DOMESTIC DEBT AND PRIVATE INVESTMENT IN

KENYA: 1963 - 2009

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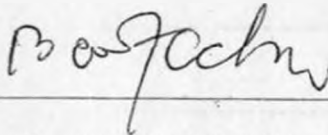
A RESEARCH PAPER SUBMITTED TO THE SCHOOL OF ECONOMICS IN PARTIAL FULFILLMENT OF THE DEGREE OF MASTER OF ARTS IN ECONOMIC POLICY AND MANAGEMENT OF THE UNIVERSITY OF NAIROBI

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DECLARATION

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

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This research paper has been submitted for presentation with our approval as university supervisors.

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ACRONYMS AND ABBREVIATIONS

AERC   African Economic Research Consortium

CBK   Central Bank of Kenya

F/Y   Financial Year

HIPCs   Highly-Indebted Poor Countries

IEA   Institute of Economic Affairs

TSLS   Two –Stage Least Squares

USA   United States of America

PV   Present Value

R   Reserves

OPERATIONAL DEFINITIONS OF TERMS

Domestic debt is the government's indebtedness to its citizens, commercial banks, non-banks and or even foreigners.

Domestic debt service is interest and principal payments of loans borrowed by the Government in the domestic market via instruments like the treasury bonds, bills.

Public debt consists of domestic and external indebtedness of a country to local and foreign residents, other countries, multilateral organizations, and commercial banks.

External debt refers to what is owed by the government to bilateral donor countries as well as multilateral financial institution such as the World Bank, International Monetary Fund, African Development Bank, etc.

ABSTRACT

This paper analyzes the increase of domestic debt to GDP ratio and its effect on private investments to GDP ratio in Kenya from 1963 to 2009. Heavy domestic borrowing puts upward pressure on interest rates and consequently private investments. The objectives of this research paper are to examine the factors that influence private investments in Kenya and draw policy implications from the research findings.

The independent variables that were used include inflation rate, GDP growth, fiscal deficit, debt service stock of domestic debt and the export government expenditure ratio. The dependent variable was private investments. The data used is secondary data that was obtained from publications like the Kenyan Statistical abstracts, Statistical bulletins and Economic surveys of various years.

The regression results after the 1st difference showed that the exports government expenditure ratio, debt service and the stock of domestic debt were all significant at 5 percent. The inflation rate, fiscal deficit and GDP growth were insignificant. These variables explained 40.51 percent of the private investment changes. The stock of domestic debt and terms of trade negatively influence private investment.

On carrying out the dynamic analysis of the model, the best possible results were achieved after the 2nd lag. The significant variables were the export government expenditure ratio, debt service and the stock of domestic debt. Of which the exports

government expenditure and the stock of domestic debt had negative coefficients. The variables explained 59.83 percent of the private investment

The conclusion therefore is that there is evidence of crowding out effect on private investments in Kenya.

CHAPTER ONE

INTRODUCTION

1.1 Public Debt

The government borrows to finance its recurrent expenses, development projects and settle its maturing international and or domestic obligations. Furthermore, the government borrows domestically mainly to finance its budget deficits. There are various instruments through which the government borrows from the Central Bank of Kenya and domestic money market. These instruments reflect the stock of existing domestic debt.

The debt problem in Kenya was exacerbated by macroeconomic mismanagement in the 1990s leading to a reduction in donor inflows (Kiringai, 2001). The government has thus resorted to occasional debt rescheduling and short-term domestic borrowing to finance its expenditures. Domestic debt induces uncertainty and affects private investment through high interest rates and the development of the financial sector. High interest rate dictates that a large proportion of the expenditures must be allocated to interest payments. Domestic debt distorts the economy and complicates macroeconomic management.

After debt servicing and the governments' salaries payment, there is little left for core functions of the government, basic infrastructure, education, health and other essential services and creation of an enabling environment for the private sector (Kiringai, 2001).

In the period ending 1989, the issue of domestic debt crisis was nowhere in the picture (Chironga, 2001). As a result, the government did not foresee a domestic debt crisis. This lack of concern was attributed to good economic performance and political stability. The country experienced good economic management, moderately good returns from its principal

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exports, and economic growth of about five percent annually that ensured adequate tax revenues to finance the budgetary estimates. However, statistics show that the stock of Kenya's domestic debt was growing at an average level of close to Kshs 2.5 billion annually up to 1989 (Republic of Kenya, 2007).

