PRIVATE INVESTMENT AND ECONOMIC GROWTH IN KENYA. AN EMPIRICAL INVESTIGATION: 1980 - 2002

BY

KING'ANG'I, PAUL KAMAU

Research paper submitted to the Department of Economics, University of Nairobi, in partial fulfilment for the degree of Master of Arts in Economics.

August 2003

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ACRONYMS

ADF:	Augmented Dickey Fuller
AERC:	African Economic Research Consortium
AIC:	Alkaike Information Criteria
CBS:	Central Bureau of Statistics
CDM:	Change in Domestic Credit
DW:	Durbin Wartson Statistics
EPZ:	Exports Processing Zones
GDP:	Gross Domestic Product
IFS:	International Financial Statistics
IMF:	International Monetary Fund
INF:	Inflation
Kshs:	Kenya Shillings
OLS:	Ordinary least squares
PP:	Phillips Perron
PUI:	Public Investment
RER:	Real Exchange Rate
RIR:	Real Interest Rate
SC:	Swartz Criteria
TOT:	Terms of Trade
US$:	United States Dollar
VAT:	Value Added Tax

DEDICATION.

This paper is dedicated to my wife Esther Kamau and my Daughters Maryanne Wambui and Joyce Wangare. I cannot underestimate the support they gave me during my two years of study.

DECLARATION

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

King'ang'i, Paul Kamau

27/08/2003

Date

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

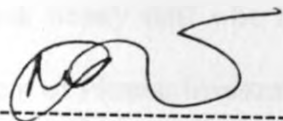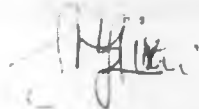Dr. Moses C. Kiptui

27/08/2003

Date

Dr. Mary Mbithi

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ACKNOWLEDGEMENT

ABSTRACT

Private investment in Kenya has been identified to be moving on a downward trend since the 1980's and the main goal of the study was to utilise time series data to analyse the extent to which private investment contributed to growth in the period between 1980 and the year 2002. Other objectives of the study were to empirically investigate the factors that affected private investment during the period under review and whether there was any relationship between growth and private investment and the impact this had on the growth of the economy.

The data used in the study was obtained from various sources including the Central Bureau of Statistics, the World Bank Africa Database 2002, Central Bank of Kenya Publications, Economic surveys, Development Plans, Statistical Abstracts and the International Financial Statistics (IFS). Various tests were conducted to arrive at reliable results. These included unit root and causality tests. The results show that private investment in Kenya was affected by various factors with public investment and changes in domestic credit having a very strong relationship with private investment. The results also show that although changes in the Gross Domestic Product and the level of private investment seemed to move in the same direction, there was no causality between the two.

Most of the other variables considered in the analysis conformed to economic theory on the relationship between them and private investment. This been the case, what is required is for the concerned authorities to look for ways of improving the current scenario in order to promote private investment and hence economic growth. This partly can be achieved through maintaining a stable investment environment and a favourable political climate.

LIST OF TABLES AND FIGURES

CHAPTER ONE: INTRODUCTION AND BACKGROUND

After Kenya attained independence in 1963 it enjoyed a remarkable growth in Gross Domestic Product (GDP), which averaged about 6.5 % per year. Much of this was attributed to agricultural expansion, favourable investment environment like low inflation, low interest rates, political stability etc. From the early 1980's the economy started performing poorly a phenomenon it has never been able to overcome since. Agricultural growth slowed down as the forces which boosted its production during the 1960's weakened. In addition, inappropriate policies turned the internal terms of trade against agriculture. The drought that affected Kenya between 1983 and 1984 worsened the situation even further.

On the part of industry, growth declined due to weak incentive systems, which favoured production for the domestic market over production for exports and to diminishing opportunities for efficient import substitution. Further to this the collapse of the East Africa Community in 1977 worsened the situation by significantly eroding the market for Kenya's non-traditional exports. The 1982 coup attempt greatly affected investment in Kenya because of the ensuing political uncertainty and caused some capital flight. (Mwega etal, 1994).

In trying to rectify the situation the Government published the Sessional paper No. 1 of 1986. "Economic management for renewed growth." This provided the policy framework and strategies that could steer the economy to more vigorous growth and enable it face the expected challenges in the future. The country's investment performance especially with respect to the private sector was very poor. Poor savings and the crisis which affected the non-bank financial

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institutions in 1986 following the collapse of several of these institutions, dealt a severe blow to the levels of deposits and credit extensions in the country. This reduced Kenya's capital formation which was detrimental to growth.

Coupled with these, the final blow may have been inflicted by the shift from a one party state to a multiparty state and the ensuing events could only stand to be regretted. The political uncertainty and the events that followed like the ethnic clashes, Foreign Aid freeze, high interest rate, high inflation and a general lack of confidence on the ruling Government further aggravated the situation. The growth in Gross Domestic Product (GDP) went to as low as - 0.8 % during this period. The same events seemed to repeat themselves in the year 1997 during the second multiparty elections, this time the problem being fuelled further by power rationing occasioned by poor rains in the country. This decline in economic performance has since 1980, been accompanied by declining investment levels thus reducing the country's growth potential. Private investment can play a vital role for renewed economic growth in developing countries and a country wishing to move to a higher and stable growth path need to put measures into place aimed at promoting the level of private investment (Ronge and Kimuyu, 1997).

Domestic investment as a share of GDP has continued to fall all along. Private and public investment as a percentage of GDP also continued to fall over the same period. In the year 2000 real GDP growth slumped to - 0.2% due to weak macroeconomic performance and governance related problems. Kenya continues to experience a poor fiscal performance, a rising inflation and a depreciating local currency. External position of the country has deteriorated overtime due to a wide trade deficit resulting from poor export performance. Real GDP growth was estimated

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to remain weak at 2.0 per cent in 2001 and proceed at 1.2 per cent in 2002. (African Economic outlook 2002).

To counter this negative trend partly the Government established an investment promotion centre. The foreign investment protection act was enacted to guarantee repatriation of capital, remittance of dividends and investments. Reforms to attract investment, especially in manufacturing, included the bond programme open to both domestic and foreign investors, under which investors are offered incentives including duty and VAT exceptions on imported plant, machinery and equipment, raw materials and other inputs. Kenya has also established two exports processing zones (EPZ) since 1990 to encourage production for export. They also enjoy additional benefits including tax holidays and exemption, and freedom from restrictions on management or technical arrangements.

All along the data available shows a consistently declining level of investment. The ratio of Gross Domestic Investment as a % of GDP was as high as 23% in 1980 declining to a low of 17.9% in 1985. Between 1986 and 1990 there was a slight improvement but from then on the situation has continued to worsen with the year 1993 recording the lowest level of 16.9%. Both Gross Domestic Product and the level of private investment seems to have been moving in the same direction.

1.1 Trends in Private Investment and Economic Growth

TABLE 1.

Private Investment & Economic Growth
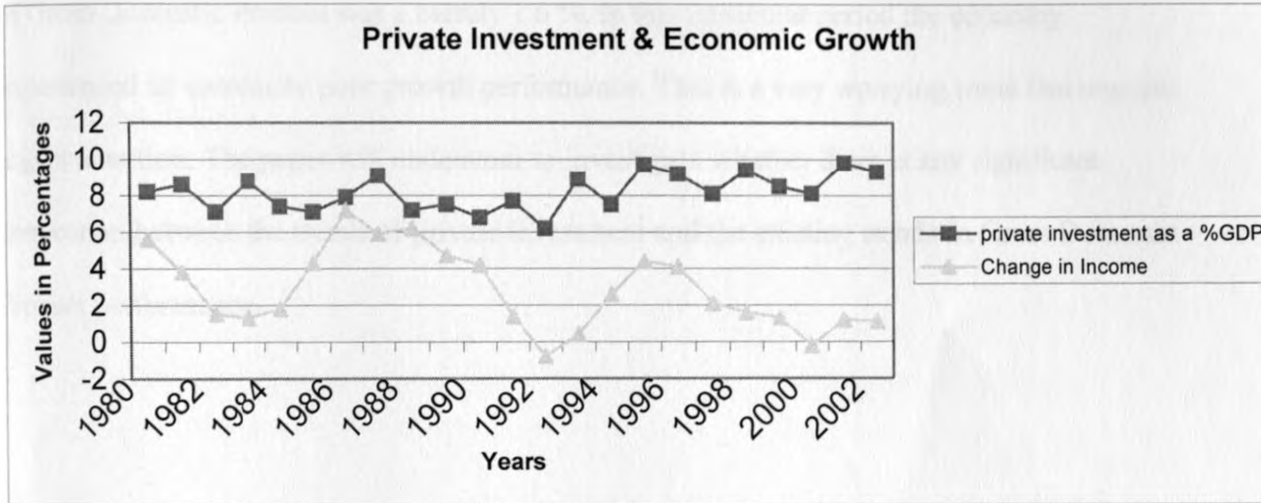
Table 1 shows the behaviour of private investment and Economic Growth in Kenya between 1980 and the year 2002. Private Investment as a % of Gross Domestic Product stood at 8.2 % in 1980 declining slightly in 1984 which could have partly been attributed to the ensuing drought that affected the country during this period. The failed 1982 coup attempt might also have scared away potential private investors. Between 1990 and 1992 it declined to about 6.2 % of Gross Domestic Product. The shift from a one party state to a multiparty state during this period could possibly explain this decline. High interest rates during this period including high treasury bills rates to squeeze out excess liquidity from the financial system may have crowded out finance to the private sector. Although the overall trend may have been up and down in a nutshell the Private Sector growth has not been satisfactory.

The analysis of the figure confirms that between 1980 and 1990 the average annual growth rate in terms of Gross Domestic Product in Kenya was about 4.5 %. This was an impressive figure if we consider the period between 1991 and the year 2002. The average annual growth rate in terms of Gross Domestic Product was a merely 1.6 %. In this particular period the economy experienced an extremely poor growth performance. This is a very worrying trend that requires urgent attention. The paper will endeavour to investigate whether there is any significant connection between the trends of private investment and the existing trends in Gross Domestic Product performance.

TABLE 2.

THE TREND OF INVESTMENT IN KENYA DURING THE PERIOD.

