# DETERMINANTS OF PRIVATE INVESTMENT AND THE RELATIONSHIP BETWEEN PUBLIC AND PRIVATE INVESTMENT IN KENYA

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## DECLARATION

This research paper is my original work and has not been presented for a degree award in any other university.


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APPROVAL

This research paper has been submitted for examination with our approval as a University Supervisors.


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# DEDICATION

This research project is dedicated to my father Hudson Birundu and my mum Teresa Birundu for their unrewardable and gift of encouragement and support

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**TABLE OF CONTENT**

**ABSTRACT**

This study undertakes to analyse the determinants of private investment and establish the relationship that exists between public investment and private investment in Kenya during the period of 1971-2011. The study adopts the flexible accelerator model using the time series data for the period in consideration. Variables in the model are real GDP, inflation, interest rate, domestic credit, exchange rate, exports and external debt. The data for these variables was collected from various sources including The Central Bank of Kenya, Economic Surveys, Statistical Abstract and International Financial statistics. Using econometric techniques such as unit root tests, co-integration and error correction model, the empirical results show domestic credit, real gross domestic product and exports have positive impact on private investment both in the long run and short run while exchange rate, external debt had both short run and long run negative impact on private investment. Public investment had only a short run negative impact while inflation had no any impact at all on private investment. The research findings show that higher amount of domestic credit, rising gross domestic product, more exports and low levels of total expenditure on public investment, less external debt and moderate exchange rate will boast private investment in Kenya. This study recommend the use of efficient and modern technologies in the manufacturing and agricultural sector to increase their productivity, more domestic credit to the private sector, debt relief among other policies are suggested to boost private investment in Kenya.

# LIST OF ABBREVIATIONS

MEI       Marginal efficiency of investment
ECM       Error correction model
INF       Inflation
GDP       Gross domestic product
EXCH      Exchange rate
INT       Interest rate
Im        Real Investment goods imports
EXPO      Exports
EXTD      External Debt
PUBIN     Public investment
LIB       Liberalization
ASEAN     Association of Southern Asian Nations
SSA       Sub-Saharan Africa
PI        Private Investment.
WB        World Bank
UNCTAD    United Nations Conference on Trade and Development
OLS       Ordinary Least Squares
CPI       Consumer Price Index
ECM       Error Correction Model
LDCs      Least Developed Nations
KNBS      Kenya National Bureau of Statistics

## LIST OF TABLES

## List of Figures

# CHAPTER ONE

# INTRODUCTION

## 1.1Background

Economists lay emphasis on capital investment as the major determinant of economic growth and development. Capital investment permits more roundabout methods of production and greater productivity thereby providing additional future source of income to the society.

As Adam Smith noted in his book Wealth of Nations (1909), capital is the determinant of "the number of useful and productive laborers" who can be set to work. Physical capital allows population to increase and labor force to increase, provides workers with better equipment and most important, makes possible a more extensive division of labor. It increases both total output and output per worker. Hence, the crucial role of investment is that, it helps in meeting the requirements of an increasing population of a developing country; it makes proper exploitation of natural resources and the establishment of different types of industries.

Hence role played by private investment in the economic growth cannot be overlooked, in most cases; private investment forms most of the total investment and compared with other forms of investments, its ratio to the total gross domestic product (GDP) is the major. Because of this reason, economists have been of the idea that, governments should be there to create enabling environment for private sector growth. Private investment has been identified to have a strong link with economic growth (Ghura 1997, Ghura and Hadjimichael 1996). This means that capital expenditure in the private sector should be utilized appropriately; to increase private investment has a direct effect on economic growth. According to Meier (1995), it is common to attribute at least 25% to 50% of the increase in GDP to capital investment. To him, this explains why countries with high GDP values have tendered to have highest rates of capital investment and vice verse.

## 1.2 Growth and Investment trends

Kenyan economic performance has been characterized by positive and negative economic growth, immediately after independence, economic growth was positive up to 1972 thereafter that growth was not sustainable 1973-74, 1979, 1990-91, and 2003, and donors withdrawals

1992 and 1997. The effects of this poor economic performance has led to the worsening of the balance of payment, unemployment, increased current account deficit, depreciation of the exchange rate and acceleration of inflation rate. As a result, there was increased investment cost leading to the reduction in economic growth. In recent years, economic growth rate fluctuated i.e.6.3% in 2006, 6.9% in 2007, 1.5% in 2008, 2.8% in 2009, 5.8% in 2010, 4.4% in 2011 and 4.6 in 2012(Government of Kenya, 2008 and 2013.This was due to low external flows to finance capital formation, poor infrastructure, low domestic credit, and low output. Furthermore, the poor performance of the economy has been attributed to the inappropriate agricultural, land, and industrial policies compounded by poor international terms of trade.

Kenya's long term economic growth rates have shown a decline overtime, during the period 1964-73 growth rates averaged 6.6%, 1974-1989 growth rate was 5.2%, the period 1990-95 growth rate was 2.5% and in the 2012 growth was 4.6% this shows that in the earlier years growth rates were much higher compared with the recent periods.

Table 1 shows how some of the economic indicators, as percentage of GDP have changed from the period 1964 to 2012.

**Table 1: Economic Indicators**

| Indicators | 1964-73 | 1974-79 | 1980-89 | 1990-95 | 1996-2000 | 2001-2005 | 2006-2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|
| GDP growth rate | 6.6 | 5.2 | 4.1 | 2.5 | 1.7 | 3.7 | 4.7 | 4.4 | 4.6 |
| Inflation (%) | 2.7 | 12.1 | 12.3 | 23.1 | 9.1 | 7.9 | 12.7 | 14.0 | 9.4 |
| GCF % of GDP | 19.7 | 23.8 | 24.1 | 20 | 17.2 | 17.3 | 19.5 | 20.0 | 20.6 |
| Exports % of GDP | 29.5 | 30.7 | 25.2 | 32.1 | 27.3 | 24.9 | 26.6 | 28.1 | 28.1 |
| Imports % of GDP | 30.4 | 34.8 | 29.6 | 32.1 | 38.2 | 33.1 | 38.9 | 45.1 | 44.7 |

Source: KNBS, various Statistical Abstracts and Economic Surveys 2013

Kenya's exports fluctuated between 24% and 32% of GDP since independence (Table 1). A few agricultural crops (especially coffee, tea and horticultural products) have been dominating exports. Crude petroleum, industrial machinery and industrial inputs such as iron and steel have continued to form major part of imports. Kenya's value for imports has not been matched by a corresponding increase in exports earnings consequently, there has been a high fluctuation in the terms and balance of trade i.e. the current account deficit rose from 2.9% of GDP over 1964-73 to 6.9% over 1974-79 on account of two oil shocks, a widening trade balance and overvalue. In the period 1996-2000, current account deficit was 2.5%, this is despite the introduction of trade liberalization in 1993. Even though liberalization has

increased the volume of imports, exports have grown lower rate than imports. Furthermore Kenya has continued to rely on industrial imports against primary exports and this has meant that there is the need for Kenya to encourage import substitution policy which calls for the creation of new industries that will manufacture domestically goods previously imported and this will reduce much of her industrial imports, this call for more investment,

Gross Capital formation (GCF) as a percentage of GDP continued to fluctuate in these periods as shown in Table 1, in situations where it improved it increased with small margin i.e. 17.2 in 1996-2000 to 17.3 in 2001-2005 a margin of 0.1, 20.0 in 2011 to 20.6 2012 a margin of 0.6. e.t.c. much of these fluctuations have been attributed to the collapse of the coffee boom, East African common market and lack of proper implementation of investment policy. The policy environment, along with tight import controls and foreign exchange controls, made the domestic environment for investment unattractive for both foreign and domestic investors.

Inflation has been fluctuating between 23% in the period 1990-95 to as low as 2 in 2002, (Table1). Inflation has mainly been a monetary phenomenon. Low monetary supply growth has coincided with low inflation and vice versa. The transition from a low inflation in the period 1964-73 to a higher rates over 1990-1995 was consistently matched by increasingly expansionary monetary policies as Kenya responded to various internal and external shocks( the oil crisis and coffee boom) were responsible for rapid growth in monetary supply in 1970s. In the mid 1990s, the government recommended the Central Bank of Kenya not to limit the extent to which the deficit could be monetized.

Table(1) show that most of the economic indicators have had a declining trend. For instance the economy's real growth rate in 1964-73 was 6.6% but declined thereafter and Gross capital formation also depicts the same trend.

Table(2) shows how various sectors have contributed to the gross domestic product in percentage form.