Kenya's stock of public debt has been on the increase over time since independence. This increment however did not raise concern. Before the period starting 1990s, the economy maintained a real GDP growth rate of about 4 percent. This implies that the economy generated enough revenue to cover budget estimates. The stock of domestic debt therefore remained manageable and stable throughout the two decades starting 1970. The total debt remained below Kshs 100 billion while the highest domestic debt was Kshs 42.8 billion (Republic of Kenya, 2007).

The period beginning 1990 saw a drastic change in the level of domestic debt accumulation. The stock of total domestic debt was at Kshs 211,813 million in the year 2001 from Kshs 16,011.18 million in 1990. The total debt stood at Kshs 577,940.4 million in 2001 from Kshs 84,391.18 million in 1990 (Republic of Kenya, 2007).

The history of domestic debt problem in Kenya can be traced back to the 1992/1993 fiscal year. This debt rose from Kshs 53.1 billion in 1988 to Kshs 165 billion in 1993, an increase of 310.7 percent (about 9 percent of GDP). During the same period, total public expenditures increased by an almost similar margin from Kshs 57.1 billion (310 percent of GDP) to Kshs 178 billion (or 48.4 percent of GDP), an increase of 311.7 percent. The rapid increase in government expenditure outweighed increase in revenues, leading to more domestic borrowing. Therefore in 1990, domestic debts were only 23.9 percent higher than revenues but by 1994, the gap had widened to 59.8 percent (Republic of Kenya, 2007).

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This period was characterized by an increase in budget deficits, excluding grants, from 6.7 percent of GDP in 1990 to 8.9 percent in 1994. The country is likely to continue having trouble with domestic debt. While the average GDP growth rate increased, peaking at 4.8 percent in 1995, it declined slightly in 1996 to stand at 4.6 percent before persistently declining to the lowest level in the history of Kenya's economic performance where the real GDP growth rate was -0.3 percent in 2000 (Republic of Kenya, 2008)
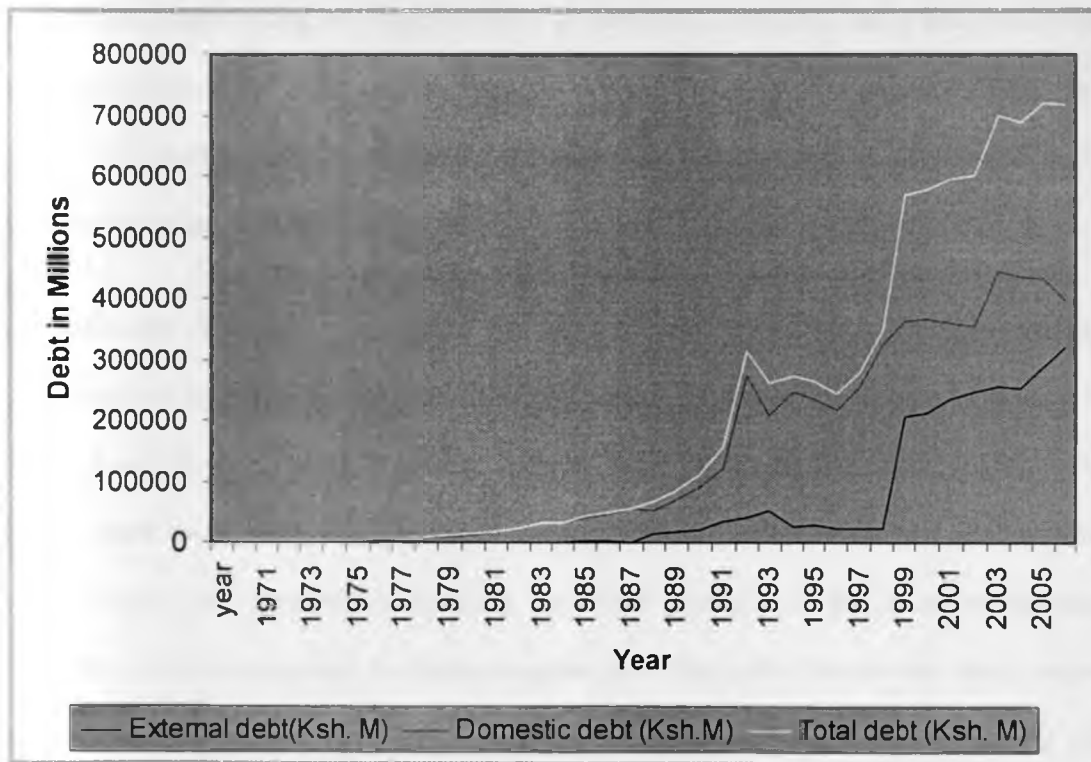
.Figure 1.1 Stock of Kenya's public debt for the period 1975-2007.