YEAR	GDP Growth Rate	Gross Domestic Investment as a % of GDP	Private investment as a % of GDP	Public investment as a % of GDP
1980	5.6	18.3	8.2	10.1
1981	3.8	18.6	8.6	10
1982	1.5	15.5	7.1	8.4
1983	1.3	15.5	8.8	6.7
1984	1.8	14.6	7.4	7.2
1985	4.3	14.1	7.1	7
1986	7.2	15.9	7.9	8
1987	5.9	16.2	9.1	7.1
1988	6.2	15.2	7.2	8
1989	4.7	15.3	7.5	7.8
1990	4.2	16.2	6.8	9.4
1991	1.4	18	7.7	10.3
1992	-0.8	13.3	6.2	7.1
1993	0.4	16.9	8.9	8
1994	2.6	16	7.5	8.5
1995	4.4	17.1	9.7	7.4
1996	4.1	16.2	9.2	7
1997	2.1	14.5	8.1	6.4
1998	1.6	14.4	9.4	5
1999	1.3	13.1	8.5	4.6
2000	-0.2	11.9	8.1	3.8
2001	1.2	15.9	9.8	6.1
2002	1.1	15.1	9.3	5.8

Sources: Economic surveys various issues

: Statistical abstracts various issues

: African Economic Outlook

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1.2 Statement of The Problem

The current levels of growth in Kenya in terms of Gross Domestic Product (GDP) has been very worrying and this has always been an issue of concern in the country. Many authors have identified low investment rate as one of the major factors constraining economic performance in the African Continent. The Economy cannot grow while the level of investment is very low. (Collier and Gunning 1999). Investment is one of the essential components or requirements of Gross Domestic Product growth but Gross Domestic Investment in Africa has been declining steadily from about 26.5% of Gross Domestic Product in 1980 to about 22 % in the 1990's. In the Kenyan case the economy has been experiencing a downward trend since the 1980's moving from about 6 % to a low of a negative growth of 0.2 % in the year 1992. A possible explanation for this could be the declining levels of private investment, which has been on a downward trend as evidenced by the available data. A part from other variables, investment is responsible for influencing growth of the economy in terms of economic performance and improved private investment can play a vital role in ensuring long-term growth and sustainability. There is a need to empirically investigate factors that have influenced it in order to guide policy makers in policy formulation. There is a need therefore to look at the investment behaviour during the period under review.

The new Government is committed to improving the economic performance of the economy and in particular it has reiterated its commitment to create jobs, eradicate corruption and ensure that the economy jumpstart from the current stagnation among other objectives. Partly this can be achieved through improved private investment. It is therefore of much interest to see how this

area of investment can help in the attainment of this noble goal. In particular it would be of much interest to see how private investment trends have been and what factors have influenced it. The study will highlight potential areas of improvement to ensure that the current trend is reversed.

1.3 Goal and Objectives of The Study
1.3.1 Goal

To analyse the extent to which Private Investment contributed to growth in Gross Domestic Product (GDP) in the period between 1980 and 2002 in Kenya.

1.3.2 Specific Objectives

1. To investigate the factors that have influenced Private Investment in Kenya in the period under review.
2. To analyse the relationship between Private Investment and the Gross Domestic Product.

1.4 Significance of The Study

There is a need to critically examine to what extent the current low level of growth can be attributed to low levels of private investment and whether the current policies are conducive to private investment in the country. The study will try to analyse what may have contributed to the current worrying trend of poor performance in terms of growth of the economy and what areas require improvement. Possible answers on the existing opportunities where potential investors can invest and likely change of policies that can help in rectifying the situation are in dire need. It is therefore necessary to empirically analyse the relationship in Kenya and a study of the role of private investment in Kenya can shed light on whether the theory that private investment promotes economic growth applies to Kenya.

The government is committed to restoration of economic performance that will lead to sustainable long run growth consistent with National Development objectives which aims at reducing poverty by half by the year 2015 and achieve a newly industrialised country (NIC) status by promoting industrialisation by the year 2020. To improve economic growth there is a need to improve private investment.

The study can play a part by suggesting what foundations we need to put in place in order to achieve the desired real economic growth rate of 6.0 %, which is the rate of growth the United Nations considers as the minimum for poverty reduction. These suggestions will be based on the findings of the study. It is against this background that we felt the need to get an insight on the issue. Further research triggered by this study in the future on the same area will move a step further in enhancing economic growth.

1.5 The Research Question

In carrying out the research, the main question was to investigate whether the current low levels of growth in Gross Domestic Product could be attributed to the corresponding low levels of private investment in Kenya.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical Literature

Net investment is the rate of change in the capital stock and the decision to invest depends on changes in the desired stock of that asset. Investment will thus occur when the actual stock (K_t) differs from the desired stock (K_t^*) (Binwe, 1993).

Keynes (1936) considered the existence of an independent investment function in the economy and observed that although savings and investment must be identical ex-post, savings and investment decisions are, in general, taken by different decision makers and there is no reason why ex-ante savings should equal ex-ante investment.

Later Keynes developed the marginal efficiency of investment (MEI) as a measure of business demand for investment decision. To him investment by a firm would occur when the MEI (Internal rate of return) on an additional investment exceeds the rate of interest or cost of funds that is incurred in making investment decisions. MEI could thus be defined as the rate of interest, which discounts the present value of investment to zero. The higher the market rate of interest, the lower the investment and vice versa. However, this analysis assumes sources of funds have the same opportunity cost. For example a firm using retained earnings to finance its activities cannot be compared with another firm borrowing from the financial system. The model also doesn't distinguish between net investment and replacement investment.

The next phase in the evolution of investment theory gave rise to the accelerator theory, which makes investment a linear proportion of changes in output. A more general form of the accelerator model is the flexible accelerator model. The basic notion behind this model is that the

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larger the gap between the existing capital stock and the desired capital stock, the greater a firm's rate of investment. Firms will plan to close the gap between the desired capital stock, K* and the actual capital stock, K, in each period.

The net investment equation is of the form

$I = \delta (K^* - K_{-1})$

Where I = net investment,

K* = desired capital stock.

K_{-1} = last period's capital stock.

And δ = partial adjustment Coefficient.

Within this framework of the flexible accelerator model, output, internal funds, cost of external financing and other variables may be included as determinants of K*.

According to Tobin (1969), the decision of whether firms will increase or decrease their current capital stock depends on the relationship between the change in the value of the firm due to the installation and replacement cost of the additional capital. This is the marginal Q which looks at the discrepancy between the market value of productive assets vis-avis their replacement costs to explain new investment.

At equilibrium, the value of q is unity and this is the optimal level of investment. If q>1, investment will be increasing meaning there is incentive to investors. However if q<1, investment will be decreasing meaning there is disincentive to invest.

However, marginal Q is not easily measured and thus what is used instead is the ratio of the market value of the firm and the replacement cost or book value of the firm. Limitations of these

are that movement from marginal q to average q is not straightforward and getting the present value is not easy because one may not have the information and shares may be unreliable.

Jorgenson (1971) and others have formulated the neoclassical approach, which is a version of the flexible accelerator model. In this approach, the desired or optimal capital stock is proportional to output and the user cost of capital (which in turn depends on the price of capital goods, the real rate of interest, the rate of depreciation and the tax structure).

Mckinnon (1973) and Shaw (1973) claimed that developing countries suffer from financial repression and that if these countries were liberated from their repressive conditions, this would induce savings, investment and growth. In this "neo-liberal" view (Galbis, 1979) investment is positively related to the rate of interest in contrast with the neoclassical theory. The reason for this is that a rise in interest rates increases the volume of financial savings through financial intermediaries and thereby raises investments funds.

Pindyck, (1991) introduced an element of uncertainty into investment theory due to irreversible investment. The argument is that since capital goods are often firm specific and have a low resale value, disinvestment is more costly than positive investment. He argues that the present value rule which says invest when the value of a unit of capital is at least as large as its cost must be modified when there is an irreversible investment because when an investment is made, the firm cannot disinvest should market conditions change adversely. This lost option value is an opportunity cost that must be included as part of the cost (Asante, 2000).

The neoclassical flexible accelerator model has been the most widely accepted general theory of investment behaviour (Greene and Villanueva, 1990). However the applicability of the theory to developing countries is very much in doubt because of various reasons hence the need to reformulate investment theories developed for industrial countries to fit the circumstances typical of developing countries.

The influence of financial variables on investment behaviour makes the specification of investment functions heavily dependent on the institutional environment in the financial system. The typical absence of equity markets and prevalence of financial repression in the developing world imply that neither Tobin's q nor standard neo-classical "flexible accelerator" investment functions can be applied uncritically in developing countries. Credit rationing can discourage investment in the sense that if some sectors like agriculture are given priority, those investors willing to invest in other sectors will be locked out of the available credit facilities. On the other hand the cost of funds in informal financial markets may influence the behaviour of private investment in many developing countries.

Further to this the role of imported intermediate goods in developing nations suggest that the specification of relative factor prices in empirical investment functions cannot be restricted to the wage rate and the user cost of capital, but must also take into account the domestic currency price, as well as the availability of such goods. Foreign exchange rationing and the cost of foreign exchange in unofficial "free" markets cannot be overlooked. In addition to this the real exchange rate in these countries is rarely stable and keep on varying.

2.2 Empirical Literature Review

Serven (1990) in his studies on the effects of a real exchange rate devaluation or capital formation showed the importance of accounting for the role of imported capital goods in explaining investment behaviour. He concluded that when a real depreciation is expected, an investment boom is likely to develop if the import content of capital goods is high relative to the degree of capital mobility, because the expected depreciation induces a switch towards foreign goods. The boom is subsequently followed by a slump when the depreciation is effectively implemented because the exchange rate change is equivalent to the removal of a subsidy on investment. An overvalued real exchange rate will also affect investment in the sense that foreign investment into the country will be discouraged and will equally make the importation of investment goods very costly.

The existence of a debt overhang also inhibits private investment. The IMF and the World Bank action of withdrawing support to countries with high debt levels also tend to discourage other donors and potential investors can also be discouraged to invest in such countries. The fear that confiscatory future taxation will be used to finance future debt service inflict fear to investors. Infact about 25 % of budget expenditures in Kenya goes to finance debt or accruing interests on loans. A large debt overhang also reduces future returns to investment because much of the returns will be used to repay external debt (Tenkins, 1998).