**Table 2: Sectoral contribution to GDP 1964-2003 (% of GDP)**

| Sector | 1964-73 | 1974-79 | 1980-89 | 1990-95 | 1996-99 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| Agriculture | 36.6 | 33.2 | 29.8 | 26.2 | 24.5 | 19.7 | 18.6 | 16.4 | 16.6 |
| Manufacturing | 10 | 11.8 | 12.8 | 13.2 | 13.3 | 12.9 | 12.6 | 13 | 13.1 |
| Services | 53.4 | 55 | 57.4 | 60.2 | 62.2 | 61.1 | 63.1 | 64.6 | 64.2 |

Source: KNBS, Statistical Abstract and Economic Survey 2004

The contribution of the various sectors to the GDP are given in Table 2, the share of the structural transformation has occurred in the economy. The share of the manufacturing sector has increased from an average of around 10% between 1964 and 1973 to approximately 13% in the 2003 while the share of agriculture has declined from an average of about 17% between 1964 and 1973 to 16.6% in 2003. This trend conforms to the empirical evidence that when a country develops, the contribution of the manufacturing sector to GDP expands; at some point it exceeds that of the agricultural sector. The service sector has grown rapidly, its share in GDP rose from 53.4% in 1964-1973 to 62.2 in1996-99 period and to 64.2 in 2003. The service sector contributes over half of Kenya's GDP and it provides over two-thirds of total modern wage employment. In this regard, its future prosperity is of vital importance to the economy besides employment, it also provides support to other sectors.

**1.3 Problem statement**

Econometric evidence (Ghura 1997, Ghura and Hadjimichael 1996) indicates that private investment has a stronger, more favourable effect on growth rather than public investment, probably because private investment is more efficient and is not closely associated with corruption.The ratio of private investment to GDP in Kenya since 1995 to 2007 has been on averaged of 11.3%, which is below the levels attained by countries with better living standards, i.e.16% in Latin America, 18% in advanced countries and 16.5% in the newly industrialized countries in Asia (Hernandez-Cata, 2000). A high percentage rate will enhance economic growth that is required for employment creation, poverty reduction and the reduction of balance of payment deficits (Meier, 1995).

Given that there is a strong link between high investment and sustainable growth, a steady decline since 1995 has been experienced in Kenya's private investment as ratio of GDP. This has been a matter of considerable concern to policy makers.

Furthermore, since the study by Blejer and Kahn (1984), Ascheaur (1989), several studies have been carried out to test the impacts that public investment may have on private investment and most of these studies have yielded mixed and contradictory results (Everhart and Sumlinki, 2001), such studies were based on panel of countries i.e. Greene and Villanueva (1991) and Ramirez (2000); Odedokun (1997) and Oshikoya (1994). Also single-country studies, show more inconsistence results as to whether public investment and private investment are complements or substitutes. This study will consider total public investment and private investment, in order to answer the question: Did higher public investment crowd out or in private investment in Kenya during the period 1971-2011?

Viewed against the background of the growing evidence of a strong link between high investment and sustainable growth, this study will attempt to specify the determinants of the private investment and also establish the relationship that exist between public and private investment in Kenya.

## 1.4 Objectives of the study.

The study's main objective is to analyze the determinants of private investment and also to establish the relationship between public and private investment in Kenya.

The specific objectives are:-

1. To analyze the impact of domestic credit, real gross domestic product, public investment, exchange rate, inflation, interest rate, external debt and exports have on the private investment in Kenya
2. To establish the relationship that exists between public and private investment
3. To provide policy recommendations based on research findings

## 1.5 Hypotheses of the study.

Three categories of hypotheses can be identified. The first category is that there is positive relationship between Real GDP, domestic credit (DCR), exports (EXPO), and, private investment. Second category is that private investment is negatively influenced by interest rate (INT), exchange rate (EXCH), external debts (EXTD) and inflation (INFL). Third is that private investment is influenced by public investment (PUBIN) whose relationship cannot be determined a prior.

**1.6 Significance of the Study**

This study is geared towards determining the relationship that exists between Real GDP, domestic credit, interest rate, exchange rate, inflation, exports, external debt, public investment and private investment in Kenya. Since Kenya, and other Sub-Saharan countries have been actively involved in alleviating poverty, reducing unemployment and balance of payment deficit while at the same time trying to find ways of raising income levels, this study will prove very important to these countries because policy makers will benefit by using the information from this study to formulate appropriate policy regarding these factors thereby positively influencing private investment.

The need for better policies will be aimed at improving private investment and this can be achieved by examining the determinants of private investment and the impacts they have on it. The necessity of formulating sound policies is well highlighted in the investment policy of Kenya, as stated below.

"Kenya has had a long history of economic leadership in the East Africa as one of its largest and most advanced economies. However, inconsistent efforts at structural reforms and poor policies over the past couple of decades have generated a prolonged period of decline in development indicators and significant eroded the leadership position at a time when other countries in the region have made significant results" (Government of Kenya, 2005).

It has also been argued that, the impact public investment may have on private investment are many. Public investment plays many competing and offsetting roles in its effect on the investment activities of the private sector, so that the net effect of public investment on private investment is an empirical question (Erden and Halcombe, 2006).

Hence, the research results will prove valuable in guiding policy makers on how to formulate appropriate policies not only on private investment but also on total investment as a whole. Furthermore, researchers too need this study for further study, besides improving already existing body of literature, policies and guidelines.

On the other hand, the information on this study can be used to compare with other macroeconomic determinants on private investment in other countries as well as it may be

needed by international governmental organization and other countries so as to persuade them to provide funds to aid in increasing investment in Kenya.

## 1.7 Organization of the paper

The rest of the paper has been organized as follows. Chapter Two presents literature review, which has both theoretical literature review and empirical literature review. Chapter Three presents the methodology of the study, data analysis and interpretation forms chapter four while, chapter five embodies summary, recommendations and conclusions.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1.0 Theoretical Literature Review

## 2.1.1 Accelerator Model

This model was developed by Clerk (1917) and it expresses a simple relationship between the rate of investment spending and changes in aggregate output. This model depicts that, investment varies directly with the rate of change in output. For instance, change in output, ceteris peribus, the desired level of capital will also change. This implies that once there is demand for output increase, then investment will also increase. Furthermore, the model postulates that, the larger (desired capital being larger), the greater the firms rate of investment. Firms will therefore strive to close a fraction $\beta$ of a gap between the desired capital (K*) and the actual capital stock (K) in each period. This implies that the desired capital stock (K) is constant fraction of output (Q) as represented below

$$K* = \beta (Q)$$

Therefore capital formation occurs when new capital equipment is being built to increase output as represented below.

$$\Delta K = I = \beta (Y_t - Y_{t-1})$$

Where $\beta$ is the accelerator coefficient.

$B = K/Y = $ Capital-Output Ratio.

## 2.1.2 Flexible Accelerator Model

Unlike the accelerator model, this model incorporates the user cost of capital in determining capital stock. It is an improvement on the accelerator model and it states that the actual change in capital stock ($K_t - K_{t-1}$) depends on the user cost of capital. The lower the rental cost of capital, the larger the desired capital stock. Therefore firms will continue to increase capital stock up to the point where the marginal product of labor is equal to the rental cost of capital. The model also shows that whenever the user cost of capital is high, investment will reduce and hence the rate of investment will also reduce. The general relationship among the desired capital stock (K*) and the rental cost of capital (rc) and the level of output is expressed as

$K* = (rc, y)$          $I = K_t - K_{t-1}$

Where I=is investment. $K_t$ is the actual capital stock at the current period while $K_{t-1}$ is last period's capital stock. In the flexible accelerator model; internal funds, cost of external financing, output and other variables can be incorporated as the determinants of the desired capital stock ($K^*$).

Also this model assumes perfect knowledge and access to relevant economic information between economic agents.

### 2.1.3 Marginal efficiency of capital (MEC)

Keynes(1936), postulated that investment is determined by marginal efficiency of capital relative to the prevailing market interest rate, this reflect the opportunity cost of invest funds. Keynes obtained a demand function for capital which was negatively related to the rate of interest. Thus Keynes coincides with the flexible accelerator model, in the sense that firms will hire an input up to the point at which its marginal product is equal to its price. Hence in the case of capital durable producer good which lead to a stream of income, over a certain length of time, the future returns and variable costs have to be estimated. It is then possible to use the present value method for deciding whether a firm should or should not buy a machine. Two approaches are then followed:-

### (a)Present value approach

$$NPV_t = -C + R_t + R_{t+1}/(1+r) + R_{t+2}/(1+r)^2 + \ldots\ldots + R_{t+n}/(1+r)^n$$

Present value is maximized in projects with positive net present value (N.P.Vs) and implementation priorities are placed in order of their P.Vs.

$$I = I(r)$$

### (b) Marginal efficiency of capital approach

$$-C + R_t + R_{t+1}/(1+m) + R_{t+2}/(1+m)^2 + \ldots\ldots + R_{t+n}/(1+m)^n = 0$$

Where, M is the rate of interest that discounts the present value of the project equal to zero. Investment projects are ranked in order of their Ms. According to Keynes, investment is a function of interest and the marginal efficiency of capital. The two methods are equivalent, if it is assumed the in the calculation of the internal rate of return. All returns are re-invested at the same M and that the rate of interest (M), are constant overtime.