Source: Republic of Kenya, *Statistical abstracts* and *Economic surveys*; Government Printer, various issues.

Figure 1.1 shows that in the period 1975 to 1999 both the domestic debt and external debt increased as the total debt increased. From the years 2003 the external debt started declining however the domestic debt was still on a steady increase therefore making the total debt rise.

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The decline in economic growth in 2007 forced the government to borrow more from the domestic market. Even more problematic is the number of stalled projects which cannot be legally terminated or cancelled. These projects continue to accumulate liabilities leading to increased domestic borrowing as these obligations are securitized with non-existent government equipment through flawed tenders (Bandiera *et al*, 2008).

Further more, the domestic debt situation is worsening due to lack of external inflows through the donor lending or financing to the government. Kenya has had a bad relationship with both bilateral and multilateral donors since 1991. The scope and structure of the local money and capital markets which is both shallow and narrow has also contributed to the problem of the domestic debt crisis (Bandiera, *et al* 2008).

Domestic debt, if utilized well, can act as a source of capital mobilization. The debt overhang and excessive interest payments lead to the domestic debt problem. The high proportion of public resources being used to service the debt could be channelled to revamping social sectors such as, clean water provision, and rural electrification. If borrowed funds are professionally and productively invested, economic growth will be an automatic goal. Therefore, debt overhang and the likely crowding out effect, affect investment which in turn affects economic growth. Indebtedness results in competition for domestic borrowing that raises the cost of borrowing thereby reducing investment.

The country is now faced with a constrained capacity to provide basic services. It is in this context that the government needs to address the problem of escalating domestic debt. Reducing domestic debt will reduce the crowding out effect on the private sector. This in turn lubricates economic growth and reduces poverty levels. However, this will affect the Government expenditure.

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It is important to note that fiscal cuts should not affect provision of basic services, as this may undermine efforts to spur economic growth. Failure to manage expenditures would raise inflation, interest rates, and undermine private sector investments and growth. The pains associated with fiscal adjustments can be tackled by seeking external financing.

External financing could be achieved by attracting investors into the country however, investments in less developed economies are constrained by financial markets being segmented, resulting in inefficient financial intermediation and misallocation of resources (McKinnon, 1973). This has been supported by the empirical results reported by King and Levine (1993) and Easterly and Levine (1995), indicating that African economic growth has been hampered by poorly developed financial markets.

In the case of Kenya, consecutive financial crisis in the late 1980s triggered significant reforms of financial system in 1989, aimed at enhancing prudential controls and ensuring a more efficient, market-oriented, allocation of credit. Although some important steps such as liberalisation of interest rates were taken in the early 1990s, poor investment record of the economy largely persisted.

Bandiera *et al* (2008), concluded in the analysis of Kenya's Investment Climate Assessment, that the positive investment trends after 2003 were being driven by three factors: lagged benefits of price, trade, exchange rate and interest liberalization forced by reduced aid after the Goldenberg scandal uncovered in 1992; solid foundation for solvency based on significant revenue collection as a pay off to the reform of tax policy and administration which started in the mid-1990s and the decline of political risk after the successful 2002 elections gave an improvement in sovereign credit worthiness and private investment climate. A reduction in political risk could have a growth dividend through two channels; at the macro

level, a reduction in real interest rates which improves government debt dynamics and contributes to stabilization and at the micro level, a lengthening of business horizons with its corollaries of lower hurdle rates of return for investment projects and greater private investment.

Interest rates play a major role in any country's financial sector. The study of interest rates in Kenya identifies four periods that can be defined by changes in the financial sector policies. Phase I covers the period before 1974, when interest rates remained unchanged. In phase II (1975-1979), interest rate ceilings were raised for the first time and in phase III (1980-1990) interest rates became an important instrument of monetary policy. Finally phase IV (1991- to date) is a time of financial reform and the liberalization of interest rates (Ngugi, 1999).