It is clear that the public sector form a major part in developing countries. Whether public sector investment raises or lowers private investment is uncertain apriori. On the other hand, public sector investment can crowd out private investment expenditure if it uses scarce physical

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and financial resources that would otherwise be available to the private sector. The financing of the public sector investment, whether through taxes, issuance of debt instruments or inflation can reduce resources available for private investment activity. The public sector may also produce marketable output that competes with private output. On the other hand, public investment to maintain and expand infrastructure and the provision of public goods is likely to be complementary to private investment. Public investment of this type can enhance the prospects for private investment by raising the productivity of capital. Public investment may stimulate private output by increasing the demand for inputs and other services. Expenditure on infrastructural projects like transport, communication, electric power and irrigation will compliment private investment. They reduce the cost of production or raise the return on private capital, thus raising the rate of capital accumulation. However public expenditure resulting in large fiscal deficits will raise interest rates and credit rationing and will thus be detrimental to private investment. (Oshikoya, 1994).

Macroeconomic instability often induced by political factors, is an important feature of the macroeconomic environment faced by developing countries and the resulting uncertainty may have a large influence on private investment. The tendency to delay irreversible investment in the face of uncertainty has also been much emphasised in the recent analytical literature on capital formation and has been shown to exist even when investors are risk neutral agents (Pindyck, 1991). Inflation rate as an indicator of macroeconomic instability can have adverse effects if high and unpredictable. This increases the risk ness of long-term investment. Greene and Villanueva (1991) found that a high inflation rate has a negative impact on investment in several developing countries.

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Although many African Countries have adopted comprehensive stabilization and structural economic reform programmes, there continue to be concern about the growth and investment performance for many African countries. Specifically the response of private sector investment, considered to be crucial for sustainable long-term growth, has been considerably less than anticipated (Cockroft and Riddell, 1991). Indeed as a ratio to GDP, private investment during the recent years has been lower than during the 1970's.

Khan and Blejer (1984) showed that public investment in developing countries had an overwhelming impact on private investment. The government could influence private investment even by changing the public investment policy alone. This implied that tightening the use of monetary policy tools used for stabilization policy would have adverse effects on private investment and consequently growth. Government budget deficit financing can crowd out the private sector and so governments should use foreign borrowing to finance the budget deficit more than using the domestically borrowed resources. They also found exchange rate and high interest rates to adversely effect investment and consequently growth.

Khan and Reinhert (1990) investigated private investment and economic growth on 24 developing countries for the period 1970 - 1979. They took a new approach that distinguished the public from the private investments unlike most of the earlier studies, which looked into the total investment. Their strategy was aimed at finding which sector's investment promoted more to economic growth than the other and the interdependence between them. They used the neo-classical model. They used exports and imports as additional variables to capital and labour.

They found out that private investment had significant effects on growth. They however cautioned that these were just direct effects but that indirect public effects could even be higher than was reported. On removing the public investment from the regression both exports and imports were found to positively influence growth.

Sundarajan and Thakur (1980) studied the relationship between public and private investment in a developing country by postulating a dynamic model of savings, investment and growth and by testing and simulating it for two countries, India and Korea. They found out that an initial increase in fixed investment by public sector raises public sector output, the private sector actual and expected output and aggregate domestic savings. If there is a negative effect owing to a net reduction in the availability of Savings to the private sector (crowding out) that more than offsets the positive effects of increased private sector output and expectations, private fixed investment falls, otherwise, private investment rises. Therefore, investment by the government stimulates and complement private investment.

Bwire (1992) examined the interactions among domestic savings, private investment and per capita growth in output, and their response to changes in key macroeconomic variables in Kenya during the 1972 - 1992 period and found out that macroeconomic instability indicators (external debt burden, current and expected inflation rate) and factors "exogenous" to policy control e.g. drought to negatively effect investment. However real interest rate, public sector investment and lagged ratio of external debt service payments to revenue from total exports were found to affect investment favourably.

Mlambo and Oshikoya, (1999), found out that gross domestic investment in Africa has been on a declining trend since the 1980's moving from 26.5% of GDP then to about 22% in 1990. By 1998 the figure was about 20%. Given that investment is considered an important requirement for GDP growth, the current trends are worrying. Infact Collie and Gunning;(1999), identified the low investment rate as a major factor constraining economic performance on the African Continent. Unless something is done, Africa will never be able to come out of this vicious Circle of low investment leading to low capital formation, which in turn adversely affects growth.

2.3 Overview of literature Review

From the literature review it was indicative that private investment decisions were influenced by among others, economic growth (GPD), real exchange rate, real interest rate, credit availability, external debt overhang, debt service payments, public investment, uncertainty, macroeconomic instability (inflation rate) and changes in terms of trade among others. Our study was intended to analyse the trend of private investment in relation to growth in Gross Domestic Product in Kenya for the specified period and the factors that affected it. Several studies done on investment had ramped Kenya among sub Saharan Africa and a country specific study was necessary. In particular the study was aimed at establishing whether the current low growth of the economy in terms of GDP could be attributed to the corresponding levels of private investment.

CHAPTER 3: METHODOLOGY

3.1 Model specification.

The study will examine variables identified in the available literature, which will include Changes in Domestic Credit, Inflation, Changes in Terms of Trade, Real Exchange Rate, The Debt GDP Ratio, Public Investment Ratio, Real Interest Rate and changes in GDP. The specification of the model for analysis will build on the method used in studying private investment in Africa. More specifically the study will adopt the method used by Oshikoya (1994) who studied seven African countries over the period 1970 –1988 Kenya included. This will be adapted to reflect the current institutional and structural constraints facing Kenya at the moment. In our study Real Interest Rates will be added as an extra variable because it is an important variable in the Kenyan situation, which in our opinion should have been included in the study.

The model takes the following form.

$$\frac{IP}{Y} = F \left\{ \Delta Y, \frac{IG}{Y}, \Delta DCR, INFL, \Delta TOT, RER, \frac{DEBT}{Y} \right\}$$

Where $\frac{IP}{Y}$

is the dependant variable representing Ratio of private investment to GDP being a function of

ΔY - real GDP growth

$\frac{IG}{Y}$ - public investment ratio.

ΔDCR - change in domestic credit.

INFL - inflation.

ΔTOT - change in terms of trade

RER - real exchange rate.

$\dfrac{\text{Debt}}{Y}$ - Debt/GDP ratio

RIR – Interest rate will be added as an extra variable

The relationship between the dependant variable and the explanatory variables was expected to be either positive or negative.

GDP - Coefficient was expected to be positive because of their positive relationship.

IG/Y - Coefficient was expected to be positive because public investment compliments private investment.

ΔDCR - The coefficient was expected to be positive. An increase in domestic credit would be expected to promote private investment.

INFL - The coefficient was expected to be either positive or negative because the effects of this on investment cannot be predicted apriori.

ΔTOT - The coefficient was expected to be negative because it would have adverse effects on investment.

RER - The coefficient was expected to be negative because importation of capital formation goods like machinery would become expensive.

R.I.R -The coefficient was expected to be negative because with a rise in interest rates fund would become expensive.

DEBT/Y- The coefficient was expected to be negative because of the debt overhang problem.

The results of the outcomes of these variables are discussed later in the paper.

3.2 Estimation Method

Ordinary least squares technique was used in our estimation. Since we used time series data, we conducted various tests, which included unit root tests such as the Dickey Fuller (DF) and Augmented Dickey Fuller (ADF) tests in order to test for stationarity. In the end we had to difference the data used in our regression and this avoided problem of spurious and inconsistent regression results. Other tests conducted included a causality test to investigate the causality between private investment and the Gross Domestic Product and cointegration tests and diagnostic tests like the Ramsey reset, heteroscedasticity and normality tests to check the appropriateness of our specification and reliability of our results.

3.3 Data Types and Sources.

The study utilises secondary time series annual data covering the period 1980 to 2002 to analyse the trend of Private Investment in relation to growth in Gross Domestic Product (GDP), investigate factors that influenced Private Investment and to analyse the relationship between Private Investment and Gross Domestic Product in Kenya in the period. The Sources of these data included the Central Bureau of Statistics, the World Bank Africa Database 2002, Central Bank of Kenya Publications, Economic Surveys, Development Plans, Statistical Abstracts and the International Financial Statistics (IFS).

3.4 Study Limitations and Suggestion for future research

The study obtained good results however some limitations mainly emanating from the data used in the analysis may have affected the outcome of the study. A point to note is that data from various sources though on the same variables and of similar periods tended to differ. Data from the world bank sources indicated generally low figures as compared to data that was obtained from Government sources. In this study we tried to reconcile the data. A possible explanation of

the variations could have been attributed to the data collection and aggregation procedures and it is important to note that the officers who compile the data could be limited in skills of doing so which is a typical problem of data available in many developing countries. We relied on data from Government sources particularly in areas where the data showed wide variations and also in cases where data was not available from other sources.

The variables considered in the study accounted for about 80% of the changes in private investment over the said period and other issues accounted for the remaining portion. These could include the political and the macro economic environment accompanying it during the period under review, lack of confidence among investors due to frustrations particularly if they were required to pay high licensing fees and we cannot also rule out the effects of issues likes corruption considering the fact that Kenya has been ranked among the most corrupt countries in the world. These factors among others might have in one way or another affected the investment climate in the country. In the future a study looking into how corruption has affected private investment in Kenya will shed more light in this area. With the change of Government it will also be interesting to compare the performances of the economy in terms of private investment during the previous regime and the current one. These are possible areas of future research in this field.

CHAPTER 4: DATA ANALYSIS AND EMPIRICAL RESULTS

This chapter is aimed at presenting the empirical results of the study. Based on the data used in the analysis and the model specified in the previous chapter. Before conducting regression on the data various tests were conducted which included unit root tests for stationarity, cointegration and causality tests between changes in Gross Domestic Product and the level of private investment. After the regression we conducted diagnostic tests, which included the Ramsey reset, heteroscedasticity and normality tests to check the appropriateness of our specification and reliability of our results.