9

However, there could be a problem with the internal rate of return in that, M may not be unique or it may be a real number.

Other economists who have argued along the same line on capital formation are; Kaldor (1957), Robnson (1956). Kaldor used a growth model for developing countries and found that, the growth of capital is determined by the performance of the economy. He showed that during times of economic boom there is an increase in the growth of capital and during economic stump capital decreases. He also noted that capital-output ratio is constant overtime, that is, they move in the same direction and by the same magnitude. Joan Robinson in her book the Accumulation of Capital (1956), viewed the determinants of investment to be; availability of funds capacity and the monetary system. She also found that past level of investment that is, if the previous year's investment was high, the condition for investment in the future is created.

## 2.2 Empirical Literature Review

A study by Matin and Waso (1992), employed an eclectic version of the basic accelerator model in assessing the determinants of private investment and to analyze how adjustment policies affect the determinants in the study. The variables in the model were; real interest rate, infrastructure capital stock, credit financing, foreign exchange reserves and gross domestic product. They found that Kenya's failure to implement adjustment policies after the collapse of the East Africa common market reduced private investment. Declining real credit to private sector, falling stocks of public infrastructure capital and lower availability of imports were the main causes of reduced private investment. Real depreciation was found to have a negative effect on private investment.

A study by Nabende and Slater (2003), focused on Private capital Formation: Short- and Long-run Crowding –in (out) effects in the Association of Southeast Asian Nations (ASEAN), 1971-1999. The model included the following variable; output growth, foreign direct investment, real exchange rates, public investment, fiscal deficit, real interest rates and uncertainty. The results of the short run suggest that output growth and public investment were the dominant factors, while in the long run, besides output growth and public investment, the foreign direct investment was another factor. Output growth had a positive effect, while public investment was significant but negatively on private investment. FDI was

found to be complimentary on less developed countries while crowding out in developed ones. Interest rate had a negative sign while exchange rate was less significant. External indebtedness had no evidence to show that it reduces private investment and there was no conclusive evidence that economic uncertainty deters private investment.

Akkina and Celebi (2002), studied the determinants of private investment and the relationship between public and private capital accumulation in Turkey (1970-1996), employing the reformulated flexible accelerator model with the following variables; real domestic credit, nominal gross domestic product, private sector net fixed investment, public sector gross fixed infrastructural investment, public sector gross fixed non-infrastructural investment, real investment goods imports, nominal interest rate, private sector capacity utilization, and percentage change in inflation. They found that real investment goods imports, change in real output, gross fixed infrastructure, GNP real domestic credit and capacity utilization, impacted positively on private investment while gross fixed noninfrastructure and percentage change in inflation measured by the GNP deflator, had a negative sign. Although percentage change in inflation was negative but was not statistically significant.

Martinez-Lopez (2001), linking public investment to private investment: Case of Spanish Regions. In his study employed a panel data approach with interest rate, public consumption, marginal productivity for private capital, productive public investment, social public investment were the variable. The estimate found a positive effect of productive and social public investment (especially in education) on private investment while public consumption and interest rate exert a negative influence on capital accumulation.

Erden and Holcombe (2006), was testing the linkage between public and private investment, a co-integration analysis for a panel of developing countries and using a neoclassical model with the following variables real gross private investment, real gross public investment, real exchange rate, inflation rate, Real GDP, uncertainty, real bank credit, user cost of capital. They found that GDP, the real interest rate and uncertainty do not affect short run dynamics of private investment. Public investment and credit availability had significant impacts on private investment in the short run. Real GDP had a strong accelerator effects. While pubic investment compliments private capital in the long run and in the short run. The real interest rate had no effect on the short run dynamics, the results consistently indicate that the flow of real credit to the private sector affects investment in the short run, this depicts that, quantity

constraints on bank have a larger impact on private investment. By contrast, Fry (1988), found a positive relationship between real interest rate and real monetary balance. According to him, the major weaknesses of financial liberalization is its total disregard to adverse effects of high lending rates of borrowing which raises the cost of capital services and therefore lowers investment.

A study by Everhart and Sumlinski (2001), focusing on the Trends of private investment in developing countries(1970-2000) and the impact on private investment of corruption and the quality of public investment, found that, the lagged private investment is positive and highly significant, Debt overhand was negative and significant, broad money was also positive and significant. They also concluded that corruption inflates public investment, these effects are associated with two variables – a higher public investment is associated with low private investment (crowding out), the relationship is negative and statistically significant. The interaction between the corruption index and the level of public investment captures the indirect effect of corruption via its impact on the quality of public investment. The corruption variable is positive and statistically significant. A larger corruption variable of corruption index signifies less corruption, which implies that any given level of public investment will be with higher corruption; less corruption leads to higher quality public investment and is associated with a higher level of private investment.

A study by Umoh (1994) focused on a relationship for saving to investment and using causality Granger tests, found that there was no causal relationship for saving to investment. Saving therefore does not Granger cause investment. Although the coefficient were positive, they were insignificant.

Serven (1996), using a standard reduced form investment equation that included measures of instability, found that the variability of inflation had a significant adverse impact on investment. Other uncertainty variables were; the variability of terms of trade, parallel market premium and real exchange rate and the debt to GDP ratio, had a significant and correct signs. On the other hand, study by Edwards (1989), while focusing on monetary and determinants of real exchange rate, also found that investment was negatively related to private investment.

Ronge and Kimuyu (1997), reviewed private investment policy content of development Planning. They demonstrated that the public investment in Kenya compliments Private investment; hence infrastructural services are central to enterprise performance so that areas with good roads, reliable cost effective utilities are more likely to attract private sector activities and investment.

A study by Ahiabor (2003), analysed the impact of corporate tax on investment in Ghana. Using modeling reduction technique, he found that the real growth rate of GDP was positive but not significant. The lending rate had the expected negative sign and it was significant. Corporate tax had the expected sign, in that it was negative and significant. The exchange rate had a positive sign and was significant.

A study by Ouattara(2005), focusing on the determinants of investment in Senegal economy with the following variables in his model; private sector investment, public sector investment, credit to the private sector, foreign aid, and terms of trade. He found that public investment, foreign aid flows and real income impact private investment directly. The terms of trade and credit to the private sector had indirect relationship with private investment.

Blejer and Khan (1984) focused on government policy and private investment in some 24 developing countries derived explicit relationship between; variations in the bank credit and government expenditure (government investment) and private capital formation. The results indicated that, the change in expected real GDP, the availability of funds to private sector, the government investment were positively related to private investment. Excess productive capacity was negatively related to private investment.

Greene and Villanueva (1991) conducted an empirical study using panel data of 23 developing countries. In this study, they estimated the equation of private investment using pooled time series and cross sectional approach. Their investment function specified the neoclassical theory to study the behavior of private investment. Using several macroeconomic variables for 23 countries, the equation is given in the following form.

$$IP/Y = f(RI, GR_{t-1}, IPUB/GDP, CPI, INC_{t-1}, (DS/XGS)_{t-1}, (DEBT/GDP)_{t-1}, Z).$$

Where: IP/Y = the ratio of private investment to GDP

RI = the real deposit interest rate, as measured by the ratio (1+NINT)/1+ECPI,

Where: NINT is the nominal interest rate

ECPI is the expected inflation rate.

$GR_{t-1}$ = the lagged percentage change in real GDP per capita

IPUB/GDP = the ratio of public sector investment to GDP

INF = the rate of inflation

$INC_{t-1}$ = the lagged level of per capita GDP in current US Dollar

$(DS/XGS)_{t-1}$ = the lagged ratio of external debt service payments to exports of goods and services.

$(DEBT/GDP)_{t-1}$ = the lagged ratio of the country's stock of external debt to its nominal GDP.

Z = A vector of country dummy variables, one for each country in the sample.

In their estimation, they used lagged values of current values of real per capita growth$(INC)_{t-1}$, per capita GDP level$(GR)_{t-1}$ and for debt service ratio$(DS/XGS)_{t-1}$, this mechanism helps to reduce the possibility of simultaneous equation bias in coefficient estimates. They estimated separate equations for the two sub periods that is 1975-81 and 1982-87; this helps to test the effect of the post 1981 debt crisis on the result.

Their findings were that the lagged debt service and the debt stock were both negative and significant, (IPUB/GDP) and $GR_{t-1}$, were positive and highly significant. Furthermore, estimated coefficient for inflation rate (CPI) was negative and highly significant, indicating that higher inflation rate, had a negative impact on the private investment. These findings are more consistent with the neoclassical investment model than with Mackinnon and Shaw hypothesis. It also indicate that high real interest rate act as an impediment to investment by raising the user cost of capital than to boosting investment by increasing the volume of financial savings.