The period before interest rate liberalization was characterized by financial repression with selective credit controls and fixed interest rate spreads. Variations in the spread were realized when interest ceilings were adjusted to protect against loss in real terms following increase in inflation rates. The CBK controlled inflation by increasing Commercial Banks cash and liquidity ratios. However, the CBK did not pay interest on reserves, resulting in an implicit cost to the banks.

Interest rates were fully liberalized in July 1991. The legal framework that does not support the enforcement of financial contracts presents a problem in that this situation creates credit management problems and leads to the increase in premium charged on credit. The regulations are therefore on paper, but their enforcement is inconsistent and ineffective, leaving banks at the legal risk of unclear provisions for collateral and bankruptcy. To cover credit risk, banks choose a premium rate that helps cover their risk. This increases the rate

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paid by borrowers but reduces the demand for loans, making investment in the T-bill market even more attractive.
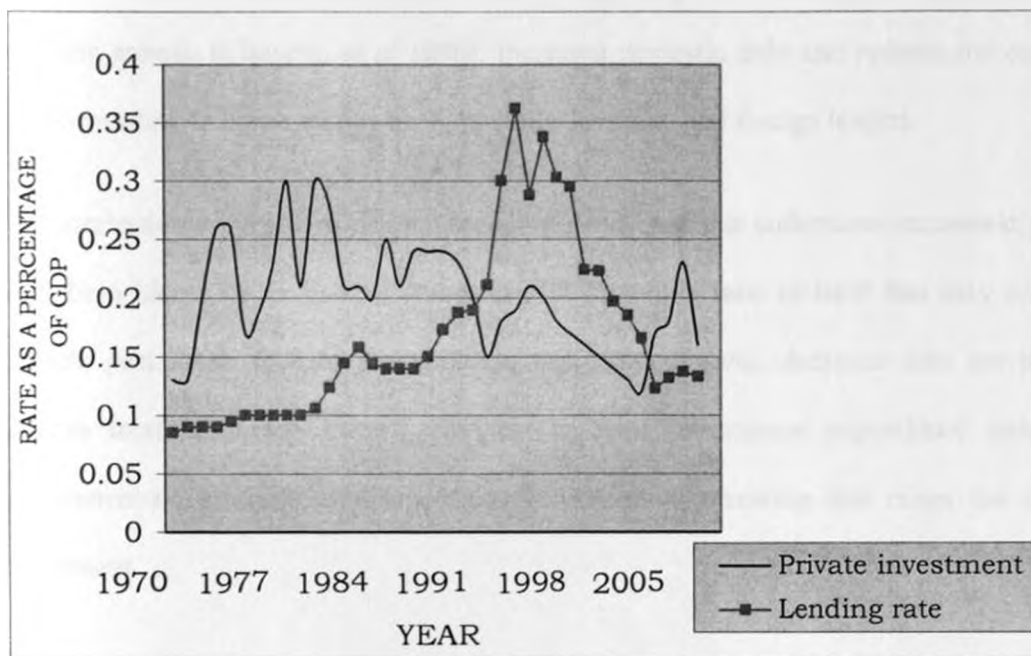
Figure 1.2 Private investments as a percentage of GDP and lending interest rate 1970-2009.

Source: Republic of Kenya, *Statistical abstracts* and *Economic surveys*; Government Printer, various issues.

From figure 1.2, it is evident that whenever interest rates were high the level of private investment declines. This is due to the fact that with high interest rates, the cost of borrowing is increased therefore most investors will not go to the financial institutions to fund their investments as most probably the rate of return on the borrowed funds at the time interest rates are high are much lower. On the other hand financial institutions could increase interest rates in order to reduce the numbers of private borrowers as opposed to lending to the Government due to the fact that the Government is a secure debtor.

Domestic debt service may lead to debt overhang in which some of the returns from investing in domestic economy are 'taxed away' by creditors. It also channels resources away from productive sectors of the economy, hence crowding out private investment and consequently reducing growth (Classens, *et al* 1996). Increased domestic debt also reduces the country's credit- worthiness hence scaring away potential investors and foreign lenders.

The mechanisms through which an economy's indebtedness undermines economic growth have been identified as: current domestic debt flow as a ratio of GDP that may stimulate growth; past stock of debt accumulation that slows growth; domestic debt service that reduces total resources; interest payment to total government expenditure ratio; and government-private sectors' competition for domestic borrowing that raises the cost of investment.