4.1 Descriptive Analysis

TABLE 5.

	PIV	CGDP	CDM	INF	TOT	RIR	PUI	RER	DGP
Mean	8.17826	2.85652	21.95217	13.3043	-0.82608	18.6004	7.37826	37.77826	70.47013
Median	8.10000	2.10000	19.00000	11.2000	-1.40000	16.8100	7.20000	27.50000	63.58238
Maximum	9.80000	7.20000	66.00000	46.0000	13.8000	45.5000	10.3000	78.60000	142.8772
Minimum	6.20000	-0.80000	-2.000000	1.60000	-12.1000	8.00000	3.80000	7.400000	46.62080
Std. Dev.	0.99359	2.19147	16.50531	10.1047	7.60629	8.00853	1.68872	25.27163	21.24641
Skewness	-0.06786	0.29729	0.892053	1.65336	0.34039	1.82375	-0.13004	0.342492	1.819622
Kurtosis	2.03600	2.04908	3.499735	5.91897	1.95229	6.77311	2.69034	1.518233	6.920546
Jarque-Bera	0.90822	1.20537	3.289740	18.6442	1.49612	26.3931	0.15672	2.553800	27.42249
Probability	0.63501	0.54733	0.193038	0.00008	0.47328	0.00000	0.92463	0.278901	0.000001
Observations	23	23	23	23	23	23	23	23	23

The results show that on average private investment has been around 8 % of the gross domestic product. The highest figure was around 9.8% with the lowest figure been 6.2 %. Change in Gross domestic product averaged about 2.8 % with the highest figure been 7.2 %. In terms of inflation the lowest recorded figure was 1.6 % and the maximum was 46 %. Change in gross domestic credit had a mean of about 21.9 % with a maximum of about 66 % with a low of negative 2 %.

The terms of trade had a maximum of 13.8 % of gross domestic product and a minimum of minus 12.1 %. On average this stood at minus 0.8 %. The real exchange rate recorded the highest standard deviation of 25.2 with a maximum of 78.6 and a minimum of 7.4. Public investment averaged about 7.3 % recording a highest figure of about 10.3 % and a minimum of 3.8 %. The real interest rate recorded a maximum figure of about 45 % and a minimum of 8 %. On average it stood at 18.6 % of gross domestic product.

4.2 Unit Root Tests

This test was necessary because time series data requires transformation failure to which the problem of non-stationarity will arise. The result of this will make the results have spurious regression. The problem of non stationarity arises in two ways. The variable in question can contain a deterministic trend or a stochastic trend. The difference between the two is that with a deterministic trend the growth of the variable can be predicted with certainty which can either be linear or polynomial but for a stochastic trend the growth of the variable cant be predicted with certainty. In testing for non stationarity or unit root test we had two options. We could either use tests based on correlogram or tests based on unit root test. The study utilised the second method because the first method is no longer used.

A stochastic process can only be stationery if the mean and variance do not vary through time. This means that the mean is constant, the variance is constant through time and the values are uncorrelated across time. This is what is referred to as white noise process. A series is said to be non-stationery because it has a trend, which is either deterministic or stochastic.

In the model

$Y_t = \alpha_0 + \beta_t + \rho y_{t-1} + \epsilon_t$

Where α_0 is the intercept

β - Captures deterministic trend

In the equation Y will be increasing due to two possible reasons.

a) Because it has a positive deterministic trend i.e. ($\beta > 0$) but would be stationary after de-trending or after removing β_t. In this case it is assumed that there is no stochastic trend in the variable i.e. $\rho < 1$

b) The variable contains a stochastic trend or follows a random walk with drift meaning $\alpha > 0$, $\rho = 1$ and $\beta = 0$.

Testing for unit roots implies testing if b above is true.

Studies by Dickey and Fuller (1979) found that if the value of ρ is indeed 1, Ordinary least squares (OLS) estimator will be biased downwards. This implies you may reject there is no unit root but there is. To solve this problem what is required is to derive the distribution for the estimator ρ that holds when $\rho = 1$ and then use the F – test of the random walk hypothesis. i.e. $\beta = 0$, $\rho = 1$.

To conduct the F test to test for the presence of unit in variables involves testing the hypothesis $\beta = 0$, and $\rho = 1$

In the equation

$Y_t = \alpha_0 + \beta_t + \rho y_{t-1} + \epsilon_t$

$Y_t - y_{t-1} = \alpha_0 + \beta_t + \rho y_{t-1} - y_{t-1} + \epsilon_t$

$Y_t - y_{t-1} = \alpha_0 + \beta_t + (\rho-1)y_{t-1} + \epsilon_t$

Where $\alpha = 1+\rho$ or $\alpha-1 = \rho$

To test for stationarity you test for significance of ρ.

H_0 : $\rho=0$ which implies that $\alpha-1 = \rho = 0$ which means $\alpha=1$

H_1: $\rho<0$ which implies that $\alpha-1<\rho<0$ meaning $\alpha<1$ which means the series is statoinary and failure to reject the null hypothesis means there is at least one unit root in the series. However it may be possible that the series has 2 to 3 unit roots. In order to test whether the series is integrated of order 1 i.e. $Y_t \sim I(1)$ instead of order 2 or 3, the series is differenced once to remove the 1st unit root after that the same test is applied and the equation becomes

$$Y_t - y_{t-1} = \rho\Delta y_{t-1} - y_{t-1} + \epsilon_t$$

If we reject H_0, now then it will be confirmation that Y is integrated of order 1 which means Δyt is integrated of order 0

i.e $\Delta y_t \sim I(0)$.

If we cannot reject the H_0 again it means that Y has a unit root and we difference the series once more. The process of differencing continues until we reject the null hypothesis. The number of differentials in Y required to arrive at a stationary representation is what is referred to as the order of integration.

Since the Dickey Fuller test doesn't take into account the possibility of having residuals that are auto correlated we use the augmented Dickey Fuller test. This is identical to the standard Dickey Fuller test but is constructed within a regression model of the form

$$Y_t - y_{t-1} = \rho y_{t-1} + \epsilon\gamma_j \Delta y_{t-j} + \mu_t$$

Where j is the lag length, which is set to ensure that the error term is distributed as white noise. Because of non stationarity particular series are transformed to achieve stationarity.

Before transformation the variables showed the following outcomes

TABLE 3.

ADF TESTS ON VARIABLES IN LEVELS

Variable	No of lags	ADF	Order of integration
Changes in Domestic Credit	3	-2.92196	I(1)
Changes in GDP	3	-3.39286	I(1)
Debt/GDP ratio	3	-2.37932	I(1)
Inflation	3	-2.50424	I(1)
Public investment	3	-2.44412	I(1)
Real Exchange rate	3	-2.34369	I(1)
Real interest rate	3	-2.04030	I(1)
Terms of trade	3	-2.81727	I(1)
Private investment	3	-2.22299	I(1)

Source: Generated from tests conducted.

ADF test statistics with 3 lags including intercept and trend

ADF Test Critical values : 1% Critical value   -4.5348
                            5% Critical value   -3.6746
                            10% Critical value   -3.2762

If the value of ADF test statistic is greater than the critical value we conclude that there is a unit root. We therefore conclude the presence of unit roots in the variables changes in Domestic Credit, Real Interest Rate, Terms of Trade, Inflation, Private Investment, Debt/GDP, Public

Investment and the Real Exchange rate at 1%, 5% and 10% level of significance and at 1 % level in changes in GDP. We therefore had to difference the variables before we could carry out the regression. It was also necessary to conduct the Phillips Perron test in order to test for the presence of structural breaks in the variables. The Phillips Perron test (1997) also confirms the unit root test given by the Augmented Dickey Fuller (ADF) test. The graphs below show the movement of the variables before differencing.

Graphs showing the movement of variables at levels
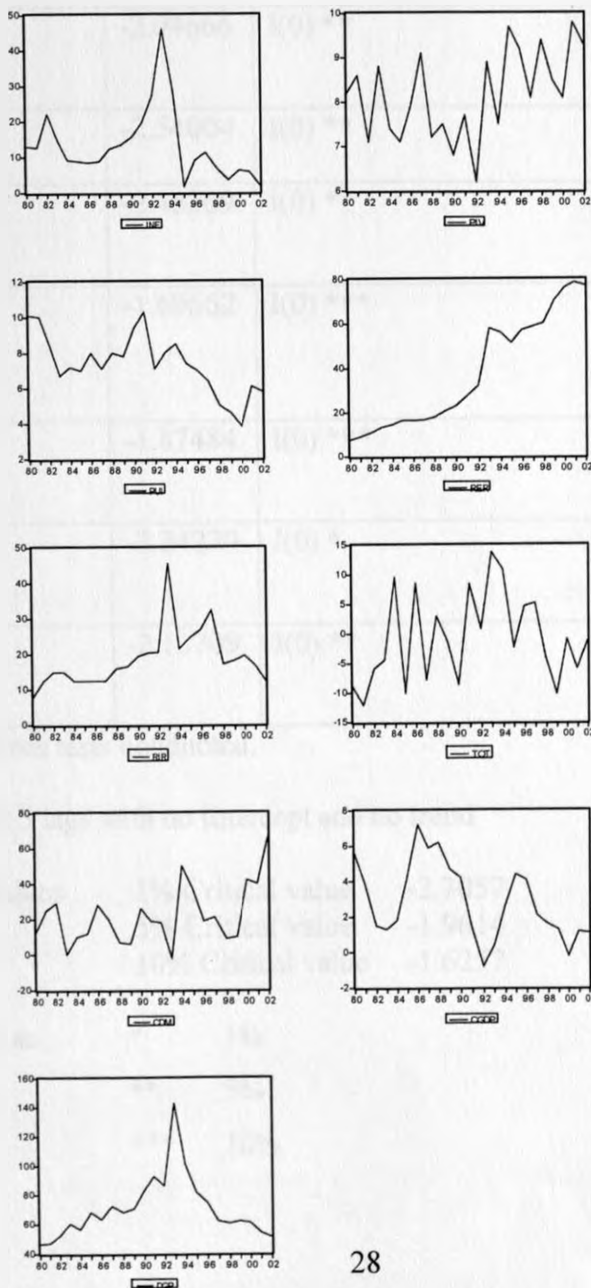
TABLE 4.

