spurious regression. A spurious regression has a high R^2, t-statistics that appear to be significant, but the results are without any economic meaning. The regression output looks good because the least squares estimates are not consistent and the customary tests of statistical inference do not hold.

Non stationarity of time series has always been regarded as a problem in economic analysis. It has been shown that the statistical properties of regression analysis using mon stationary time series are dubious. If series are non stationary one is likely to finish up with a model showing promising diagnostic test statistics even in the case where there is no sense in the regression analysis. Regression analysis makes sense only for data, which is not subject to a trend.

Appendix 10: Static (Long run) Growth Model

Dependent Variable: LNGDP
Method: Least Squares
Date: 06/20/14 Time: 15:59
Sample: 1976 2012
Included observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011347	0.005054	2.245114	0.0326
LNBD	-0.001507	0.005354	-0.281448	0.7804
LNFE	-0.032383	0.027833	-1.163471	0.2541
LNIN	-0.001133	0.001698	-0.667269	0.5099
LNK	0.037893	0.118862	0.318798	0.7522
LNPI	0.045656	0.066480	0.686754	0.4977
LNPOP	0.081627	0.328881	0.248197	0.8057
DV	0.002427	0.002389	1.015969	0.3180

R-squared	0.147348	Mean dependent var	0.012172
Adjusted R-squared	-0.058465	S.D. dependent var	0.005498

S.E. of regression	0.005656	Akaike info criterion	-7.323360
Sum squared resid	0.000928	Schwarz criterion	-6.975053
Log likelihood	143.4822	Hannan-Quinn criter.	-7.200565
F-statistic	0.715933	Durbin-Watson stat	2.174513
Prob(F-statistic)	0.659180		

Appendix 11: Over-parameterized (General) Growth Model)

Dependent Variable: D(LNGDP)
Method: Least Squares
Date: 06/20/14 Time: 19:26
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.012193	0.000468	26.06636	0.0000
DD(LNBD	0.001601	0.000366	4.371098	0.0003
DDLNFE	-0.032355	0.001789	-18.08589	0.0000
DDLNGDP	0.972926	0.013889	70.05205	0.0000
DDLNIN	-0.001027	0.000118	-8.727479	0.0000
DDLNK	0.036006	0.009279	3.880563	0.0009
DDLNPI	0.047651	0.004604	10.34959	0.0000
DDLNPOP	0.100498	0.022421	4.482258	0.0002
DLNBD	-0.001612	0.000624	-2.584190	0.0177
DLNFE	-0.025021	0.002269	-11.02488	0.0000
DLNIN	-0.000964	0.000211	-4.565522	0.0002
DLNK	0.036814	0.013068	2.817202	0.0106
DLNPI	0.050798	0.005693	8.922632	0.0000
DLNPOP	0.118475	0.030864	3.838596	0.0010
DV	0.001973	0.000179	11.03437	0.0000
ECT(-1)	-0.963851	0.020577	-46.84079	0.0000

R-squared	0.997652	Mean dependent var	0.012503
Adjusted R-squared	0.995890	S.D. dependent var	0.005188
S.E. of regression	0.000333	Akaike info criterion	-12.87839
Sum squared resid	2.21E-06	Schwarz criterion	-12.17461
Log likelihood	247.8111	Hannan-Quinn criter.	-12.63275
F-statistic	566.4565	Durbin-Watson stat	1.316634
Prob(F-statistic)	0.000000		

Appendix 12: Short run (Dynamic) Growth Model

Dependent Variable: DLNGDP
Method: Least Squares
Date: 06/20/14 Time: 19:30
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.013170	0.000581	22.68421	0.0000
DDLNBD	0.001463	0.000492	2.970117	0.0071
DDLNFE	-0.034070	0.002437	-13.97799	0.0000
DDLNGDP	0.984716	0.017599	55.95139	0.0000
DDLNIN	-0.000612	9.41E-05	-6.505535	0.0000
DDLNK	0.011002	0.007184	1.531466	0.1399
DDLNPI	0.042075	0.005690	7.394580	0.0000
DDLNPOP	0.145685	0.028247	5.157643	0.0000
DLNBD	-0.001522	0.000847	-1.797264	0.0860
DLNFE	-0.022885	0.002959	-7.733970	0.0000
DLNPI	0.045743	0.006286	7.277615	0.0000
DLNPOP	0.157443	0.041084	3.832211	0.0009
DV	0.001685	0.000234	7.204609	0.0000
ECT(-1)	-0.985816	0.025948	-37.99216	0.0000

R-squared	0.994999	Mean dependent var	0.012503
Adjusted R-squared	0.992044	S.D. dependent var	0.005188
S.E. of regression	0.000463	Akaike info criterion	-12.23353
Sum squared resid	4.71E-06	Schwarz criterion	-11.61772
Log likelihood	234.2036	Hannan-Quinn criter.	-12.01860
F-statistic	336.6948	Durbin-Watson stat	1.534911
Prob(F-statistic)	0.000000		

Appendix 13: Stationarity Test (Variables in Levels)

	at levels				
variables	ADF	1%	5%	10%	Probability
LNBD	-5.8304	-4.22682	-3.5366	-3.20032	0.0001*
LNGD	-1.8236	-4.22682	-3.5366	-3.20032	0.6729
LNIN	-4.91659	-4.22682	-3.5366	-3.20032	0.0017*
LNIR	-3.8945	-4.22682	-3.5366	-3.20032	0.0223**
LNPOP	-1.67955	-4.22682	-3.5366	-3.20032	0.7402
LNPI	-3.69884	-4.23497	-3.54033	-3.20245	0.0353**