Unless a country's economy grows fast enough to sustain its maturing debt obligations and maintain a conducive environment for domestic investment, indefinite internal indebtedness may have serious detrimental effects on the economy's performance and on the welfare of its population.

1.2 Statement of the problem

Heavy domestic borrowing puts upward pressure on interest rates and consequently on investment. This in turn raises commercial banks lending rates, thus making the cost of borrowing quite expensive. The net effect of this high cost of borrowing is reduced private investment leading to slow economic growth (Osei, 1995). This led to the introduction of an Interest Rates Bill (Central Bank of Kenya Amendment Act, 2000) that sought to regulate commercial banks' lending rates.

The accelerator principle of investment, suggests that growth in investment accelerates economic growth, (Dwivedi, 1985). If borrowed funds are invested productively, economic growth ensues. Since the year 1990, Kenya's experience with domestic debt shows that it adversely affects interest rates thus raising the cost of credit to the private sector investment (Kirira, 2000).

Whereas, domestic debt has been rising substantially, economic growth has been declining over the years. This is quite a gloomy situation because, as Fischer and Easterly (1990) pointed out, a country must ensure sustainable fiscal policy that depends on how fast an economy is growing. The question that emerges is whether the large debt burden is one of the factors leading to low economic performance and the uneven pace of economic reforms in Kenya.

Private investments contribute to economic growth and development. Investments lead to growth of incomes, adoption of new technology, creation of employment opportunities and improvement in the living conditions of citizens. Long term solutions to technology deficiency, unemployment and poverty in developing countries can be created through investments. With growth expectations to be around 10 percent per annum for the next 25 years, (Republic of Kenya, 2007), the growth of the private investment will be a key driver.

Domestic debt remains one of the few funding options for achievement of the Vision 2030 growth targets. Domestic debt, however, may crowd out the private investment, distort the financial markets, hamper deepening the financial sector, put upward pressure on interest rates, reduce efficiency of the financial sector and exacerbate poverty. Issuing more domestic debt would therefore be of serious concern to poverty reduction strategy.

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This research has been done to fill the gap in the empirical literature on the effect of domestic debt on private investment, besides adding value to academic knowledge on private investment-economy nexus in Kenya.

The purpose of this study therefore was to examine the influence of Kenya's domestic debt on private investments.

1.3 Research questions

i.   What are the factors that influence private investments in Kenya?

ii.   What are the policy implications from (i) to (ii)?

1.4 Objectives the study

The overall objective of this study was to examine the relationship between Kenya's domestic debt and private investment. Specifically, the study did:

i.   Examine the factors that influence private investments in Kenya.

ii.   Establish the causality of domestic debt and private investments in Kenya.

iii. Draw policy implications from the research findings.

1.5 Significance of the study

The research paper has provided useful information on variables that affect private investments in Kenya particularly, the effects of the domestic debt on investments.

This research is beneficial to the policy makers in analysing the best ways in which to manipulate these variables particularly the domestic debt to encourage private investment as this would improve the country's growth rates.

To the future researchers, this study can provide information on the effects of increasing domestic debt on private investment. This study is an addition to economic literature.

1.6 Scope and limitations of the study

This research dealt with the stock of Kenya's domestic debt and private investments for the period 1965-2009. The research was able to capture the effects of domestic debt before the debt crisis of 1980s and 1990s and the period after the debt crisis on private investments in Kenya.

Public debt has increased since the 1990s when the donor countries significantly reduced aid and lending to Kenya. Prior to the 1990s, the main focus was on the external debts and its effects on the HIPCs.

As a result of reduced lending by donor countries, most HIPCs were forced to revert to borrowing internally. The internal debt in these countries, have grown significantly with not much being studied on the effects of this debt to the economy.

This paper has therefore studied the growth of the public debt and its effects, if any, on the investments in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review focuses on both theoretical and empirical studies carried out to examine the impact of domestic debt on private investment.

2.2 Theoretical Literature

2.2.1 The Neo-Classical Model of Investment

A recurrent theme in both financial theory and corporate practice is that of determining both the optimal level of investment and the optimal capital structure for the firm. That is, assuming that the objective of the firm is to maximize the wealth of its stockholders, and given the set of available opportunities and capital market conditions, at what levels of investment and borrowing will that wealth be maximized?