## 2.3 Overview of empirical Literature

From empirical literature review, several models have been employed in order to determine factors that influence private investment, i.e. Tobin's q approach, financial repression, foreign exchange shortage neoclassical case under perfect competition, while other scholars use a combination of some of these models. The results of these studies mostly depend on models chosen. In case of this study, the flexible accelerator model is used. Although this model has

been successfully in the advanced countries where we have the reliability of data and also due to the assumption of perfect knowledge and access to relevant economic information between economic agents, this cannot apply to third world where there are data limitations and structural constraints. This has led to the modification of the flexible accelerator model in the LDCs and it has often been the most applicable in empirical research Ouattara (2004), Seruvatu and Jayaraman (2001).

From the literature review, it can be observed that, several factors can determine private investment, i.e. exchange rate, interest rate, real GDP, Public investment, domestic credit, among other variables. Private investment is primarily influenced by the profit motive, in this sense many factors in an open economy i.e. Kenya are beyond the control of investor, profit expectations center around the future price level and export competitiveness( Serven and Salimano 1992), as a result a low rate of inflation and appropriate pricing of capital and land to maintain international competitiveness are the main macroeconomic challenges for decision makers to make the country investor friendly (World Bank 1995).

Furthermore, a high rate of inflation will tend to discourage private investment and this call for prudent fiscal policies, which will avoid unsustainable fiscal deficits, as well as good monetary policies.

Although there has been studies regarding public investment, most of these studies have yielded contradictory results i.e. Bleja and Khan (1994), Oshikoya(1994), Greene and Villanueva(1991) support complimentarity of private and public investment, while some like that of Ramirez supported substitutability of public and private investment. Thus there is the need to carry out more studies regarding public investment because there has been no consensus as to the impact it has on private investment, thereby enhancing policy formulation regarding fiscal policies towards private investment.

Hence, this study will therefore adjust the neoclassical flexible accelerator model to incorporate the variables: Domestic credit, inflation, public investment, external debt, exports, and the exchange rate in an effort to determine whether they influence private investment in Kenya

# CHAPTER THREE
# METHODOLOGY

## 3.1 Theoretical Framework of the model

The idea in the formulation of private investment model is that, investment in the private sector follows the flexible accelerator hypothesis. This model assumes that the larger the gap between the existing capital stock and the desired capital stock, the greater the firm's rate of investment. Firms will plan to close the gap between the desired capital sock, K* and the actual capital stock, K in each period.

The flexible accelerator model has been the most popular, however in the context of developing countries due to the data limitations and structural constraints, a variant of the flexible accelerator model has often been used in empirical research Ouattara( 2004 ), and Seruvatu and Jayaraman (2001)). This model has been utilized in this study, to reflect data limitations and structural constraints characterized by LDCs. Other variables incorporated in the model include; inflation, public investment, domestic credit, exchange rate, external debt and exports.

All the variables used in this study have been incorporated in the private investment function to investigate and see whether they have any impact on private investment. Most of the LDCs countries have been faced with unstable macro-economic growth; this makes it possible to embrace variables like interest rate, inflation and Real GDP. Also the LDCs encounter unfavorable trade with developed countries necessitating us to include exchange rate, exports and external debts. Public investment will reflect the role the government play in private sector investment.

## 3.2 Model specification

Following the discussions in chapter two and the above theoretical framework, the benchmark model to be tested here is the modification of flexible accelerator model of investment for a developing economy and focuses on the hypothesized determinants of private investment in Kenya. The, general private investment equation is given as

PI =F (RGDP, INT, DCR, INF, EXPO, EXTD, EXCH PUBIN)

Where:

PI is the private investment

RGDP is the Real GDP

INT is the Real Interest rate

DCR is the Domestic credit given to private sector

INF is the inflation

EXPO is exports

EXTD is external debt

EXCH is the exchange rate

PUBIN is public investment

The above equation shows the implicit function of the private investment. The explicit function is as follows.

$$PI=\beta_0+\beta_1 DCR+\beta_2 EXCH+\beta_3 EXPO+\beta_4 EXTD+\beta_5 INT+\beta_6 PUBIN+\beta_7 RGDP+ \mu_t$$

**3.3 Definitions and Measurements of variables**

The dependent variable is the private investment (PI), which is the total amount, spent on private investment measured in Kenyan shillings in real teams.

The following are the independent variables;

RGDP is the value of total production of real goods and services in an economy over specified period of time, usually one year, expressed in real terms.

Interest rate is the cost of borrowing of funds for use over a given period of time. It is measured as percentage

Domestic credit is the credit advanced by domestic credit institutions to non-bank residents. It is expressed as the total amount of domestic credit advanced to non-bank residents over a given period of time (one year), expressed in real terms.

Exchange rate is the cost of one currency against another, measured as the quantity of US dollar per Kenyan shillings.

Exports represent the total value of all goods and other market services provided to the rest of the world by Kenya. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services.

External debt is the debt owed to nonresidents repayable in foreign currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. It is expressed as the total amount in Kenyan shillings, in real terms.

Public investment is public expenditure on investment such highways, water, sewerage lines, communications systems, health facilities, education, proxied by the government expenditure on total investment expressed in real terms.

Inflation is the general price increase in the economy. It is measured by the percentage change in the consumer price index.

### 3.4 Expected a prior

From economic theory, the expected signs of the above variables in relation to private investment are as follows.

We expect a positive relationship between gross domestic product and private investment. This is because as demand for goods and services increases, it puts pressure for more investment in real capital goods in order to meet the increasing demand.

Economic theory postulates a negative relationship between interest rate and private investment; this is due to the fact that as interest rate increases, it becomes expensive for the private sector to borrow financial resources to invest. Thus the interest rate (cost of investment) is inversely related to investment.

A positive relationship is expected between the private sector credit and private investment. When we have more financial resources, the private sector will get more credit which it uses for more investment.

Economic theory postulates a positive relationship between exports and Private investment. As the demand for exports increases puts pressure on the available investments to produce more, this necessitates investors to increase their investments to cater for the increasing demand of home goods in foreign countries.

We expect a negative relationship between external debt and private investment. Debt overhang and servicing has shown negative impact on investment.
We cannot a prior determine accurately the expected relationship between public and private investment. Some instances public investment have crowded out private investment i.e such a crowding out effects have been attributed to financing government projects through higher taxes or through public borrowing. In this case public investment has a negative impact on private investment. However in some cases public investment may boost private investment by increasing private returns through the provision of communication, transport and other infrastructure (Green and Villanueva, 1991). Thus the sign of public investment cannot be determined a prior.

Inflation affects investment by increasing the uncertainty of investment. Inflation may lead to a reduction of investment.

We expect a negative relationship between exchange rate and private investment. When the domestic currency appreciates it may lead to decrease in the rate of investment. Imports will become cheaper as compared to domestically goods and hence more imports will be consumed than domestically produced goods and services.

## 3.5 Data type and sources

The period chosen for economic analysis is 1971-2011 using annual data. This period is chosen in consideration to data availability and also in an effort to retrieve how variables under study, have been determining the trend of private investment. The data used was

obtained wholly from secondary sources, specifically; Statistical abstract, and Kenya's Economic Surveys, International financial Statistics, and Central Bank of Kenya.

## 3.6 Data Analysis

### 3.6.1 Test for integration

This test is used to determine whether the data for the variables under study is stationary (or nonstationary). This test is conducted to prepare the time series variables for statistical analysis and to ensure that variables to be used in the analysis are integrated of the same order. A unit root test is a statistical test for the proposition that in the autoregressive statistical model of the time series data, the null hypothesis is that $\rho=0$, where $\rho=\alpha-1$ and $\alpha=1$ in the equation $\Delta y = \rho y_{t-1}+v_t$, where $v_t$ is a random term and the alternative hypothesis is that $\rho$ is less than zero in the equation. If $\rho=0$ or $\alpha=1$, then there is a unit root and the variable under consideration is nonstationary or integrated and if the null hypothesis is rejected then the time series variable is stationary. A stationary series depicts mean revision in that it fluctuates around a constant long run mean and has a finite variance that is time invariant. On the other hand nonstationary time series when used in estimation, produces unreliable t-statistic of the estimated coefficients that have infinite variances, mean or variance that are time dependent i.e no long run mean to which the series returns to.

It is essential for the unit root test to be carried out on all the time series variables to determine the order of their stationarity before OLS regression is done to avoid spurious results. Yule showed that nonstationary variables produce spurious regression results with a high $R^2$ value and t-statistic that may lead one to conclude that there is a significant statistical relationship between the dependent and independent variables, whereas a prior there should be none. According to Granger and Newbold, an $R^2 > d$(Durbin Wartson) is a rule of thumb to suspect that the estimated regression is spurious.