LNK	-4.90947	-4.23497	-3.54033	-3.20245	0.0018*
LNNS	-4.81722	-4.22682	-3.5366	-3.20032	0.0022*
LNFE	-0.63781	-4.22682	-3.5366	-3.20032	0.9705
LNTOT	-4.25776	-4.22682	-3.5366	-3.20032	0.0093*

*** Significant at 1% level ** Significant at 5%level**

Appendix 14: Stationarity Test (Variables in Difference)

	at first difference				
variables	ADF	1%	5%	10%	Probability
LNBD	-6.81964	-4.25288	-3.54849	-3.20709	0*
LNGD	-6.47733	-4.23497	-3.54033	-3.20245	0*
LNIN	-7.17046	-4.24364	-3.54428	-3.2047	0*
LNIR	-6.76363	-4.24364	-3.54428	-3.2047	0*
LNPOP	-6.10807	-4.23497	-3.54033	-3.20245	0.0001*
LNPI	-4.11551	-4.23497	-3.54033	-3.20245	0.0134**
LNK	-4.81722	-4.22682	-3.5366	-3.20032	0.0022*
LNNS	-7.73659	-4.23497	-3.54033	-3.20245	0*
LNFE	-4.80974	-4.23497	-3.54033	-3.20245	0.0023*
LNTOT	-8.54797	-4.23497	-3.54033	-3.20245	0*

* Significant at 1% level **Significant at 5% level

Appendix 15: Static Growth Model: Stationarity Test on the Residual (Growth)

	ADF	1%	5%	10%	Probability
Residual	-6.60277	-4.23497	-3.54033	-3.20245	0*

Appendix 16: Static (long run) Private Investment

Dependent Variable: DLNPI
Method: Least Squares
Date: 06/22/14 Time: 11:12
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.138838	0.056456	2.459225	0.0199
LNBD	-0.016781	0.014365	-1.168131	0.2520
LNNS	0.172362	0.139837	1.232589	0.2273
LNGDP	-0.171148	0.327461	-0.522651	0.6051
LNIN	-0.036387	0.024708	-1.472657	0.1513
LNFE	-0.322602	0.249248	-1.294304	0.2054
DV	0.100804	0.188430	0.534969	0.5966

R-squared	0.224817	Mean dependent var	0.121114
Adjusted R-squared	0.069780	S.D. dependent var	0.127571
S.E. of regression	0.123040	Akaike info criterion	-1.183963
Sum squared resid	0.454162	Schwarz criterion	-0.879195
Log likelihood	28.90332	Hannan-Quinn criter.	-1.076518
F-statistic	1.450087	Durbin-Watson stat	1.442460
Prob(F-statistic)	0.228906		

Appendix 17: Over-parameterized Private Investment

Dependent Variable: DLNPI
Method: Least Squares
Date: 06/22/14 Time: 11:26
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.136602	0.006011	22.72633	0.0000
DDLNBD	0.016841	0.001266	13.30494	0.0000
DLNBD	-0.015697	0.002211	-7.098615	0.0000
DDLNFE	0.218902	0.015627	14.00762	0.0000
DLNFE	-0.285980	0.023427	-12.20743	0.0000
DDLNGDP	0.114515	0.026596	4.305779	0.0003
DLNGDP	-0.168009	0.034371	-4.888140	0.0001
DDLNIN	0.039353	0.002288	17.20209	0.0000
DLNIN	-0.041297	0.003593	-11.49427	0.0000
DDLNNS	-0.167812	0.013447	-12.47937	0.0000
DLNNS	0.183660	0.020495	8.961266	0.0000
DDLNPI	1.021366	0.017812	57.34039	0.0000
DV	0.031527	0.015525	2.030637	0.0546
ECT(-1)	1.001343	0.019670	50.90670	0.0000

R-squared	0.996436	Mean dependent var	0.119874
Adjusted R-squared	0.994330	S.D. dependent var	0.129154
S.E. of regression	0.009725	Akaike info criterion	-6.142882
Sum squared resid	0.002081	Schwarz criterion	-5.527069
Log likelihood	124.5719	Hannan-Quinn criter.	-5.927947
F-statistic	473.1409	Durbin-Watson stat	1.750897
Prob(F-statistic)	0.000000		

Appendix 18: Short run (Dynamic) Private Investment

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.106589	0.010871	9.804780	0.0000
DLNBD	0.008304	0.003638	2.282702	0.0309
DDLNFE	0.232903	0.045755	5.090174	0.0000
DLNFE	-0.235131	0.055621	-4.227388	0.0003
DDLNIN	0.047529	0.006449	7.369471	0.0000
DLNIN	-0.045383	0.010364	-4.378975	0.0002
DDLNNS	-0.197249	0.037587	-5.247752	0.0000
DLNNS	0.201577	0.057991	3.476022	0.0018
DDLNPI	1.089073	0.050442	21.59081	0.0000
ECT(-1)	-1.050084	0.055911	-18.78128	0.0000

R-squared	0.963281	Mean dependent var	0.119874
Adjusted R-squared	0.950571	S.D. dependent var	0.129154
S.E. of regression	0.028714	Akaike info criterion	-4.032705
Sum squared resid	0.021437	Schwarz criterion	-3.592838
Log likelihood	82.58869	Hannan-Quinn criter.	-3.879180

F-statistic	75.78749	Durbin-Watson stat	2.101000
Prob(F-statistic)	0.000000		

Appendix 19: Stationarity of the Residual (Private Investment)