This concerns the inter-dependency of the firm's investment and financing decisions. In the finance literature this interdependency arises because of capital market imperfections such as taxes, transaction costs or asymmetric information.

The firm is assumed to produce a single good from two homogenous factors, labour and capital. In addition to its expenditures on labour and real capital, the firm pays or receives interest on its net debt position. The firm is assumed to face a positive probability of bankruptcy, which is directly related to its leverage rate. In the event of bankruptcy, the firm's lender may suffer losses. Hence, the firm's borrowing cost is expected to increase with the leverage rate.

The stockholder wealth maximization problem of the firm is solved subject to constraints on: the amount of output obtainable from its labour and capital services; the flow of capital services from the firm's capital; and the amount of borrowing possible.

The resulting investment and borrowing demand functions each include both physical and financial input variables. These include the value of output, the leverage rate, the excess of the equity yield over the risk-free rate of interest, and a default risk premium (Branson, 1972).

2.2.2   Marginal Efficiency of Investment (MEI)

This is a criterion for investment decision that was suggested by Keynes (1963). The marginal efficiency of an investment project, m, is defined as the rate of interest that will discount the PV of the project to zero.

Thus, m, is defined by

$$0 = -C + R_t + \frac{R_{t+1}}{1+m} + \frac{R_{T+2}}{(1+m)^2} + ... + \frac{R_{t+n}}{(1+m)^n} \quad .... \quad (2.1)$$

$$PV_t = -C + \frac{R_{t+1}}{1+r} + \frac{R_{t+2}}{(1+r)^2} + ... + \frac{R_{t+n}}{(1+r)^n} \quad .... \quad (2.2)$$

If, with any given C and R stream, solving for m in the above equation, the interest rate that would discount the project's net returns to zero. Investment programs can be ranked by m, much as they were by PV. A project with high returns stream would have a high PV and thus require a high m to discount the net returns stream to zero. As the size of total investment

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program is increased, projects with lower cost of capital streams are preferred, so that as i rises, m falls. The PV ranking depends on the market rate of interest that is, the rate at which earnings can be reinvested, where the marginal efficiency of investment is not related to the market rate.

Where:

R   The yields (net returns) from an investment project

PV   Present Value

C   Cost of investment

m   The marginal efficiency of an investment project

r   Market Interest rate

Businesses typically compare the MEI on physical capital with interest rate return on financial capital when deciding to undertake an investment project. Because different investment project have different returns, businesses often have a range of alternatives from which to choose (Branson, 1979).

MEI shows that up to a certain point the interest cost of financing investment is roughly constant. But as the size of investment program goes beyond that point the cost of borrowing, or the opportunity cost of using retained earnings, begins to rise (Branson, 1979).

This model is not satisfactory as a general criterion for investment demand. However, it does have an advantage in that it points out the fact that there may be more than one cost of capital or interest rate facing a firm, depending on the extent to which it draws on various sources of investment funds, and these various costs of capital levels affect the firm's decision to invest.

This theory is used in this paper to determine the extent to which interest rate determine the levels of investment in Kenya. This is because it is clear that an investor will look at the marginal efficiency of the capital that is intended for investment before investing in a country.

2.2.3   Accelerator theory

This is an economic theory that suggests that as demand or income increases in an economy, so does the investment made by firms. This theory suggests that if an increase in the demand levels result in an excess of demand, firms have two choices of how to meet the excess demand, which is to either raise prices to cause demand to drop or to increase investment to match demand.

The accelerator theory proposes that most companies choose to increase production thus increase their profits. The theory further explains how this growth attracts more investors, which in turn accelerates growth (Dwivedi, 1985).

The formal attributes of Accelerator – Multiplier Model can be written as:

$$Y_t = C_t + I_t \quad \text{.............................. (2.4)}$$

$$C_t = \alpha Y_{t-1} \quad \text{.............................. (2.5)}$$

$$I_t = \beta(Y_{t-1} - Y_{t-2}) \quad \text{...................... (2.6)}$$

Where Y= income, C= consumption, I= investment, α= marginal (= average) propensity to consume, β= accelerator coefficient and t is the number of the "day". By substitution, equations (2.1) to (2.3) yields:

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$$Y_t = (\alpha+\beta) \, Y_{t-1} - \beta Y_{t-2} \ldots\ldots\ldots\ldots\ (2.7)$$

Equation (2.7) is a second-order difference equation, its solution in general form is

$$Y_t = A_{1\mu 1}{}^t + A_{2\mu 2}{}^t \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (2.8)$$

Where A_1, A_2 depend upon the initial investment conditions and $_{\mu 1}$ and $_{\mu 2}$ are determined by the values of α and β (Dwivedi, 1985).