To test for stationarity or nonstationarity, the augmented Dickey Fuller (ADF) test was applied to time series variables.

A variable is nonstationary if the estimated ADF test statistic is smaller than the critical value in absolute terms and vice versa. Some nonstationary variables have to be differenced to make them stationary. If a time series has a unit root, the first difference of such time series has to transform it to stationary. The test for unit root and differencing is done to avoid the problem of spurious and inconsistence regression results.

**3.6.2 Estimation Technique**

The estimation technique used in this study is the Ordinary Least Squares (OLS); this was done with the help of E-views and it was applied to the time-series or annual data to estimate the regression line. The study used both ECM and Co-integration using Engle-Granger two step procedure to determine the long run and short run models, this was done to avoid the problem of spurious regression results which might imply a significant relationship between private investment and its determinants which in fact could not exist. Other tests are Ramsey reset, Heteroscedasticity and normality tests that catered for proper model specification and reliability results.

# CHAPTER FOUR

# RESULTS AND DISCUSSIONS

**4. Introduction**

This chapter deals with data presentation, interpretation and analysis. It shows the discussions and the results from the collected data. Also diagnostic and stability tests are included in this chapter.

**4.1 Stationality Test results**

The augmented Dickey-Fuller (ADF) test is used in determining the order of stationality. Table (3) below show the results of ADF test.

**Table 3: The ADF test for unit root**

| | At Level | | At First Difference | | Order of Integration |
|---|---|---|---|---|---|
| Variables | t-statistic | Critical values | t-statistic | Critical values | |
| Private Investment | -0.8803 | -4.2023 at 1% <br> -3.5247 at 5% | -4.5171 | -4.2092 at 1% <br> -3.5229 at 5% | I(1) |
| Domestic Credit | -0.3711 | -4.1958 at 1% <br> -3.5217 at 5% | -4.9183 | -4.2023 at 1% <br> -3.5247 at 5% | I(1) |
| Exchange Rate | -1.9664 | -4.2023at 1% <br> -3.5247 at 5% | -4.9737 | -4.2092at 1% <br><br> -3.5279 at 5% | I(1) |
| Exports | -0.6609 | -4.2023 at 1% <br><br> -3.5247 at 5% | -5.3916 | -4.2092 at 1% <br><br> -3.5279 at 5% | I(1) |
| External debts | -1.5557 | -4.2092 at 1% <br> -3.5279 at 5% | -3.6895 | -4.2165 at 1% <br><br> -3.5312 at 5% | I(1) |
| Interest rate | -1.4720 | -4.2023 at 1% <br> -3.5247 at 5% | -3.2180 | -3.2180 at 5% <br><br> -3.1949 at 10% | I(1) |
| Public investment | -2.0530 | -4..2023at 1% <br> -3.5247 at 5% | -4.1455 | -3.6067 at 1% <br><br> -2.9327 at 5% | I(1) |
| Real gross domestic product | -0.1917 | -4.2023 at 1% <br><br> -3.5247 at 5% | -3.4688 | -3.6067 at 1% <br><br> -2.9378 at 5% | I(1) |
| Inflation | -3.8106 | -3.6019 at 1% <br><br> -2.9358 at 5% | | | I(0) |

The results show that all the variables are nonstationary at levels except inflation and therefore they were differenced once to make them stationary.
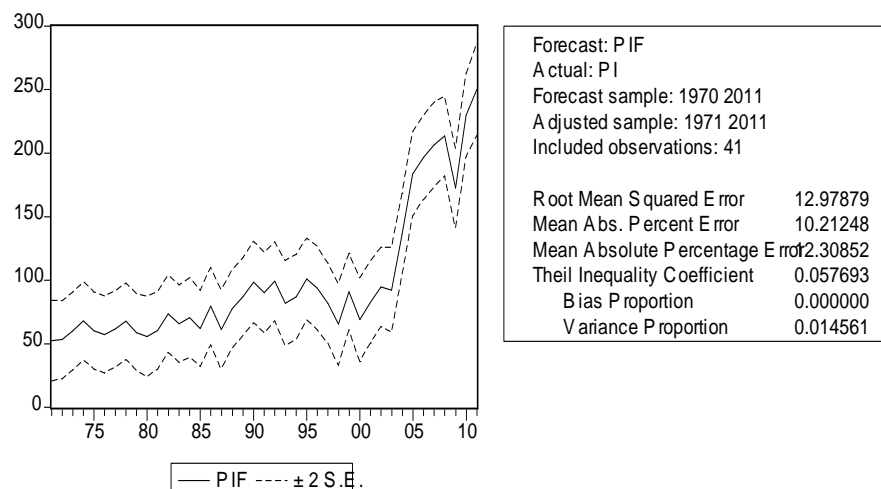
## 4.2 Co-integration results

A times two or more variables may be nonstationary but a linear combination of these variables form a long term or equilibrium relationship between them. This condition is exhibited when a regression of these variables is run and residuals from these regression are subjected to unit root test and found to be stationary at levels I (0). Under these condition, although the individual variables are I(1) that is they have stochastic trends their linear combination is I(0) and the regression results from these variables is consistent and give a meaningful interpretation, in  these instances the variables are said to be co-integrated. Variables, found to be co-integrated must be integrated of the same order. The Engle-Granger two step procedures was used and found that there was co-integration between private investment and its determinants. The long run equation of the following form was estimated.

$$PI = \beta_0 + \beta_1 DCR + \beta_2 EXCH + \beta_3 EXPO + \beta_4 EXTD + \beta_5 INT + \beta_6 RGDP + \beta_7 PUBIN + \mu_t$$

The above equation excludes inflation because it is stationary at levels. Residuals were obtained from this equation. From here we obtain the forecast value for private investment which is shown in figure (1).

**Figure 1: Forecast value for private investment**



| | |
|---|---|
| Forecast: PIF | |
| Actual: PI | |
| Forecast sample: 1970 2011 | |
| Adjusted sample: 1971 2011 | |
| Included observations: 41 | |
| | |
| Root Mean Squared Error | 12.97879 |
| Mean Abs. Percent Error | 10.21248 |
| Mean Absolute Percentage Error | 12.30852 |
| Theil Inequality Coefficient | 0.057693 |
| Bias Proportion | 0.000000 |
| Variance Proportion | 0.014561 |

— PIF ---- ±2 S.E.

ECM = PI – PIF

Then the ECM residuals were exposed to the unit root test and the results are as shown below

**Table 4: Engle-Granger two step co-integrating test at levels**

| | | | |
|---|---|---|---|
| ADF test statistic | -4.0986485 | 1% Critical Value | -3.6067 |
| | | 5% Critical | -2.9378 |
| | | 10% Critical Value | -2.6029 |

If the computed Engle Granger test statistic value has excessive negativity than the critical value then we conclude that the residuals from the private investment function are I (0); that is, they are stationary at levels. The ADF test-statistic value in Table (5) shows that the ECM exhibit excessive negativity leading to the conclusion that these variables are co-integrated and the parameters of investment function can be interpreted as long run parameters. From this conclusion the error correction model for private investment function is adopted as shown below

$$\Delta PI = \beta_0 + \beta_1 \Delta DCR + \beta_2 \Delta EXCH + \beta_3 \Delta EXPO + \beta_4 \Delta EXTD + \beta_5 \Delta INT + \beta_6 \Delta PUBINV + \beta_7 \Delta RGDP + \beta_8 INF + \beta_9 ECM(-1) + \mu_t$$

## 4.3 Long run equilibrium

Since we have found that the private investment function does form a long run equilibrium relationship, its parameters can be interpreted as long term parameters and therefore the long run regression result is consistent and meaningful. The long run regression results can be viewed in appendix.III

## 4.4 Diagnostic Tests

The ordinary least squares require that certain assumptions must hold for the output (results) to be reliable. The following diagnostic tests were conducted