Null Hypothesis: D(U) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.776625	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(U,2)
Method: Least Squares
Date: 07/13/14 Time: 15:35
Sample (adjusted): 1978 2012
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(U(-1))	-1.281487	0.164787	-7.776625	0.0000
C	-0.002141	0.022542	-0.094961	0.9249

R-squared	0.646968	Mean dependent var	-0.003283
Adjusted R-squared	0.636270	S.D. dependent var	0.221123
S.E. of regression	0.133359	Akaike info criterion	-1.136096
Sum squared resid	0.586894	Schwarz criterion	-1.047219
Log likelihood	21.88168	Hannan-Quinn criter.	-1.105416
F-statistic	60.47590	Durbin-Watson stat	2.071821
Prob(F-statistic)	0.000000		

Appendix 20: Long run National Savings Model

Dependent Variable: DLNNS
Method: Least Squares
Date: 06/22/14 Time: 12:00
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.171360	0.062075	2.760535	0.0096
LNBD	-0.007371	0.018568	-0.396962	0.6941
LNIN	0.050519	0.033545	1.506006	0.1422
LNIR	0.026401	0.035654	0.740492	0.4646
LNGDP	-0.222210	0.427636	-0.519625	0.6070
DV	-0.158658	0.169654	-0.935184	0.3569

R-squared	0.113374	Mean dependent var	0.137024
Adjusted R-squared	-0.029630	S.D. dependent var	0.155347
S.E. of regression	0.157632	Akaike info criterion	-0.709712
Sum squared resid	0.770285	Schwarz criterion	-0.448482
Log likelihood	19.12967	Hannan-Quinn criter.	-0.617616
F-statistic	0.792802	Durbin-Watson stat	2.457580
Prob(F-statistic)	0.563065		

Appendix 21: Over Parameterized National Savings Model

Dependent Variable: DLNNS
Method: Least Squares
Date: 06/22/14 Time: 12:23
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.170802	0.013447	12.70221	0.0000
DDLNIN	-0.047210	0.006840	-6.901548	0.0000
DLNIN	0.045910	0.011355	4.043176	0.0005
DDLNBD	0.005702	0.003432	1.661455	0.1096
DLNBD2	-0.008380	0.005687	-1.473549	0.1536
DDLNGDP	0.326791	0.076969	4.245763	0.0003
DLNGDP	-0.251236	0.095339	-2.635192	0.0145
DDLNIR	-0.027461	0.007018	-3.912797	0.0007
DLNIR	0.029049	0.010918	2.660715	0.0137
DDLNNS	0.940860	0.031497	29.87183	0.0000
DV	-0.011351	0.031072	-0.365307	0.7181
ECT(-1)	0.914287	0.052913	17.27898	0.0000

R-squared	0.978984	Mean dependent var	0.132388
Adjusted R-squared	0.969351	S.D. dependent var	0.154934
S.E. of regression	0.027124	Akaike info criterion	-4.115598
Sum squared resid	0.017657	Schwarz criterion	-3.587758
Log likelihood	86.08076	Hannan-Quinn criter.	-3.931368
F-statistic	101.6340	Durbin-Watson stat	2.087270

Prob(F-statistic)	0.000000

Appendix 22: Short-Run (Dynamic) Savings Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.175010	0.014439	12.12098	0.0000
DDLNIN	-0.043937	0.007463	-5.887122	0.0000
DLNIN	-0.034587	0.011665	-2.964953	0.0063
DLNBD	-0.008703	0.003626	-2.400174	0.0177
DDLNGDP	0.337994	0.084521	3.998930	0.0004
DLNGDP	0.288978	0.100255	2.882421	0.0076
DDLNIR	0.013505	0.005139	2.628009	0.0140
DDLNNS	0.949347	0.033608	28.24803	0.0000
ECT(-1)	-0.931551	0.055929	-16.65584	0.0000

R-squared	0.971034	Mean dependent var	0.132388
Adjusted R-squared	0.962452	S.D. dependent var	0.154934
S.E. of regression	0.030022	Akaike info criterion	-3.961444
Sum squared resid	0.024336	Schwarz criterion	-3.565565
Log likelihood	80.30600	Hannan-Quinn criter.	-3.823272
F-statistic	113.1418	Durbin-Watson stat	1.988674
Prob(F-statistic)	0.000000		

Appendix 23: Stationarity Test on Residual (National Savings)

Null Hypothesis: D(U) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.552268	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(U,2)
Method: Least Squares
Date: 07/13/14 Time: 15:41
Sample (adjusted): 1979 2012
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(U(-1))	-2.363446	0.276353	-8.552268	0.0000
D(U(-1),2)	0.503766	0.156396	3.221094	0.0030
C	-0.012246	0.029931	-0.409134	0.6853

R-squared	0.838218	Mean dependent var	-0.003029
Adjusted R-squared	0.827780	S.D. dependent var	0.420228
S.E. of regression	0.174392	Akaike info criterion	-0.570924
Sum squared resid	0.942791	Schwarz criterion	-0.436245
Log likelihood	12.70571	Hannan-Quinn criter.	-0.524995
F-statistic	80.30782	Durbin-Watson stat	1.708228
Prob(F-statistic)	0.000000		

Appendix 24: Static (long Run) Regression Budget Deficit Model

Dependent Variable: DLNBD2
Method: Least Squares
Date: 06/22/14 Time: 13:17
Sample (adjusted): 1976 2012
Included observations: 37 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.162212	0.617269	0.262790	0.7945
LNIN	0.192139	0.299715	0.641074	0.5262
LNGDP	-0.382872	4.000591	-0.095704	0.9244
LNTOT	0.343612	0.350858	0.979346	0.3350
LNFE	0.950742	3.098194	0.306870	0.7610
DV	-0.161674	2.327170	-0.069473	0.9451