ADF TESTS ON VARIABLES IN FIRST DIFFERENCE

Variable	No of lags	ADF	Order of integration
Changes in Domestic Credit **(Dcdm)**	3	-2.7752	I(0)*
Changes in GDP **(Dcgdp)**	3	-3.17321	I(0) **
Debt/GDP ratio **(Ddgp)**	3	-2.04666	I(0) **
Inflation **(Dinf)**	3	-2.54004	I(0) **
Public investment **(Dpui)**	3	-2.45269	I(0) **
Real Exchange rate **(Drer)**	3	-1.69662	I(0) ***
Real interest rate **(Drir)**	3	-1.87484	I(0) ***
Terms of trade **(Dtot)**	3	-3.24229	I(0) *
Private investment **(Dpiv)**	3	-2.13709	I(0) **

Source: Generated from tests conducted.

ADF test statistics at 3 lags with no intercept and no trend

ADF Test Critical values : 1% Critical value   -2.7057
                            5% Critical value   -1.9614
                            10% Critical value -1.6257

Variables stationary at   *   1%

                               **   5%

                               ***   10%

After differencing the variables were stationary and all integrated of order zero.

Graphs showing the movement of variables used in the regression.
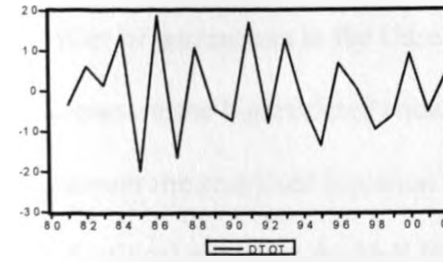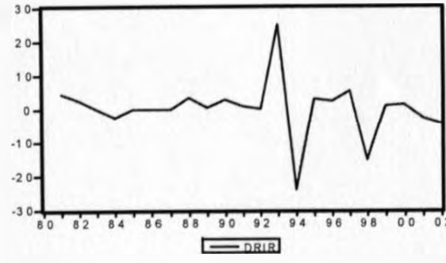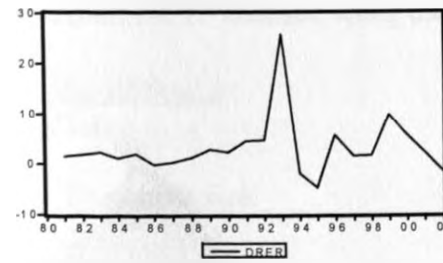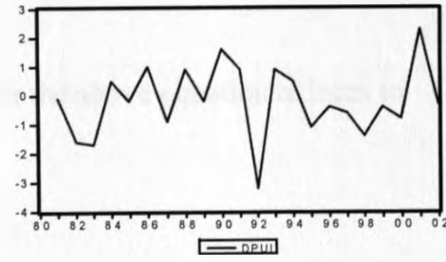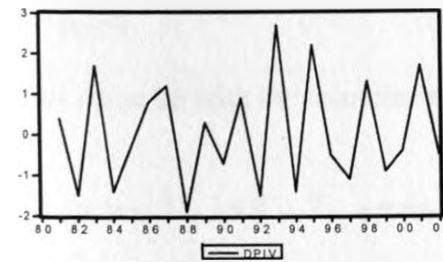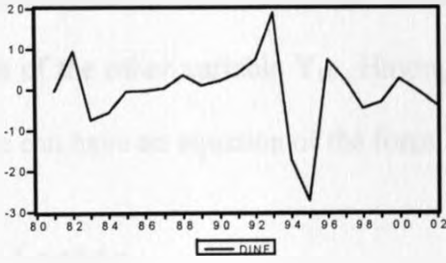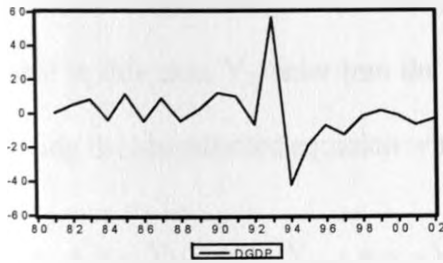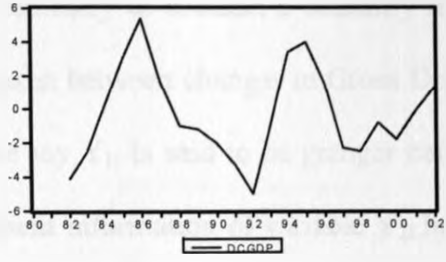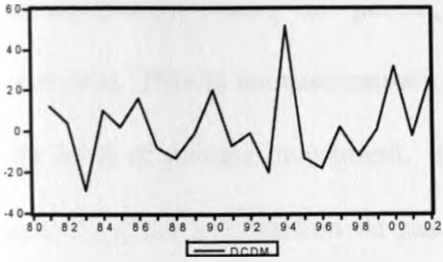
4.3 Causality Tests

To have a clear analysis of the relationship between the changes in growth and the level of private investment during this period, it was necessary to conduct a causality test between the two variables. This is because causality could exist between changes in Gross Domestic Product and the level of private investment. A variable say Y_{1t} is said to be granger caused by another variable Y_{2t} if the information on past and present information of variable Y_{2t} helps to improve the forecast of the variable Y_{1t}. Testing of this relationship involves testing whether lags of one variable in this case Y_{2t} enter into the equation of the other variable Y_{1t}. Having two equations one being the unrestricted equation whereby we can have an equation of the form

$$Y_{1t} = \alpha_{10} + \alpha_{11} Y_{1t-1} + \beta_{11} Y_{1t-2} + \alpha_{12} Y_{t-1} + \beta_{12} Y_{2t-2} + \varepsilon_{1t}$$

If $\alpha_{12} = \beta_{12} = 0$

Then we come up with the restricted equation or the above equation reduces to

$$Y_{1t} = \alpha_{10} + \alpha_{11} Y_{1t-1} + \beta_{11} Y_{1t-2} + \varepsilon_{1t}$$

We calculate the F* Statistic using the formula

$$F^* = \frac{RSS_R - RSS_{UR} / \rho}{RSS_{UR} / T - K}$$

Where T= sample size

ρ – Number of lags

K=Number of parameters in the Unrestricted Equation.

UR= Represent the Unrestricted equation

R= Represent the restricted Equation

If F* > F critical we reject the Null Hypothesis of no causality meaning there is causality.

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The results of the causality tests showed that neither of the two variables granger caused the other. This is because the F-calculated is less than F critical and we therefore accept the null hypothesis on non causality.

Pairwise Granger Causality Tests
Date: 08/20/03   Time: 15:24
Sample: 1980 2002
Lags: 5

Null Hypothesis:	Obs	F-Statistic	Probability
DCGDP does not Granger Cause DPIV	16	2.46534	0.17228
DPIV does not Granger Cause DCGDP		0.44428	0.80298

4.4 Cointegration Analysis

Bivariate cointegration results with private investment as the endogenous variable.

TABLE 5

Variable	ADF(1)	DF	Conclusion
Change in domestic credit	-2.042712(**)	-4.760452(*)	Cointegrated
Terms of trade	-1.698711(***)	-3.926682(*)	Cointegrated
Real exchange rate	-3.217005(*)	-5.289762(*)	Cointegrated
Real interest rate	-1.801820(***)	-3.794559(*)	Cointegrated
Change in gross domestic product	-1.726320(***)	-3.936995(*)	Cointegrated
Debt/GDP ratio	-1.750552(***)	-4.145509(*)	Cointegrated
Public investment	-2.814036(*)	-4.926258(*)	Cointegrated
Inflation	-2.123435(**)	-4.551657(*)	Cointegrated

Source : From tests conducted

ADF (1): ADF test on variables at 1 lag and with no intercept or trend
DF: Test on variables with intercept

D.F Critical values: 1%   -3.7667   ADF Critical values: 1%   -2.6819
                     5%   -3.0038   5%   -1.9583
                    10%   -2.6417   10%   -1.6242

* Stationary at 1%

** Stationary at 5%

*** Stationary at 10%

The aim of this analysis was to test whether the variables are integrated of the same order and whether a linear combination of the variables is also integrated of the same order or lower. This is because differencing of variables could lead to loss of long run equilibrium relationship between the variables. Ours was thus to test if the two trends are moving together in the long run in any systematic and consistent way. Cointegration of variables implies that there must be an adjustment process to prevent the deviations from long run equilibrium relationship from becoming larger and larger. An error correction model will take care of this through an error correction mechanism where both short run and long run factors are allowed to play a role.

The cointegration results show that the variables are cointegrated with the dependent variable private investment and hence the need to estimate an error correction model by incorporating an error correction term in the model and using the first difference of the explanatory variables. The procedure is to perform a joint regression of all the variables in their levels that are integrated with the dependent variable and then use the generated residuals to come up with an error correction term that is used in the regression together with the other variables in their first difference.

4.5 Results and Discussion of Estimation

In our regression we regressed private investment in the first difference against the independent

variables also in their first differences and incorporated an error correction term lagged once i.e

ECT_1. Our aim was to assess the effects of the explanatory variables on private investment.

Using E-Views Econometric programme this yielded the following results

Dependent Variable: DPIV
Method: Least Squares
Date: 08/20/03   Time: 08:47
Sample(adjusted): 1982 2002
Included observations: 21 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.058776	0.211463	-0.277948	0.7862
DCDM	-0.032922	0.010436	-3.154569	0.0092
DTOT	0.007233	0.016579	0.436252	0.6711
DRER	0.042396	0.043913	0.965452	0.3551
DRIR	-0.029965	0.030748	-0.974530	0.3507
DCGDP	0.148728	0.074982	1.983508	0.0728
DGDP	0.028461	0.018751	1.517827	0.1573
DPUI	0.034418	0.148375	0.231969	0.8208
DINF	-0.068055	0.028481	-2.389491	0.0359
ECT_1	-1.022305	0.227085	-4.501856	0.0009

R-squared	0.863059	Mean dependent var		0.033333
Adjusted R-squared	0.751017	S.D. dependent var		1.375621
S.E. of regression	0.686410	Akaike info criterion		2.391070
Sum squared resid	5.182744	Schwarz criterion		2.888462
Log likelihood	-15.10624	F-statistic		7.702979
Durbin-Watson stat	1.406079	Prob(F-statistic)		0.001257

To improve on the results we had to introduce some lags on some variables. The main reason

was to allow for the fact that some amount of time usually lapses between the movement of

independent variable and the response of the dependent variable and therefore lagged variables

leaves the model with more realistic and dynamic properties. After performing the regression this

produced the following results, which were more realistic.