## 4.4.1 Multicolinearity of the regressors

Multicollinearity in the ordinary least squares poses a major problem but in the context of co-integrated regressors,  multicollinear is important since such variables follow similar trends at

a point on time and hence a linear combination of the time series will be stationary and thus collinearity is a positive advantage. In this study the correlation matrix was used to test for multicollinearity and some of the long run regression variables were found to be having low levels of multicollinearity while other variables had a high level of multicollinearity. In the short run model, the variables have low levels of multicollinearity as shown in Table 5 and hence do not pose any serious problems to this study.
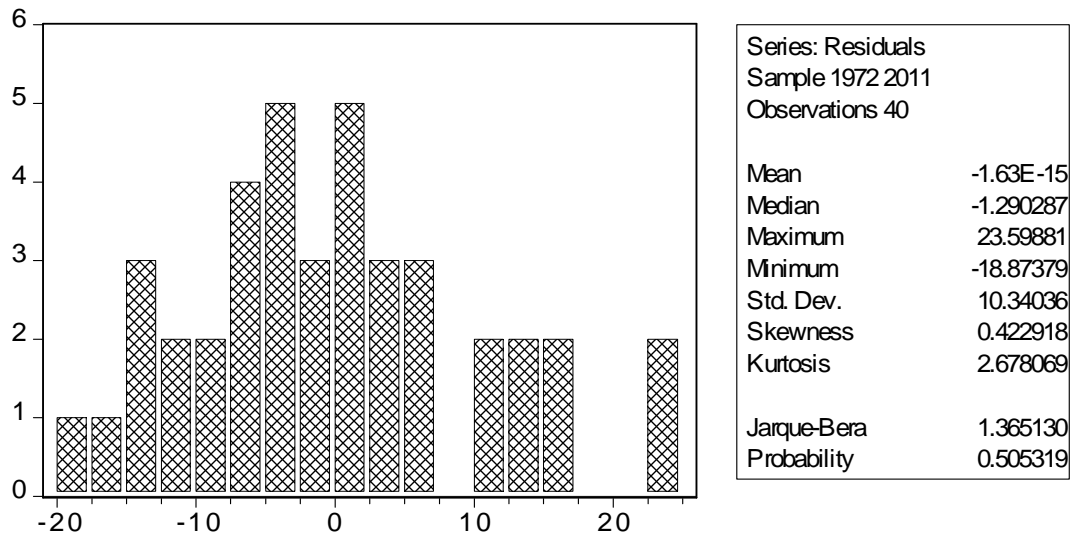
**Table 5 Correlation matrix**

|  | D(DCR) | D(EXH) | D(EXPO) | D(EXTD) | D(INT) | D(PUBIN) | D(RGDP) | INF |
|---|---|---|---|---|---|---|---|---|
| D(DCR) | 1.000 | -0.274 | 0.154 | 0.351 | -0.226 | -0.083 | 0.428 | -0.230 |
| D(EXCH) | -0.274 | 1.000 | 0.494 | -0.106 | 0.421 | 0.229 | -0.120 | 0.552 |
| D(EXPO) | 0.155 | 0.494 | 1.000 | 0.122 | 0.271 | -0.073 | 0.240 | 0.261 |
| D(EXTD) | 0.351 | -0.106 | 0.122 | 1.000 | 0.106 | 0.071 | 0.303 | -0.027 |
| D(INT) | -0.226 | 0.421 | 0.271 | 0.106 | 1.000 | 0.064 | -0.051 | 0.670 |
| D(PUBIN) | -0.083 | 0.230 | -0.074 | 0.071 | 0.064 | 1.000 | 0.342 | 0.054 |
| D(RGDP) | 0.428 | -0.110 | 0.240 | 0.303 | -0.051 | 0.342 | 1.000 | -0.314 |
| INF | -0.231 | 0.552 | 0.261 | -0.027 | 0.670 | 0.054 | -0.314 | 1.000 |

### 4.4.2 Residual tests

### 4.4.2.1 Histogram-Normality Test

The test for normality seeks to establish whether residuals are well distributed or not. The null hypothesis for this test, is that kurtosis = 3, skewness = 0 and Jarque-Bera probability be more than 10%, if this is the case, then residuals are said to be normally distributed. From the result below kurtosis = 2.678067, skew ness =0.422918 while probability =50.53% thus we can accept the null hypothesis of normality and say that residuals are well distributed as depicted in figure(2).

**Figure 2: Histogram-Normality Test**



| | |
|---|---|
| Series: Residuals | |
| Sample 1972 2011 | |
| Observations 40 | |
| | |
| Mean | -1.63E-15 |
| Median | -1.290287 |
| Maximum | 23.59881 |
| Minimum | -18.87379 |
| Std. Dev. | 10.34036 |
| Skewness | 0.422918 |
| Kurtosis | 2.678069 |
| | |
| Jarque-Bera | 1.365130 |
| Probability | 0.505319 |

## 4.4.2.2 Serial correlation LM test

This test enables one to know whether residuals are serial correlated or to detect for autocorrelation. If Breusch-Godfrey serial correlation test probability is significant then the residuals are correlated, but from the results in Table (6) shows Breusch-Godfrey probabilliy is 0.213918 which is insigfinicant and therefore conclude that residuals are not correlated.

**Table 6: Breusch-Godfrey test**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 1.630305 | Probability | 0.213918 |
| Obs*R-squared | 4.172164 | Probability | 0.124173 |

## 4.4.2.3 White Heteroskedasticity

This test is only applicable to residuals from least square regression. It tests the null hypothesis that, the coefficients of the variables in the argumented regression are all equal to zero. This null hypothesis also assumes that the error is both homoscedastic and independent of regressors. Therefore if the F-statistic probability is significant the null hypothesis is rejected and if is insignificant the null hypothesis is accepted. Conducting this test for ECM

model was impossible since number of observations were small, the results in Table (7) for the long run model shows that F-statistic probability is 0.175977, this is insignificant and hence accept the null hypothesis.

## Table 7: White Heteroskedasticity Test

| White Heteroskedasticity Test: | | | |
|---|---|---|---|
| F-statistic | 2.321413 | Probability | 0.175977 |
| Obs*R-squared | 38.62317 | Probability | 0.309215 |

## 4.5 Stability Tests

### 4.5.1 Ramsey Reset Test

Ramsey reset test is conducted to determine whether the model is well specified, check for omission of any important variables and also to determine if there is correlation between the explanatory variables and the residuals. If one of this is not correct, it will lead to significant test statistic. From the results in Table (8) the F-statistic probability is 0.466608 when number fitted is one, this is insignificant and therefore conclude that the model is well specified.

## Table 8: Ramsey RESET Test

| Ramsey RESET Test: | | | |
|---|---|---|---|
| F-statistic | 0.544242 | Probability | 0.466608 |
| Log likelihood ratio | 0.743722 | Probability | 0.388471 |

### 4.5.2 Recursive Residuals

This test seeks to show stability of the residuals at 5% level of significant. In this model the residuals appeal to be stable for the most part of it as shown in figure (3

**Figure 3: Recursive Residuals**



Recursive Residuals ----- ± 2 S.E
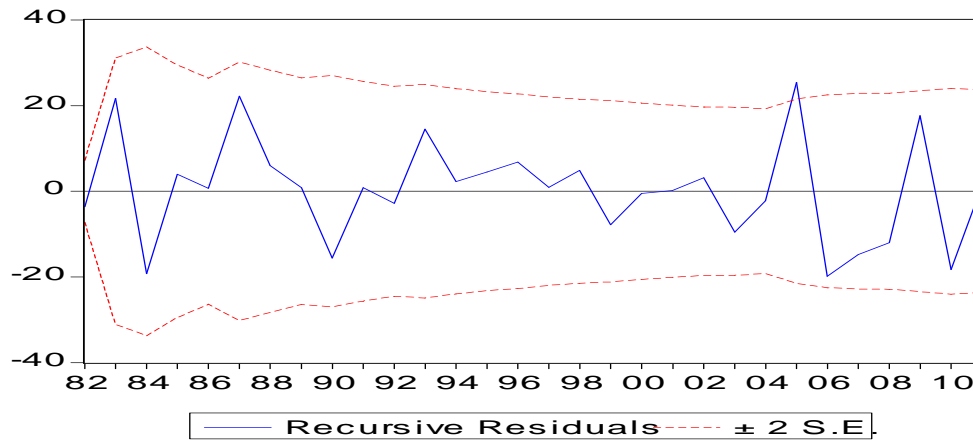
### 4.5.3 Cusum Test

This test for stability of the model of 5% level of significant. As can be seen in figure (4) the model seem to be stable and hence it is insensitive to changes in the size of the sample.

**Figure 4: Cusum Test**



CUSUM ----- 5% Significance
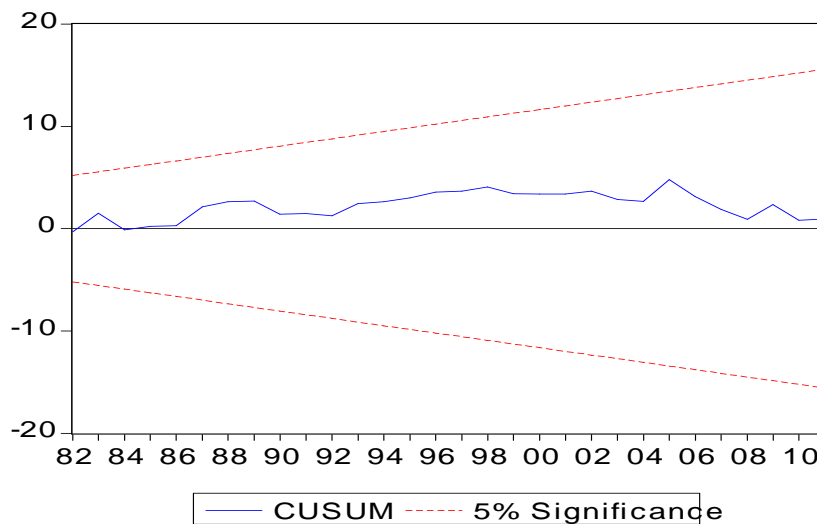
### 4.5.4 Recursive Coefficients

The test is used to establish how the coefficients of the model have been trending at 5% level of significant. C(1) shows stability of the constant coefficient while C(2) to C(10) show stability of the explanatory variables. All the coefficients are within the boundaries as can be seen in table 10 and they are stable.