R-squared	0.073905	Mean dependent var	0.101583
Adjusted R-squared	-0.075465	S.D. dependent var	1.463497
S.E. of regression	1.517714	Akaike info criterion	3.819681
Sum squared resid	71.40713	Schwarz criterion	4.080911
Log likelihood	-64.66410	Hannan-Quinn criter.	3.911777
F-statistic	0.494781	Durbin-Watson stat	2.627771
Prob(F-statistic)	0.777622		

Appendix 25: Over Parameterized Budget Deficit Model

Dependent Variable: DLNBD2
Method: Least Squares
Date: 07/29/14 Time: 10:58
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.179429	0.004118	43.56972	0.0000
DDLNBD	1.000099	0.000988	1011.994	0.0000
DDLNFE	1.153436	0.012652	91.16673	0.0000
DLNFE	1.085923	0.018068	60.10305	0.0000
DDLNGDP	-0.249242	0.023990	-10.38923	0.0000
DLNGDP	-0.232208	0.032610	-7.120781	0.0000
DDLNIN	0.189111	0.001713	110.3904	0.0000
DLNIN	0.189785	0.002791	68.01076	0.0000
DDTOT	-0.348923	0.002231	-156.3982	0.0000
DTOT	0.349125	0.004183	83.47220	0.0000
DV	-0.057462	0.003368	-17.05884	0.0000
ECT(-1)	1.000271	0.001612	620.5603	0.0000

R-squared	0.999981	Mean dependent var	0.114421
Adjusted R-squared	0.999973	S.D. dependent var	1.482142
S.E. of regression	0.007756	Akaike info criterion	-6.619450
Sum squared resid	0.001444	Schwarz criterion	-6.091611
Log likelihood	131.1501	Hannan-Quinn criter.	-6.435220
F-statistic	116185.1	Durbin-Watson stat	1.461229

Prob(F-statistic)	0.000000

Appendix 26: Short run (Dynamic) Budget Deficit Model

Dependent Variable: DLNBD
Method: Least Squares
Date: 07/29/14 Time: 10:51
Sample (adjusted): 1977 2012
Included observations: 36 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.383803	0.123135	3.116931	0.0042
DDLNBD	0.947316	0.033647	28.15418	0.0000
DLNFE	1.602995	0.425214	3.769858	0.0008
DLNGDP	-0.847863	0.767016	-1.105405	0.2784
DDLNIN	0.171392	0.057394	2.986226	0.0058
DLNIN	0.164798	0.094234	1.748822	0.0913
DTOT	0.266263	0.077641	3.429402	0.0019
ECT(-1)	-0.915044	0.055121	-16.60057	0.0000

R-squared	0.971514	Mean dependent var	0.114421
Adjusted R-squared	0.964393	S.D. dependent var	1.482142
S.E. of regression	0.279677	Akaike info criterion	0.482768
Sum squared resid	2.190140	Schwarz criterion	0.834661
Log likelihood	-0.689828	Hannan-Quinn criter.	0.605588
F-statistic	136.4223	Durbin-Watson stat	2.023468
Prob(F-statistic)	0.000000		

Appendix 27: Stationarity Test on Residual (Budget Deficit)

Null Hypothesis: U has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.318890	0.0000
Test critical values:	1% level	-3.639407	
	5% level	-2.951125	
	10% level	-2.614300	

*MacKinnon (1996) one-sided p-values.
Augmented Dickey-Fuller Test Equation
Dependent Variable: D(U)
Method: Least Squares
Date: 07/29/14 Time: 12:53
Sample (adjusted): 1979 2012
Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
U(-1)	-2.529052	0.400237	-6.318890	0.0000
D(U(-1))	0.925412	0.287608	3.217618	0.0031
D(U(-2))	0.357295	0.168877	2.115716	0.0428
C	0.041482	0.210372	0.197182	0.8450

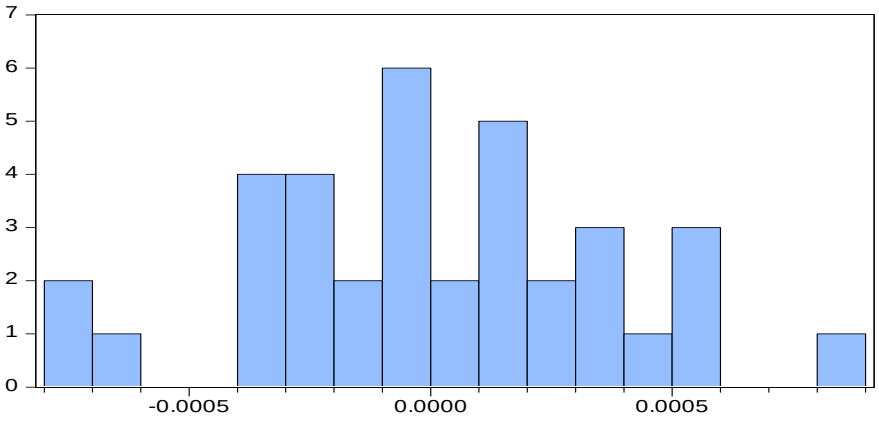
R-squared	0.758055	Mean dependent var	0.023050
Adjusted R-squared	0.733860	S.D. dependent var	2.377429
S.E. of regression	1.226485	Akaike info criterion	3.356313
Sum squared resid	45.12797	Schwarz criterion	3.535885
Log likelihood	-53.05732	Hannan-Quinn criter.	3.417552
F-statistic	31.33170	Durbin-Watson stat	2.159936
Prob(F-statistic)	0.000000		