Method: Least Squares
Date: 08/22/03   Time: 10:59
Sample(adjusted): 1982 2002
Included observations: 21 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DPUI	-0.006920	0.130741	-0.052927	0.9587
DRER	0.076253	0.040874	1.865571	0.0890
DRIR	-0.045873	0.028706	-1.598022	0.1383
DTOT	0.014482	0.015071	0.960924	0.3572
DCGDP	0.138243	0.066485	2.079328	0.0618
DCDM_1	-0.024757	0.006341	-3.904387	0.0025
DGDP	0.026722	0.016769	1.593569	0.1393
DINF	-0.054192	0.026212	-2.067462	0.0630
ECT_1	-0.745120	0.211826	-3.517603	0.0048
C	-0.215808	0.189810	-1.136971	0.2797

R-squared	0.890678	Mean dependent var	0.033333
Adjusted R-squared	0.801232	S.D. dependent var	1.375621
S.E. of regression	0.613299	Akaike info criterion	2.165825
Sum squared resid	4.137490	Schwarz criterion	2.663216
Log likelihood	-12.74116	F-statistic	9.957754
Durbin-Watson stat	2.044796	Prob(F-statistic)	0.000399

To get a more parsimonious equation and improve on our results further we dropped variables with the lowest t-Statistic values and estimated a restricted model because they were not significant and there was no need of including them in our final regression. The variables that were dropped were public investment, which had a t-statistic of –0.52927, real interest rate with a t-statistic of –1.598022, terms of trade with a t-statistic of 0.960924 and debt/GDP ratio, which had a t-statistic of 1.593569. The results improved drastically with all the remaining variables becoming significant. The results of this regression are displayed below.

Dependent Variable: DPIV
Method: Least Squares
Date: 08/22/03   Time: 10:59
Sample(adjusted): 1982 2002
Included observations: 21 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRER	0.087937	0.032335	2.719515	0.0158
DCGDP	0.132133	0.058554	2.256620	0.0394
DCDM_1	-0.022601	0.004948	-4.567815	0.0004
DINF	-0.047055	0.022332	-2.107104	0.0524
ECT_1	-0.847214	0.203568	-4.161821	0.0008

C	-0.242402	0.177225	-1.367765	0.1915
R-squared	0.849564	Mean dependent var		0.033333
Adjusted R-squared	0.799418	S.D. dependent var		1.375621
S.E. of regression	0.616090	Akaike info criterion		2.104110
Sum squared resid	5.693510	Schwarz criterion		2.402545
Log likelihood	-16.09316	F-statistic		16.94200
Durbin-Watson stat	2.050094	Prob(F-statistic)		0.000011

4.5.1 Diagnostic Tests

Due to uncertainty regarding the appropriateness of our specification, functional form and reliability of the results, there was a need to conduct some diagnostic tests on the models used in our regression.

Proper specification is firmly demonstrated by the recursive test. The following figure shows the recursive residuals along with standard error bands with a positive or minus 2 standard deviations.

Figure 1
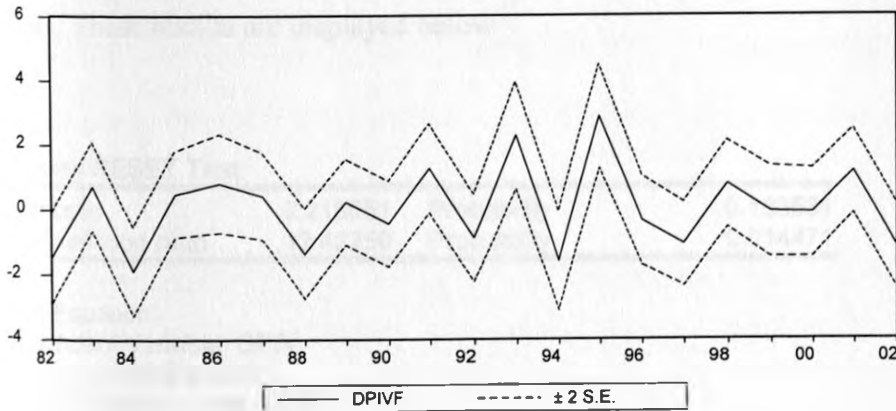
The Cusum test represented by the graph below confirms the above figure with two standard error bands.

Figure 2
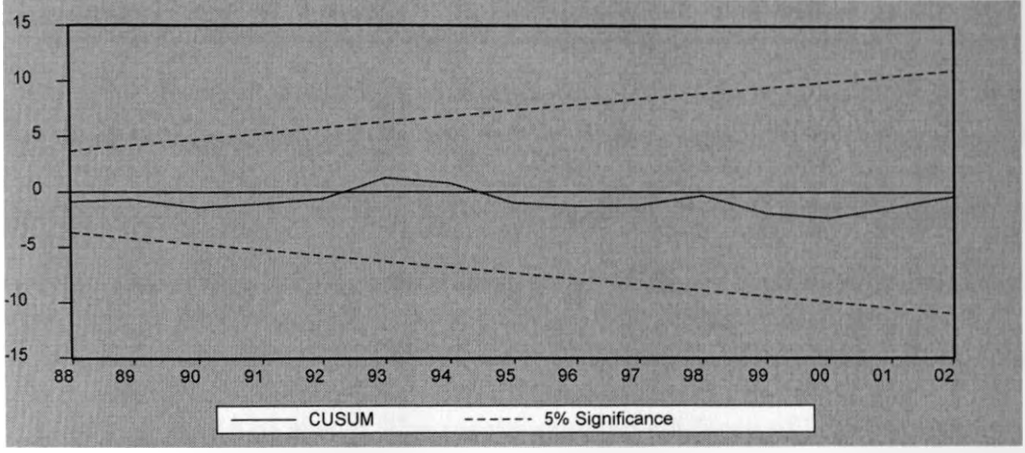
The Ramsey RESET test gives F=2.219 with a probability value of 0.133531 which shows there is no specification error. The Ramsey Reset test proposed by Ramsey (1969) is only applicable to equations estimated by least squares and will test for incorrect functional form and specification errors. These results are displayed below

Ramsey RESET Test:

F-statistic	2.218651	Probability	0.133531
Log likelihood ratio	12.42250	Probability	0.014471

Test Equation:
Dependent Variable: DPIV
Method: Least Squares
Date: 08/22/03   Time: 12:27
Sample: 1982 2002
Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DRER	-0.067867	0.110943	-0.611722	0.5532
DCGDP	0.016509	0.103548	0.159430	0.8762
DCDM_1	-0.013100	0.012312	-1.063968	0.3101
DINF	-0.047439	0.030211	-1.570266	0.1447
ECT_1	-0.093719	0.610867	-0.153419	0.8808
C	0.296012	0.502665	0.588886	0.5678
FITTED^2	-0.218000	0.417025	-0.522750	0.6115
FITTED^3	0.974996	0.596032	1.635812	0.1301

FITTED^4	0.165836	0.135624	1.222766	0.2470
FITTED^5	-0.170166	0.096438	-1.764517	0.1054
R-squared	0.916738	Mean dependent var		0.033333
Adjusted R-squared	0.848615	S.D. dependent var		1.375621
S.E. of regression	0.535230	Akaike info criterion		1.893515
Sum squared resid	3.151188	Schwarz criterion		2.390907
Log likelihood	-9.881908	F-statistic		13.45701
Durbin-Watson stat	1.911981	Prob(F-statistic)		0.000097

The white heteroscedasticity test will test for heteroscedasticity in the residuals from a least squares regression. The problem with heteroscedasticity is that the disturbance variance is not constant across time periods or across a survey. Ordinary least squares estimates are consistent in the presences of heteroscedasticity, but the estimated standard errors may no longer be valid because they could be biased. The results show no evidence of heteroscedasticity.

The test statistic show $N*R^2 = 17.11$ and $X^2_{0.05}(11) = 19.68$ so the hypothesis of homoscedasticity is not rejected.

In testing for serial correlation the F-statistic and Obser*R-squared are not significant, the two statistics fails to reject the hypothesis of zero first order autocorrelation of the disturbance term. Hence there is no serious problem of serial correlation. These results are shown below.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.134633	Probability	0.719162
Obs*R-squared	0.200026	Probability	0.654700

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 08/26/03   Time: 12:23

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DINF	-0.003947	0.025396	-0.155420	0.8787
DRER	0.001351	0.033513	0.040300	0.9684
DCDM_1	-0.000122	0.005108	-0.023971	0.9812
ECT_1	0.076413	0.295544	0.258550	0.7997
DCGDP	-0.005061	0.061877	-0.081798	0.9360
C	-0.010370	0.184744	-0.056132	0.9560
RESID(-1)	-0.163860	0.446577	-0.366924	0.7192

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R-squared	0.009525	Mean dependent var	-3.70E-17
Adjusted R-squared	-0.414964	S.D. dependent var	0.533550
S.E. of regression	0.634670	Akaike info criterion	2.189778
Sum squared resid	5.639279	Schwarz criterion	2.537952
Log likelihood	-15.99266	F-statistic	0.022439
Durbin-Watson stat	2.004207	Prob(F-statistic)	0.999930

Histogram normality test on residuals shows the residuals are normally distributed. These results are shown by the figure below