**Figure 5: Recursive Coefficients**



## 4.6 The error correction model

As noted in 4.2., the variables are co-integrated and therefore form a long run relationship between them. If there is short term disequilibrium, th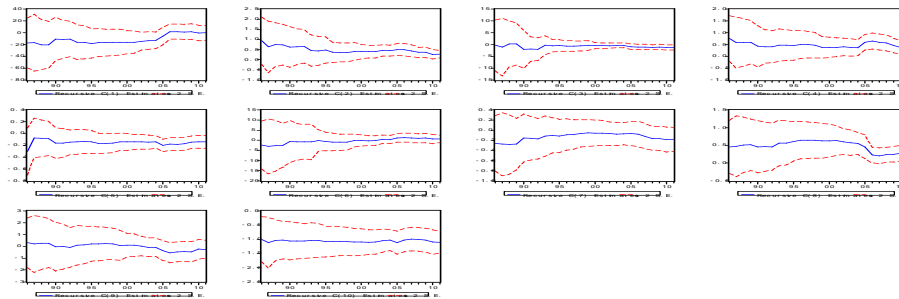en the error term can be treated as the "equilibrating error" and the error term is used to tie the short run behaviour of the private investment to its long run function.

## Table 9. The regression estimation results

Dependent Variable: D(PI)
Method: Least Squares
Date: 10/20/14   Time: 12:03
Sample(adjusted): 1972 2011
Included observations: 40 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -0.374158 | 6.321425 | -0.059189 | 0.9532 |
| D(DCR) | 0.269859 | 0.092443 | 2.919184 | 0.0066 |
| D(EXCH) | -1.219738 | 0.554674 | -2.199017 | 0.0357 |
| D(EXPO) | 0.371012 | 0.142585 | 2.602050 | 0.0143 |
| D(EXTD) | -0.141813 | 0.053545 | -2.648511 | 0.0128 |
| D(INT) | 0.676831 | 0.906535 | 0.746613 | 0.4611 |
| D(PUBIN) | -0.183740 | 0.119153 | -1.542055 | 0.1335 |
| D(RGDP) | 0.270182 | 0.108199 | 2.497080 | 0.0182 |
| INF | -0.264298 | 0.373883 | -0.706901 | 0.4851 |
| ECM(-1) | -1.108708 | 0.186861 | -5.933333 | 0.0000 |

| | | | | |
|---|---|---|---|---|
| R-squared | 0.719353 | Mean dependent var | | 4.917929 |
| Adjusted R-squared | 0.635159 | S.D. dependent var | | 19.51890 |
| S.E. of regression | 11.78983 | Akaike info criterion | | 7.984669 |
| Sum squared resid | 4170.001 | Schwarz criterion | | 8.406889 |
| Log likelihood | -149.6934 | F-statistic | | 8.543971 |
| Durbin-Watson stat | 1.829643 | Prob(F-statistic) | | 0.000003 |

**4.7 Discussion of the Regression Results**

From the short run regression results, the model explains about 71.94% of the private investment with the Durbin-Watson statistic of 1.8 which is close to two implying that the residuals of the model are not correlated. The mode is significant with F-statistic of 8.5044 and p-value approaching zero.

Domestic credit to the private sector has a positive sign which is significant both in the short run and long run. It shows that domestic credit is positively related to private investment in Kenya and therefore as more domestic credit is advanced to the private sector, more of it, is channeled to private investment. Similar results were found by Martin and Waso (1992), Akkina and Celebi(2002), Blejer and Khan (1984) whose studies depicted that domestic credit was directly related to private investment while study by Ouattara(2005), contradicts with this results, his findings showed that credit to private sector had indirect relationship with private investment.

The exchange rate is negatively related to private investment both in the short run and long run. This is because of the fact that as the Kenyan shillings improves (appreciates), imports becomes cheaper than goods produced within the country and this implies that Kenyans will consume more imports as compared to home produced goods. Hence home industries may be forced to reduce production, some may close down and this will cause a reduction in private investment. Serven (1996), also found similar results.

Exports, both in the short run and long run has had a positive impact which is significant, due to the fact that as more of our goods get demand in other countries, enhances our industries to produce more for the rising demand both at home and in other countries. This necessitate the investors to invest more in order to meet the rising demand both at home and other countries. An External debt has a negative significant impact on private investment in Kenya both in the long run and short run, Green and Villanueva (1991) found similar results. This shows that as the external debt increases, private investment goes down. It also further implies that as the debt increases the country continues to create a burden for the future generations since they are the ones who are going to repay the debt.

Interest rate has a positive sign which is insignificant both in the long run and short run. It shows that the lending rate in Kenya has had no impact on private investment. The reason

could be that most of the finances to private investment is sourced from somewhere else apart from financial institution. Similar result was found by Erden and Holcombe (2006). The findings by Martinez-Lopez (2001), Fry (1988), and Godson Ahiabor (2003) contradicted the above findings and found that interest rate had a negative sign that was significant. To them interest rate is negatively related to private investment.

Public investment impacts private investment negatively both in the short run and long run. This implies that whenever more resources are allocated to public investment, there is less resources left to the private sector, this is the crowding out effect meaning that the government may have been financing public investment through higher taxes or through domestic borrowing thereby raising up the interest rate. In the first case of taxes, there could be fewer amounts left for domestic saving by the public to be availed to the financial institutions for investors to borrow while in the second case, the cost of borrowing has gone high. Thus there is an inverse relationship between private investment and public investment in Kenya. Erden and Holcombe (2006), found similar results. Akkina and Celebi (2002) while dealing with the components of public investment, they sought to know the impacts they had on private investment and found that public sector gross fixed infrastructure investment impacted private investment positively while public sector gross fixed non-infrasructure was negatively impacting private investment.

Real gross domestic product has the positive sign which is significant at 5% critical value. Akkina and Celebi (2002), Blejer and Khan (1984), found similar results. This implies that gross domestic product has a positive impact on private investment in Kenya. The reason could be that, as GDP increases it puts more pressure on the available capital goods in the private sector so as to meet the required increase demand of goods and services. It also means that private investors desire to close the gap between the actual gross domestic product and the required gross domestic product, creating a need for more investment and as a result private investment goes up.

Inflation on the other hand had the negative sign but insignificant. This means that inflation has had no impact on private investment in the period covered. Akkina and Celebi (2002), found similar results while Green and Villanueva (1991) also found that inflation had a negative sign that was highly significant to private investment.

The ECM (-1), has a negative sign and is significant and hence shows the extent of the adjustment of the private investment with regard to its equilibrium level. The results indicate the presence of an underlying long run relationship between private investment and its fundamentals.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study sought to find the determinants of private investment and to establish the relationship between public and private investment in Kenya for the period 1971-2011. The variables under study were private investment, domestic credit, exchange rate, exports, external debt, interest rate, public investment and inflation. All the variables were I(1) except inflation which was stationary at levels. The estimation of the long run equation was done which enabled us to obtain residuals and the residuals were found to be stationary at levels, leading to the conclusion that the variables were co-integrated. This necessitated the need to estimate a dynamic model of private saving using the error correction model(ECM). The ECM model was chosen because it was the most appropriate model for dynamic estimation. This model was accompanied by residual tests and stability tests. Also the ECM was supported by a significant error term coefficient.

The study showed that Domestic credit, exchange rate, exports, external debt stocks and real gross domestic product had a significant impact on private investment in both long run and short term periods while public investment had a long run impact had no short term impact. Interest rate and inflation have had no impact.

## 5.2 Conclusions

The research findings show that higher amount of domestic credit, rising gross domestic product, more exports and low levels of total expenditure on public investment, less external debt and moderate exchange rate will boast private investment in Kenya. The results further supports the idea that, domestic credit should be availed to the private sector to enhance private investment while at the same time, the manufacturing and agricultural sectors should be improved to enhance their productivity through use of more efficient and modern technologies so as to increase output and investment growth. Furthermore as the demand rise for our locally produced goods in other countries means more of our goods are going to be exported, this calls for the rise in private investment.