Appendix 28: Multocolliniarity Test (Growth Model)

Variance Inflation Factors
Date: 06/20/14 Time: 19:33
Sample: 1976 2012
Included observations: 36

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	3.37E-07	56.67093	NA
DDLNBD	2.42E-07	3.856659	3.856495
DDLNFE	5.94E-06	1.831530	1.831463
DDLNGDP	0.000310	2.739140	2.736488
DDLNIN	8.85E-09	1.454463	1.454462
DDLNK	5.16E-05	1.271409	1.270632
DDLNPI	3.24E-05	2.219937	2.218303
DDLNPOP	0.000798	2.281681	2.278484
DLNBD	7.17E-07	4.177967	4.159027
DLNFE	8.76E-06	2.704832	2.072862
DLNPI	3.95E-05	4.106587	2.128837
DLNPOP	0.001688	32.94368	3.182724
DV	5.47E-08	5.362409	2.234337
RESIDG(-1)	0.000673	2.853749	2.851986

Appendix 29: Normality Test for Residual (Growth Model)



Series: Residuals
Sample 1977 2012
Observations 36

Mean	2.61e-18
Median	-5.38e-06
Maximum	0.000828
Minimum	-0.000757
Std. Dev.	0.000367
Skewness	-0.040179
Kurtosis	2.803789
Jarque-Bera	0.067434
Probability	0.966845

Appendix 30: Serial Correlation Test (Growth)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	4.173523	Prob. F(2,20)	0.0306
Obs*R-squared	10.60053	Prob. Chi-Square(2)	0.0050

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/20/14 Time: 19:36
Sample: 1977 2012
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000118	0.000514	0.229049	0.8212
DDLNBD	0.000142	0.000439	0.323355	0.7498
DDLNFE	-0.000773	0.002184	-0.353808	0.7272
DDLNGDP	-0.011314	0.016526	-0.684633	0.5014
DDLNIN	9.22E-05	9.16E-05	1.007147	0.3259
DDLNK	0.003989	0.006807	0.586032	0.5644
DDLNPI	-0.000146	0.005104	-0.028674	0.9774
DDLNPOP	-0.002295	0.024939	-0.092022	0.9276
DLNBD	-0.000284	0.000759	-0.374427	0.7120
DLNFE	0.000613	0.002812	0.217849	0.8298
DLNPI	-0.003429	0.005680	-0.603754	0.5528
DLNPOP	-0.005069	0.036559	-0.138666	0.8911
DV	-2.05E-05	0.000206	-0.099370	0.9218
RESIDG(-1)	-0.014931	0.024238	-0.616025	0.5448
RESID(-1)	0.465314	0.233231	1.995079	0.0598
RESID(-2)	-0.584072	0.233813	-2.498034	0.0213

R-squared	0.294459	Mean dependent var	2.61E-18
Adjusted R-squared	-0.234697	S.D. dependent var	0.000367
S.E. of regression	0.000408	Akaike info criterion	-12.47121
Sum squared resid	3.32E-06	Schwarz criterion	-11.76743
Log likelihood	240.4818	Hannan-Quinn criter.	-12.22557
F-statistic	0.556470	Durbin-Watson stat	2.158442
Prob(F-statistic)	0.874689		

Appendix 31: Heteroscedasticity Test for the Residual(Growth)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.750663	Prob. F(13,22)	0.6987
Obs*R-squared	11.06189	Prob. Chi-Square(13)	0.6056
Scaled explained SS	3.725850	Prob. Chi-Square(13)	0.9938

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/20/14 Time: 19:38
Sample: 1977 2012
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.59E-07	2.35E-07	1.103265	0.2818
DDLNBD	-9.55E-08	1.99E-07	-0.479657	0.6362
DDLNFE	-1.20E-07	9.86E-07	-0.121280	0.9046
DDLNGDP	2.23E-06	7.12E-06	0.313317	0.7570
DDLNIN	-4.48E-08	3.80E-08	-1.176945	0.2518
DDLNK	-3.03E-07	2.90E-06	-0.104157	0.9180
DDLNPI	1.58E-06	2.30E-06	0.685875	0.5000
DDLNPOP	6.44E-06	1.14E-05	0.563754	0.5786
DLNBD	3.03E-07	3.43E-07	0.884539	0.3860
DLNFE	1.91E-06	1.20E-06	1.599146	0.1241
DLNPI	-6.13E-07	2.54E-06	-0.241344	0.8115
DLNPOP	-1.13E-05	1.66E-05	-0.682003	0.5024
DV	-7.43E-08	9.46E-08	-0.785712	0.4404
RESIDG(-1)	-1.01E-06	1.05E-05	-0.096140	0.9243

R-squared	0.307275	Mean dependent var	1.31E-07
Adjusted R-squared	-0.102063	S.D. dependent var	1.78E-07
S.E. of regression	1.87E-07	Akaike info criterion	-27.85995
Sum squared resid	7.70E-13	Schwarz criterion	-27.24414
Log likelihood	515.4791	Hannan-Quinn criter.	-27.64502
F-statistic	0.750663	Durbin-Watson stat	1.793313
Prob(F-statistic)	0.698727		

Appendix 32: Serial Correlation(Private Investment)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.701938	Prob. F(2,24)	0.2036
Obs*R-squared	4.471613	Prob. Chi-Square(2)	0.1069