FIGURE 3

Series: Residuals	
Sample 1982 2002	
Observations 21	
Mean	4.23E-17
Median	-0.021490
Maximum	0.977550
Minimum	-0.818155
Std. Dev.	0.533550
Skewness	0.108144
Kurtosis	1.924830
Jarque-Bera	1.052425
Probability	0.590838
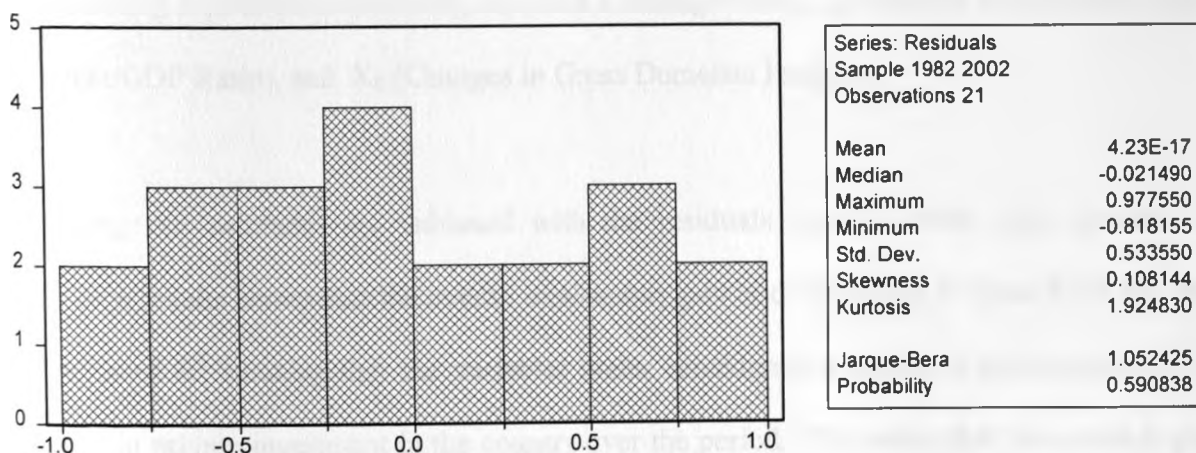
The diagnostic tests show the model was properly specified and a Durbin Wartson statistic of 2.0 shows that there is no serial correlation of the disturbance term across time periods hence our estimates are efficient since the standard errors are unbiased. The Jarque – Bera statistic for testing the normality of the residuals has a probability value of 0.590838, which strongly suggest normality of errors for the model. This is the case although the sample size is small. The results are consistent and the parameters are stable.

The following was thus the equation that was estimated using ordinary least squares method

$$Y = -0.0588 + 0.0072X_1 - 0.029965X_2 - 0.068055\ X_3 + 0.034418\ X_4 + 0.042396X_5 - 0.032922\ X_6 +$$
$$\quad (1.1369)\ (0.4362)\quad (0.9745)\quad (2.1071)\quad (0.23197)\quad\quad (2.7195)\quad\quad (4.5678)$$

$$0.028461\ X_7 + 0.148728\ X_8 - ECT\_1$$
$$(1.5178)\quad\quad (2.2566)\quad (3.5176)$$

In this equation the t values are given in parentheses below each coefficient

Where Y represents changes in private investment, the values represent the Betas and the Xs representing the explanatory variables i.e X_1 (Terms of Trade), X_2 (Real Interest Rate), X_3(Inflation), X_4(Public Investment), X_5 (Real Exchange Rate), X_6(Changes in Domestic Credit), X_7 (Debt/GDP Ratio), and X_8 (Changes in Gross Domestic Product).

Assuming our estimates are unbiased with the residuals being a white noise process, the regression results shows that the overall explanatory power of the model is about 80 % this been the adjusted R^2 meaning that the variables under consideration explain a good portion of the changes in private investment in the country over the period. This means that the model is good in explaining changes in private investment in the country. The rest is explained by other variables not considered in the study. These could include the political environment existing in the country during this period and other issues like corruption, which of late has been identified to be very rampant.

From the above results some of the changes in private investment in the country during this period have been influenced by the level of public investment. This conforms to the theory that public investment especially expenditures geared towards the improvement of infrastructure like roads, power and water etc compliments private investment.   The coefficient for public

investments is positive and this was the relationship expected in our analysis. This from the result means that a one-unit change in public investment led to about 0.034 unit change in private investment in the country. The relationship between public investment and changes in private investment over the period is displayed in the figure below. The figure shows that except for the periods between 1982 and 1983, the year 1986 and 1993 the two variables have been moving in the same direction.

FIGURE 4

The Movement of Private Investment and Public Investment
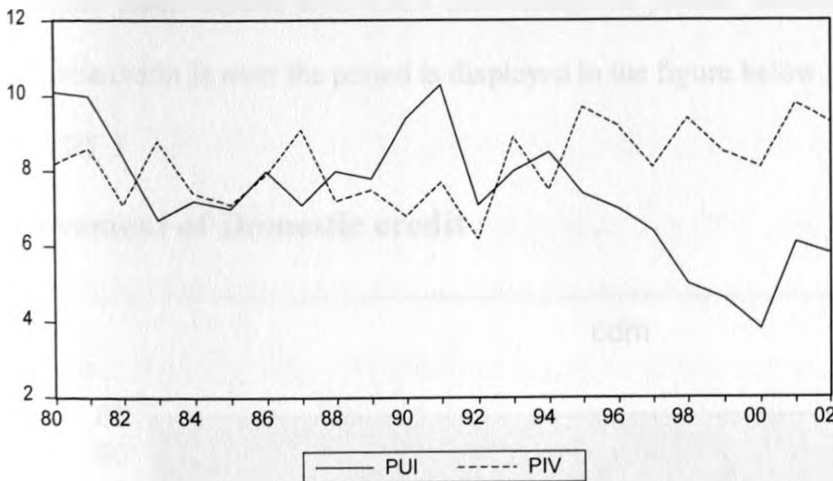
Inflation contributed to private investment but in the negative direction. The coefficient for inflation is a negative figure of about 0.047 that is significant at 5% level and with a t- statistic of 2.1071 strongly suggesting that the variable was important in explaining private investment in the period. This in part conforms to our initial expectation. The reason for this relationship could stem from the fact that a private investor would be unwilling to take the risk of investing if the macro-economic environment is unstable and unpredictable because this could impact negatively on the return of his investment in the long run. By implication it can be pointed out that the high

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inflation rate experienced in the country in the mid 1990's must have impacted negatively on private investment.

The coefficient for lagged changes in domestic credit was expected to be positive but the results showed otherwise. The results show a negative coefficient of about 0.023 that was very significant at 1%,5%and 10% levels of significance. The t statistic for this coefficient was 4.5678, which further confirms the high significance of this variable in influencing private investment in the country over the period under review. This means that a one-unit change in domestic credit results to a 0.023 unit change in private investment. The trend of changes in domestic credit is over the period is displayed in the figure below.

FIGURE 5

Movement of Domestic credit
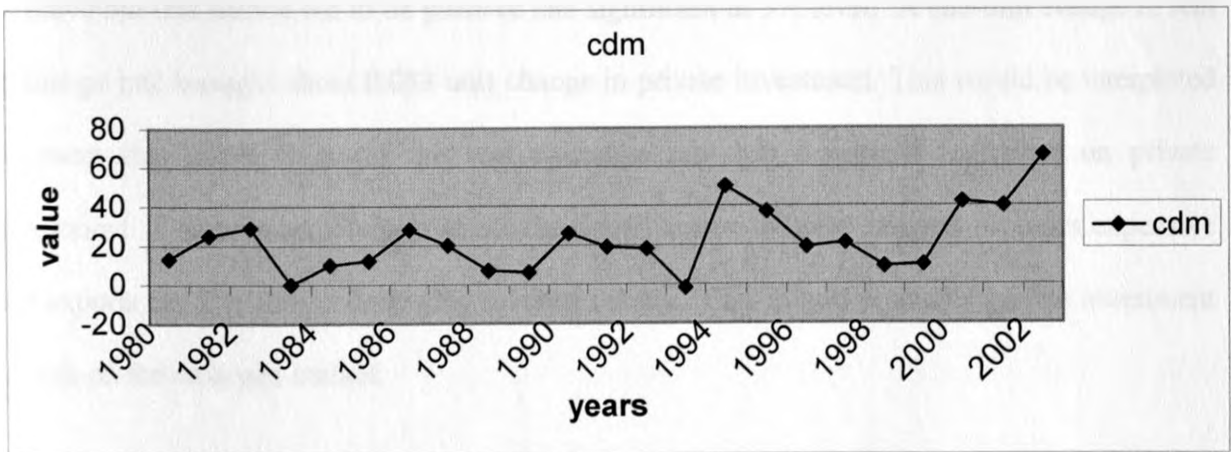
The negative relationship could be explained by the fact that initially it was expected that changes in domestic credit on the upward direction would have impacted positively on private investment. However, we find that the changes between 1982 and 1985 were on the negative direction moving from about 29% to 12% in 1985. In 1989 the figure went to a low of about 6%

recording the lowest figure of –2% in 1993. These negative movements may have impacted negatively on private investment hence the high significance of the variable.

The coefficient for changes in Debt/ Gross Domestic Product ratio was expected to be negative because the variable was expected to impact negatively on private investment. The results showed otherwise returning a positive coefficient of about 0.028 though not significant. This means a one-unit change in this ratio contributed about 0.028-unit change in private investment and in the negative direction. It is thus not clear whether the debt overhang problem applies to Kenya at the moment. It could be that private investors have not started worrying about the current level of debt.

The coefficient for the variable real exchange rate did not conform to our expectations. We expected the relationship between real exchange rate and changes in private investment to be negative but this turned out to be positive and significant at 5% level. A one-unit change in real exchange rate brought about 0.088 unit change in private investment. This would be interpreted to mean that depreciation of the real exchange rate has a positive influence on private investment. This is more likely to affect the export sector whereby imports becomes expensive and exports cheaper thus encouraging markets outside. This in turn promotes private investment to cash on the enlarged market.

The coefficient for the variable changes in gross domestic product had a positive value of about 0.132. This was to our expectations since we expected that changes in gross domestic product would have a positive impact on private investment. This coefficient was significant at 5% level and had a t- statistic of 2.2566, which further confirms the significance of the variable. This

means that a 1 unit change in gross domestic product produces about 0.132 unit change in private investment and in the positive direction. This conforms to economic theory.

The coefficient for terms of trade had a positive value of about 0.007. This was not to our expectations because initially we expected that terms of trade would impact negatively on private investment. However this coefficient was not significant at the 1%, 5% or the 10% level of significance. It also showed a very low t- statistic 0.436. This implies that a one-unit change in terms of trade improves private investment by about 0.007 units. This is possibly because it encourages more investment to take advantage of the improved terms of trade.