On the other hand, countries with a negative relationship between public and private investment require that less resource allocation to the public sector in order for private

investment to increase. Such countries should try and borrow fewer amounts from external sources so as reduce the adverse impact associated with huge external debt. Also the effect of exchange rate cannot be overlooked, the exchange rate should be moderate to avoid the adverse impact on private investment.

**5.3 Policy Recommendations**

Domestic credit has had a significant impact on private investment at a 1% critical value. As it can be observed from short term regression results, a one unit increase in domestic credit leads to 0.27 increases in private investment. The study reveals that credit constraint to the private sector restraint private investment growth, more appropriate policies should be put in place to ensure more credit is advanced to private sector to boost investment, among this include low user cost of capital for more investors to access credit.

The exchange rate had a negative significant impact at a 1% critical value. One unit increase in exchange rate leads to 2.22 decreases in private investment. The regression results show that the coefficients of exchange rate had a major impact on private investment than any other variable in the study. Policies aimed at ensuring that the Kenyan currency does not appreciate so much or does not depreciate so much, should be put in place. This also is meant to avoid more importation of goods and services for consumption at the expense of domestic production. This policy furthermore ensures that import substitution industries are not auto-competed by the consumption of foreign goods thus investment is not impaired.

External debts has significant negative impact on private investment at 5% critical value that is a one unit increase in external debt leads to 0.142 decrease in private investment. The Kenya's external debt has been accumulating over the years and this means that there is debt overhang problem in Kenya while debt servicing has crowing out effect. Thus the study supports the need for Kenya to be considered for debt relief measures, Bardsall and Williamson argue that "an assured dollar of debt relief is probably more efficient in generating development than a promise of a new aid"(Bardsall and Williamson, 2002). The government should also reduce borrowing from other countries so as to reduce the future burdening of debt servicing by its people.

The interest rate did not have any impact on private investment on the period under study. To try and ensure that interest rate does affect private investment, there should be incentives to borrow for private investment through lowering lending interest rate, by doing so; investors will be motivated to borrow more financial resources for long term investment.

Public investment does influence private investment negatively in the long run. This depicts that whenever public investment goes up, it does that at the expense of private investment. Policies aimed at improving private investment, will be to reduce taxes and also to reduce public borrowing by the government that is aimed at diverting resources from private sector to public sector. Public resources should be used more efficiently and priorities be given to essential sectors that may boost private sector such as infrastructure, communication and transportation.

Real gross domestic product has a significant positive impact on private investment; its coefficient indicates that when there is increase the production of goods and services within the economy, there is outright rise private investment. This can be done by implementing policies that will lead to an increase in GDP and hence more investment to counteract the increasing demand of GDP. Improving the productivity of sectors such as agriculture and manufacturing by providing more efficient and modern technologies will increase private investment. Furthermore input subsidies are likely to boost private and growth in GDP

Inflation has had no impact on private investment in Kenya for the period under study. The economic policies aimed at sustaining moderate rate of inflation which may have a positive impact on private investment, furthermore, government should always ensure that the inflation rate is kept at a single digit so as to avoid the negative impacts the may be associated with it.

## 5.4 Limitations of the study

In any scientific research there has to be some limitations. In this study there were some limitations here and there. First, the study only concentrated on measurable economic factors while it did not take into account of non-quantifiable factors such as political, social and other non-measurable economic factors i.e. technology, tastes and preferences of the population. These factors might also be important in explaining investment behaviour of private

investment in Kenya. Thus future studies should incorporate these variables in order to determine their influence on private investment.

Also lending interest rate was incorporated only while Treasury bill rate and depository rates were left out. It is therefore important that researchers should focus on the highlighted areas to form the basis for future study

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**APPENDIX:I BREUSCH-GODFREY TEST**

Breusch-Godfrey Serial Correlation LM Test:

| | | | |
|---|---|---|---|
| F-statistic | 1.630305 | Probability | 0.213918 |
| Obs*R-squared | 4.172164 | Probability | 0.124173 |

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/20/14   Time: 12:07

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 0.410717 | 6.247377 | 0.065742 | 0.9481 |
| D(DCR) | 0.029888 | 0.092845 | 0.321919 | 0.7499 |
| D(EXCH) | 0.059369 | 0.544489 | 0.109035 | 0.9140 |
| D(EXPO) | 0.027679 | 0.141449 | 0.195682 | 0.8463 |
| D(EXTD) | 0.027322 | 0.054986 | 0.496893 | 0.6231 |
| D(INT) | -0.372215 | 0.911687 | -0.408270 | 0.6862 |
| D(PUBIN) | 0.057580 | 0.121110 | 0.475436 | 0.6382 |
| D(RGDP) | -0.027153 | 0.108525 | -0.250201 | 0.8043 |
| INF | -0.072758 | 0.370360 | -0.196452 | 0.8457 |
| ECM(-1) | -0.220739 | 0.274543 | -0.804024 | 0.4282 |
| RESID(-1) | 0.352910 | 0.318719 | 1.107275 | 0.2776 |
| RESID(-2) | -0.343926 | 0.213904 | -1.607852 | 0.1191 |

| | | | |
|---|---|---|---|
| R-squared | 0.104304 | Mean dependent var | -1.50E-15 |
| Adjusted R-squared | -0.247576 | S.D. dependent var | 10.34036 |
| S.E. of regression | 11.54966 | Akaike info criterion | 7.974515 |
| Sum squared resid | 3735.053 | Schwarz criterion | 8.481179 |
| Log likelihood | -147.4903 | F-statistic | 0.296419 |
| Durbin-Watson stat | 2.038989 | Prob(F-statistic) | 0.981095 |

**APPENDIX II: RAMSEY RESET TEST**

Ramsey RESET Test:

| | | | |
|---|---|---|---|
| F-statistic | 0.544242 | Probability | 0.466608 |
| Log likelihood ratio | 0.743722 | Probability | 0.388471 |

Test Equation:
Dependent Variable: D(PI)
Method: Least Squares
Date: 10/20/14   Time: 12:09
Sample: 1972 2011
Included observations: 40

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -1.978586 | 6.731027 | -0.293950 | 0.7709 |
| D(DCR) | 0.239352 | 0.101920 | 2.348434 | 0.0259 |
| D(EXCH) | -1.175900 | 0.562086 | -2.092030 | 0.0453 |
| D(EXPO) | 0.348406 | 0.146911 | 2.371540 | 0.0246 |
| D(EXTD) | -0.132484 | 0.055418 | -2.390614 | 0.0235 |
| D(INT) | 0.268188 | 1.068322 | 0.251037 | 0.8036 |
| D(PUBIN) | -0.168003 | 0.121949 | -1.377648 | 0.1789 |
| D(RGDP) | 0.250970 | 0.112097 | 2.238862 | 0.0330 |
| INF | -0.144070 | 0.410492 | -0.350970 | 0.7281 |
| ECM(-1) | -1.032104 | 0.215030 | -4.799816 | 0.0000 |
| FITTED^2 | 0.003413 | 0.004626 | 0.737728 | 0.4666 |

| | | | |
|---|---|---|---|
| R-squared | 0.724523 | Mean dependent var | 4.917929 |
| Adjusted R-squared | 0.629530 | S.D. dependent var | 19.51890 |
| S.E. of regression | 11.88042 | Akaike info criterion | 8.016076 |
| Sum squared resid | 4093.184 | Schwarz criterion | 8.480518 |
| Log likelihood | -149.3215 | F-statistic | 7.627179 |
| Durbin-Watson stat | 1.847519 | Prob(F-statistic) | 0.000008 |

**APPENDIX III: Long run regression results**

Dependent Variable: PI

Method: Least Squares

Date: 10/19/14   Time: 07:51

Sample(adjusted): 1971 2011

Included observations: 41 after adjusting endpoints

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | -60.83512 | 22.88527 | -2.658266 | 0.0120 |
| DCR | 0.244834 | 0.112352 | 2.179161 | 0.0366 |
| EXCH | -1.435533 | 0.412817 | -3.477410 | 0.0014 |
| EXPO | 0.706820 | 0.129396 | 5.462462 | 0.0000 |
| EXTD | -0.222635 | 0.055244 | -4.030015 | 0.0003 |
| INT | 0.010944 | 0.599545 | 0.018254 | 0.9855 |
| PUBIN | -0.271111 | 0.110302 | -2.457892 | 0.0194 |
| RGDP | 0.171669 | 0.064509 | 2.661156 | 0.0119 |

| | | | |
|---|---|---|---|
| R-squared | 0.943417 | Mean dependent var | 98.78899 |
| Adjusted R-squared | 0.931415 | S.D. dependent var | 55.24004 |
| S.E. of regression | 14.46669 | Akaike info criterion | 8.354754 |
| Sum squared resid | 6906.407 | Schwarz criterion | 8.689109 |
| Log likelihood | -163.2725 | F-statistic | 78.60235 |
| Durbin-Watson stat | 2.129110 | Prob(F-statistic) | 0.000000 |