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/22/14 Time: 11:46
Sample: 1977 2012
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.001608	0.010653	0.150969	0.8813
DLNBD2	0.001328	0.003869	0.343198	0.7344
DDLNFE	0.003564	0.044932	0.079329	0.9374
DLNFE	-0.022196	0.055542	-0.399620	0.6930
DDLNIN	-0.001352	0.006326	-0.213677	0.8326
DLNIN	-0.002986	0.010490	-0.284625	0.7784
DDLNNS	0.004958	0.037038	0.133851	0.8946
DLNNS	0.003972	0.056871	0.069834	0.9449
DDLNPI	-0.006392	0.049441	-0.129290	0.8982
UPI(-1)	0.006649	0.055060	0.120762	0.9049
RESID(-1)	-0.171092	0.228243	-0.749607	0.4608
RESID(-2)	-0.419018	0.235845	-1.776670	0.0883

R-squared	0.124211	Mean dependent var	-6.36E-18
Adjusted R-squared	-0.277192	S.D. dependent var	0.024749
S.E. of regression	0.027969	Akaike info criterion	-4.054224
Sum squared resid	0.018775	Schwarz criterion	-3.526385
Log likelihood	84.97604	Hannan-Quinn criter.	-3.869994
F-statistic	0.309443	Durbin-Watson stat	1.755082
Prob(F-statistic)	0.976655		

Appendix 33: Heteroskedasticity Test: Preusch- Pagan Godfrey (Private Investment)

F-statistic	2.043160	Prob. F(9,26)	0.0748
Obs*R-squared	14.91343	Prob. Chi-Square(9)	0.0933
Scaled explained SS	8.386553	Prob. Chi-Square(9)	0.4957

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 06/22/14 Time: 11:46
Sample: 1977 2012
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000867	0.000298	2.907386	0.0074
DLNBD2	6.32E-05	9.98E-05	0.633573	0.5319
DDLNFE	0.001244	0.001255	0.991218	0.3307
DLNFE	-0.001929	0.001525	-1.264566	0.2172
DDLNIN	-3.33E-05	0.000177	-0.188046	0.8523
DLNIN	0.000124	0.000284	0.435651	0.6667
DDLNNS	0.000375	0.001031	0.363781	0.7190
DLNNS	-0.001143	0.001590	-0.718602	0.4788
DDLNPI	0.001204	0.001383	0.870104	0.3922
UPI(-1)	0.005424	0.001533	3.537232	0.0015

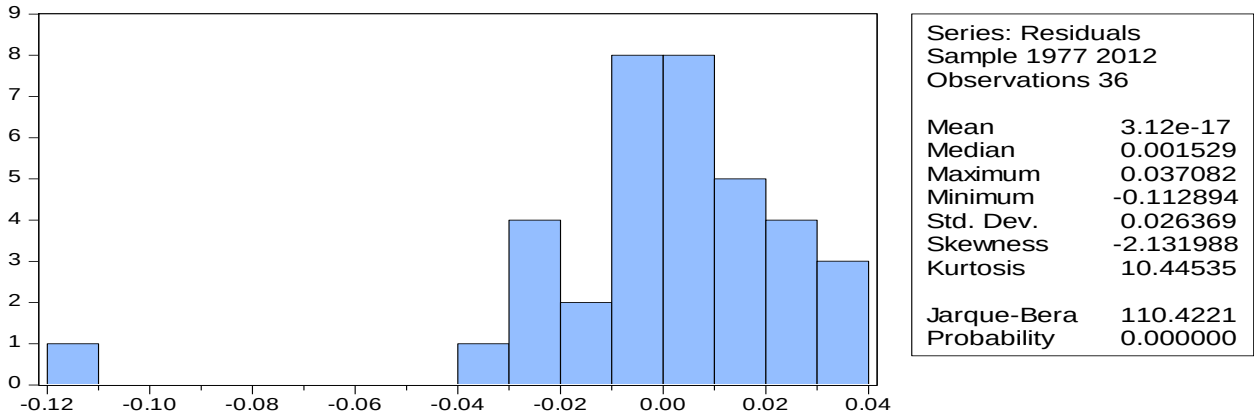
R-squared	0.414262	Mean dependent var	0.000595
Adjusted R-squared	0.211506	S.D. dependent var	0.000887
S.E. of regression	0.000787	Akaike info criterion	-11.22537
Sum squared resid	1.61E-05	Schwarz criterion	-10.78550
Log likelihood	212.0566	Hannan-Quinn criter.	-11.07184
F-statistic	2.043160	Durbin-Watson stat	2.259271
Prob(F-statistic)	0.074848		

Appendix 34: Multicollinearity Test (National Savings)

Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000208	8.326584	NA
DDLNIN	5.57E-05	4.674780	4.674759
DLNIN	0.000136	4.204640	4.204473
DLNBD2	1.31E-05	1.128177	1.121304
DDLNGDP	0.007144	1.909474	1.906768
DLNGDP	0.010051	9.109504	1.633624
DDLNIR	2.64E-05	1.918002	1.917924
DDLNNS	0.001129	2.717824	2.716209
UNS(-1)	0.003128	2.657547	2.657110

Appendix 35: Normality Test(National Savings)



Appendix 36: Serial Correlation Test (National Savings)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.068553	Prob. F(2,25)	0.9339
Obs*R-squared	0.196356	Prob. Chi-Square(2)	0.9065