The coefficient for the real interest rate had a negative value of about 0.029 although this was not significant at the 1%, 5% or 10% level of significance. The t- statistic for this coefficient was also very low showing a figure of about 0.974. This sign was expected because of the negative relationship between private investment and the real interest rate. This means that a one unit change in real interest rate would have a negative impact on private investment of about 0.029 units. This means an increase in real interest rates discourages private investment because funds for investment become more expensive. The result thus conforms to economic theory.

The coefficient for the error correction term included in our error correction model showed an expected negative sign of about 0.85. This coefficient represent the speed of adjustment and it is supposed to be negative so that the deviations do not persist and the move is towards the equilibrium point. This coefficient was very significant at 1%, 5% and the 10% levels. This coefficient had a very strong t-statistic of about 4.1618, which further shows the importance of

including this variable in our estimation in order to capture the long run equilibrium relationship between the variables. The variables inflation, real exchange rate, changes in gross domestic product, ragged changes in domestic credit and the ragged error correction term were thus the five most significant in explaining private investment in Kenya during this period.

CHAPTER 5: CONCLUSION AND POLICY RECOMMENDATIONS

5.1 CONCLUSION.

Our study was aimed at empirically testing the relationship between private investment and changes in Gross Domestic Product, investigating the factors that had affected private investment and lastly assessing whether the low levels of growth of the economy could be explained by the levels of private investment. The study was to cover the period between 1980 and the year 2002.

The study shows that there existed a significant relationship between changes in gross domestic product and the levels of private investment. However there was no causal relationship between private investment and changes in Gross Domestic Product. The results show that other factors also played a role as it had earlier been envisaged. In particular public investment and changes in domestic credit were found to be very important in explaining changes in private investment over this period. This means improved public investment particularly in areas that compliment private investment and increased credit facilities to the private sector would go along way in improving the level of private investment and hence growth of the economy. The study also found that the current low levels of growth could not wholly be attributed to the low levels of private investment.

Large portions of debt were expected to negatively influence private investment in Kenya. This could be explained by the problems associated with a large debt overhang. Investors are usually very sensitive to this because they fear of high taxes in the future to cover interest payments and the repayment of principle. However the results did not support this argument.

The influence of real exchange rate was positive and significance at 1 % level. This means depreciation of the real exchange rate has a positive influence on private investment. This in most cases affects the exports sector whereby imports becomes expensive and exports cheaper and hence the economy enjoys markets outside. However caution should be taken when depreciating the local currency because confidence of local investors may be eroded. This may also have a negative influence particularly when it comes to importation of intermediate goods used as raw materials in the local manufacturing sector and capital investment goods.

The results of the findings shows that the variables real interest rate, inflation and terms of trade had a negative influence on the level of private investment in the period under review. Increased real interest rates act as a detriment to private investment by increasing the cost if investment funds. The end results with reduced private sector demand for credit due to its high costs means the economy suffers from reduced capital formation. Inflation on the other hand affects private investment because of the uncertainties associated with it and the fear of lower returns from their investment in the future. Through out the period terms of trade showed a declining trend meaning exports had not been performing well and this influenced Private investment and in the negative direction.

Finally although these factors affect private investment, other factors like unfavourable political climate and the macro economic environment that accompanies it must have played an important role and may have been responsible for the current low level of private investment. Kenya is

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also very much dependent on agriculture but the climatic conditions has not been very favourable for increased investment in this area.

5.2 POLICY RECOMMENDATIONS

The results have shown how various factors affected private investment during the period and hence the direction to which policy should be directed and some of the areas that require attention include the following. There is a need to reduce the current high domestic debt burden, which has tended to discourage private investment and has also contributed to high cost of borrowing funds for investment. There is also need to try and sustain a growth rate of about 5 % and above which is conducive to investment. The Government should also work hard to provide incentives to encourage investment in the country. The current fight against corruption is also hoped to play an important role in this area. Prudence in Government spending is also necessary.

The Government should also look for possible ways of improving the terms of trade by improving the level of exports in the country. The reason for this is because terms of trade have affected the level of private investment in the negative direction. This trend can be reversed at least to some level with improved terms of trade. Public investment has been shown to compliment private investment especially investment aimed at improving public infrastructures like roads, water and power and these should be given priority.

A large proportion of debt is detrimental to private investment because of the debt overhang problem. The current trend is very worrying especially considering that the total domestic debt stood at 202,710 million Kshs by June 2002 worsening to about 226,064 million by the end of December 2002. The external debt position was even worse standing at 368,185 million by the

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end of December 2002. Much of these debts were from Multilateral Creditors who accounted for about 58 % of the total external debt and Bilateral creditors accounting for about 34 %. Improvements in this area will encourage private investment and the government can do this through proper debt management, asking for debt relief from Donors like the IMF, the World Bank and other bilateral Donors. Debts with low interest rates and with long maturity period should be the priority. The Government can also look for grants, which are not payable back. By doing this the investors will not shy away from investing in Kenya because of the problems associated with debt overhang.

The variables real exchange rate and public investment were very significance at 1 % level. This implies these areas should be given great emphasis if the current trends are to be reversed. Improved public investment especially in the area of infrastructure development will go along way in improving private investment. This is because this has been seen to compliment private investment. Increased credit facilities to the private sector should be of much priority because this impacts positively on the level of private investment. The coefficient for inflation was also significant at 5 % level and the government should have a strong and sound monetary policy, which will deter high inflationary trends that will discourage private investment.

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APPENDICES

DATA USED IN THE REGRESSIONS

year	Change in Income	Change in Domestic Credit	Inflation	Change in Terms of Trade	Real Exchange Rate	Real Interest Rate	Private investment as a % of GDP	Public Investment as a % of GDP	Debt	Gross Domestic Product
1980	5.6	13	12.9	-8.9	7.4	8	8.2	10.1	3387	7265
1981	3.8	25	12.6	-12.1	9	12.5	8.6	10	3228	6854
1982	1.5	29	22.1	-5.9	10.9	15	7.1	8 4	3368	6437
1983	1.3	0	14.7	-4.4	13.3	15	8.8	6.7	3628	5984
1984	1.8	10	9.1	9.6	14.4	12.5	7.4	7.2	3512	6192
1985	4.3	12	8.7	-10.1	16.4	12.5	7.1	7	4181	6131
1986	7.2	28	8.4	8.6	16.2	12.5	7.9	8	4604	7241
1987	5.9	20	8.7	-7.8	16.5	12.5	9.1	7.1	5784	7972
1988	6.2	7	12.3	3	17.7	16	7.2	8	5810	8519
1989	4.7	6	13.4	-1.4	20.6	16.5	7.5	7.8	5890	8341
1990	4.2	26	15.6	-8.6	22.9	19.4	6.8	9.4	7058	8533
1991	1.4	19	19.7	8.5	27.5	20.3	7.7	10.3	7453	8043
1992	-0.8	18	27.1	0.8	32.2	20.5	6.2	7.1	6898	8002
1993	0.4	-2	46	13.8	58	45.5	8.9	8	7111	4977
1994	2.6	50	28.8	10.9	56.1	21.5	7.5	8.5	7202	7148
1995	4.4	37	1.6	-2.4	51.4	24.5	9.7	7.4	7412	9047
1996	4.1	19	9	4.6	57.1	26.9	9.2	7	6931	9257
1997	2.1	21	11.2	5.2	58.7	32.3	8.1	6.4	6603	10612
1998	1.6	9	6.6	-4.2	60.4	17.1	9.4	5	6943	11444
1999	1.3	10	3.5	-10.2	70.3	18.1	8.5	4.6	6558	10527
2000	-0.2	42	6.2	-0.9	76.2	19.5	8.1	3.8	6343	10357
2001	1.2	39.9	5.8	-5.9	78.6	16.81	9.8	6.1	6129	10473
2002	1.1	66	2	-1.2	77.1	12.4	9.3	5.8	6445	12573

Notes: The values for the real exchange rate (RER) are expressed in terms of one US Dollar. Debt and GDP figures are in million US Dollars

Source 1.Central Bureau of Statistics
2.World Bank Africa Database 2002
3. Central Bank of Kenya Publications
4. Economic Surveys and the International Financial Statistics (IFS).

RESULTS ON UNIT ROOT TESTS

ADF Test Statistic	-2.222991	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PIV,2)
Method: Least Squares

ADF Test Statistic	-2.921962	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CDM,2)

ADF Test Statistic	-2.817274	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TOT,2)

ADF Test Statistic	-2.343697	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RER,2)

ADF Test Statistic	-2.040300	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RIR,2)

ADF Test Statistic	-3.392859	1% Critical Value*	-4.5743
		5% Critical Value	-3.6920
		10% Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CGDP,2)

ADF Test Statistic	-2.379327	1% Critical Value*	-4.5743

| | | 5% | Critical Value | -3.6920 |
| | | 10% | Critical Value | -3.2856 |

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(DGP,2)

ADF Test Statistic	-2.444116	1%	Critical Value*	-4.5743
		5%	Critical Value	-3.6920
		10%	Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(PUI,2)

ADF Test Statistic	-2.504245	1%	Critical Value*	-4.5743
		5%	Critical Value	-3.6920
		10%	Critical Value	-3.2856

*MacKinnon critical values for rejection of hypothesis of a unit root.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INF,2)

PHILLIPS PERRON TEST

PP Test Statistic	0.135270	1%	Critical Value*	-2.6756
		5%	Critical Value	-1.9574
		10%	Critical Value	-1.6238

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: (Newey-West suggests: 2)
2
Dependent Variable: D(PIV)

PP Test Statistic	-2.429335	1%	Critical Value*	-4.4415
		5%	Critical Value	-3.6330
		10%	Critical Value	-3.2535

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: (Newey-West suggests: 2)
2
Dependent Variable: D(CGDP)

PP Test Statistic	-2.199739	1%	Critical Value*	-4.4415
		5%	Critical Value	-3.6330
		10%	Critical Value	-3.2535

*MacKinnon critical values for rejection of hypothesis of a unit root.

Lag truncation for Bartlett kernel: (Newey-West suggests: 2)
2