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 06/22/14 Time: 12:53
Sample: 1977 2012
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.000610	0.015169	-0.040197	0.9683
DDLNIN	-0.000593	0.007933	-0.074723	0.9410
DLNIN	-0.000651	0.012479	-0.052203	0.9588
DLNBD2	-0.000120	0.003883	-0.030955	0.9756
DDLNGDP	0.003324	0.089705	0.037053	0.9707
DLNGDP	0.004644	0.105197	0.044149	0.9651
DDLNIR	-0.000717	0.005805	-0.123488	0.9027
DDLNNS	0.004023	0.038340	0.104936	0.9173
UNS(-1)	0.006075	0.060749	0.100004	0.9211
RESID(-1)	-0.048912	0.231670	-0.211127	0.8345
RESID(-2)	0.083370	0.265145	0.314430	0.7558

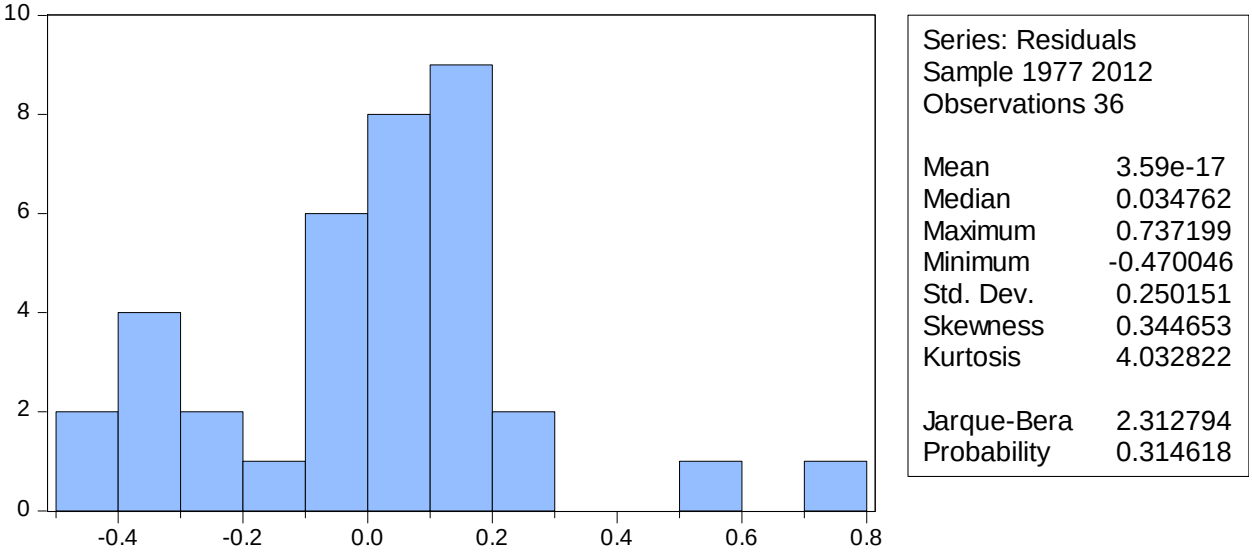
R-squared	0.005454	Mean dependent var	3.12E-17
Adjusted R-squared	-0.392364	S.D. dependent var	0.026369
S.E. of regression	0.031115	Akaike info criterion	-3.855803
Sum squared resid	0.024203	Schwarz criterion	-3.371950
Log likelihood	80.40445	Hannan-Quinn criter.	-3.686925
F-statistic	0.013711	Durbin-Watson stat	1.906096
Prob(F-statistic)	1.000000		

Appendix 37: Multicollinearity Test (Budget Deficit)

Variance Inflation Factors
Date: 07/29/14 Time: 10:54
Sample: 1975 2012
Included observations: 36

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.015162	6.978333	NA
DDLNBD2	0.001132	3.005813	3.005656
DLNFE	0.180807	1.572735	1.220445
DLNGDP	0.588314	6.144120	1.101836
DDLNIN	0.003294	3.185757	3.185742
DLNIN	0.008880	3.161735	3.161609
DTOT	0.006028	1.553022	1.416622
U(-1)	0.003038	2.771369	2.771322

Appendix 38: Normality test (Budget Deficit)



Appendix 39: Serial correlation test (budget deficit)

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.315274	Prob. F(2,26)	0.7323
Obs*R-squared	0.852393	Prob. Chi-Square(2)	0.6530

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/29/14 Time: 11:15
Sample: 1977 2012
Included observations: 36
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.019478	0.128634	-0.151422	0.8808
DDLNBD2	0.000851	0.034524	0.024653	0.9805
DLNFE	-0.145227	0.476792	-0.304592	0.7631
DLNGDP	0.184067	0.820088	0.224448	0.8242
DDLNIN	-0.013410	0.062533	-0.214439	0.8319
DLNIN	-0.012216	0.102420	-0.119269	0.9060
DTOT	0.017569	0.082662	0.212537	0.8333
U(-1)	0.005647	0.057093	0.098915	0.9220
RESID(-1)	-0.059098	0.214479	-0.275541	0.7851
RESID(-2)	0.203886	0.264520	0.770780	0.4478

R-squared	0.023678	Mean dependent var	3.59E-17
Adjusted R-squared	-0.314280	S.D. dependent var	0.250151
S.E. of regression	0.286778	Akaike info criterion	0.569917
Sum squared resid	2.138283	Schwarz criterion	1.009783
Log likelihood	-0.258505	Hannan-Quinn criter.	0.723442
F-statistic	0.070061	Durbin-Watson stat	1.999297
Prob(F-statistic)	0.999869		

Appendix 40 Heteroscedasticity test: Breusch- Pagan- Godfrey (Budget Deficit)

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.477013	Prob. F(7,28)	0.2158
Obs*R-squared	9.708296	Prob. Chi-Square(7)	0.2057
Scaled explained SS	8.905760	Prob. Chi-Square(7)	0.2595

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 07/29/14 Time: 11:18
Sample: 1977 2012
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.110991	0.045201	2.455506	0.0205
DDLNBD2	-0.022404	0.012351	-1.813874	0.0804
DLNFE	-0.217704	0.156089	-1.394739	0.1741
DLNGDP	-0.301718	0.281560	-1.071595	0.2931
DDLNIN	-0.020499	0.021069	-0.972977	0.3389
DLNIN	0.040209	0.034592	1.162395	0.2549
DTOT	0.025610	0.028501	0.898565	0.3765
U(-1)	-0.030952	0.020234	-1.529688	0.1373

R-squared	0.269675	Mean dependent var	0.060837
Adjusted R-squared	0.087094	S.D. dependent var	0.107451
S.E. of regression	0.102665	Akaike info criterion	-1.521557
Sum squared resid	0.295124	Schwarz criterion	-1.169664
Log likelihood	35.38803	Hannan-Quinn criter.	-1.398737
F-statistic	1.477013	Durbin-Watson stat	1.864455
Prob(F-statistic)	0.215844		

Appendix 41:Raw Data Used (1975-2012) in Millions Kshs.

	POP	PI	IN	FE	GD	IR	NS	DV	K	BD	TOT
1975	13.1	127.2	19.1	8.4	5,652	1.6	4,342	0	4,838	1,972	1,122
1976	13.5	150.1	11.4	8.3	5,664	7.5	5,884	0	5,809	1,375	202
1977	14.0	198.4	14.8	7.7	6,201	5.9	8,800	0	7,800	1,387	1,252
1978	14.4	226.9	16.9	7.5	6,618	6.7	12,200	0	10,280	1,480	3,998
1979	15.1	268.7	8.0	7.4	7,134	4.1	8,451	0	8,935	1,719	2,730
1980	15.6	283.8	13.9	9.0	7,128	0.9	13,212	0	9,878	2,451	3,441
1981	16.2	328.7	11.6	10.9	8,318	1.4	14,210	0	11,542	4,666	2,084
1982	16.7	439.5	20.7	13.3	8,804	2.6	15,356	0	13,367	4,555	3,443
1983	17.3	516.4	11.4	14.4	9,666	3.6	16,655	0	14,418	686	1,801
1984	17.9	532.7	10.3	16.4	10,417	3.8	17,680	0	15,308	2,336	4,734
1985	18.5	580.0	13.0	16.2	11,453	5.3	25,530	0	17,412	8,733	4,887
1986	19.2	707.5	2.5	16.5	12,703	4.9	25,569	0	23,064	6,649	4,751
1987	19.8	826.6	8.6	17.7	15,052	8.2	31,857	0	25,741	5,741	6,679
1988	20.5	869.2	12.3	20.6	17,566	8.0	37,737	0	30,319	1,593	7,759
1989	21.4	898.7	13.8	22.9	21,214	6.8	42,366	0	33,157	8,477	12,082
1991	22.7	1035.0	20.1	32.2	29,072	5.7	47,022	0	42,671	8,265	3,396
1992	23.4	1039.8	27.3	58.0	37,198	1.8	44,751	1	43,853	3,084	1,085
1993	24.1	1333.7	46.0	56.1	40,995	3.4	58,750	1	56,506	26,811	16,510
1994	24.8	1593.9	28.8	51.4	46,604	16.4	77,300	1	75,616	16,753	11,276
1995	25.5	2462.3	1.6	57.1	53,910	15.8	101,517	1	99,497	2,693	30,531
1996	26.3	2468.0	8.9	58.7	62,016	5.8	103,226	1	110,142	1,708	47,547
1997	27.0	2514.9	11.4	60.4	70,248	16.9	116,633	1	118,535	18,495	66,897
1998	27.8	2592.5	6.7	70.3	79,592	21.1	142,023	1	133,366	4,255	72,818
1999	28.7	2503.6	5.7	76.2	89,243	17.5	140,768	1	141,403	7,681	59,193
2000	29.5	2446.8	10.0	78.6	100,812	15.3	168,540	1	161,714	7,341	98,080
2001	32.1	2428.2	5.7	78.7	117,460	17.8	191,703	1	185,186	27,760	102,876
2002	33.0	2411.7	2.0	75.9	131,156	17.4	156,737	1	178,466	35,386	55,669
2003	33.9	2611.0	9.8	79.2	148,284	9.8	186,542	1	179,254	16,074	67,439
2004	34.8	4387.6	11.6	75.6	170,404	5.0	216,158	1	207,196	211	79,728

2005	35.8	6411.4	10.3	72.1	196,434	7.6	249,871	1	264,728	26,067	105,624
2006	36.8	7074.9	14.5	67.3	224,230	5.4	299,986	1	309,592	40,624	173,950
2007	37.8	7510.1	9.8	69.2	264,472	7.3	350,553	1	355,090	13,672	200,232
2008	38.8	8185.5	26.2	77.4	333,611	0.7	405,477	1	409,597	41,750	298,015
2009	39.8	8504.8	9.2	79.2	400,658	5.1	471,476	1	465,111	28,501	315,175
2011	42.0	9875.3	14.0	84.5	687,998	2.6	632,519	1	608,982	65,001	504,879
2012	43.2	11233.8	9.4	86.1	770,313	8.7	691,052	1	701,398	84,573	591,548

Source: World Bank Data (World Bank, Website)