The critics of this theory argue that the accelerator theory should not be used because it eliminates the possibility of controlling demand through price controls and on its assumption of perfect markets and restriction on growth and user cost of capital. The model is however adjusted for developing countries in order to capture several imperfections that include financial repression, debt overhang, a dominant role of imported capital goods, and macroeconomic instability (Agenor and Montiel, 1996).

The accelerator theory is used to formulate economic policies. For example, would it be better to use tax cuts to create more disposable income for consumers who would then demand more products, or would it be faster to give those cuts to business, which will then be able to use more capital for growth? Every government and their economists create their own interpretation of the accelerator theory and the question it can be used to answer (Dwivedi, 1985)

The major limitation with this approach is that the relationship between net investment and growth is not static and assumed but varies overtime (Jayaraman, 1996).

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2.2.4 Discount cash flow

This method is used to estimate the attractiveness of an investment opportunity (Pratt, *et al* 2000). Discounted cash flow analysis uses future cash flow projections and discounts them using the weighted average cost of capital to arrive at the present value, which is used to evaluate the potential for investment. If the value arrived at through DCF analysis is higher than the current cost of the investment, the investment opportunity may be a good one. Calculated as

$$DCF = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_n}{(1+r)^n}$$

CF = Cash Flow

r = discount rate (WACC)

...............................(2.9)

DCF value of an investment measured in terms of the cash invested and received is adjusted for the time value of money. The future cash flow must be discounted in order to express their present values to properly determine the value of a company or a project under consideration as a whole (Pratt, *et al.* 2000).

The DCF model's shortcoming is that it is merely a mechanical valuation tool, which makes it subject to the axiom 'garbage in garbage out'. Small changes in inputs can result in large changes in the value of a company. A simple annuity is used to estimate the terminal value past ten years for example. This is done because it is harder to come to a realistic estimate of the cash flows as time goes on (Pratt *et al.* 2000)

2.2.5 Tobin Q Theory

Tobin (1969) proposed Tobin q theory that explains how a firm decides whether they make investments of physical capital or not. The Tobin q is a ratio comparing the market value of a company's stock with the value of a company's equity book value

$$Tobin\text{ 's } q = \frac{\left(Equity\ Market\ Value\ + Liabilities\ Book\ Value\right)}{\left(Equity\ Book\ Value\ + Liabilities\ Book\ Value\right)}$$

The value 'q' represents the ratio of the market value of a firm's existing share to the replacement cost of firms' physical assets.

q= value of stock market / corporate net worth

It states that if q, representing equilibrium is greater than one, q>1, additional investment in the firm would exceed the cost of firm' assets. If q is less than one, q<1, the firm would be better off selling its assets instead of trying to use them. The ideal state is where q is approximately equal to one denoting the firm is in equilibrium.

The downside of this theory is that the rates of profits in a firm, predicts investment much better than the Tobin's q theory.

If all markets cleared, Tobin's q should normally average around one, with the market value of corporate equities and bonds moving in step with the current cost of corporate fixed assets. But historically Tobin's q has fluctuated to a mean of 1.24. The neoclassical theory explains the high mean with intangible assets such as knowledge, technology and goodwill since a corporations balance sheet normally only includes machines and other tangible assets (Tobin 1969).

2.3 Empirical Literature

Research on determinants of economic growth and investment in developing countries has been carried out. These however, were mainly based on theoretical data. Most economic

studies include a standard set of domestic, external, policy and explanatory variables. Most of the studies find one or more debt variables to be significantly and negatively correlated with investment or growth. Some however, leave open the relative importance of debt vis-à-vis other factors and channels of great impact of debt.

Although different studies, Chritensen (2004), Borensztein (1990), Cohen (1993), Ihoya (1996), have focused on different countries, which experience different economic environment, the results clearly indicate the negative impact of debt on economic growth. The need for Kenya to pursue accelerated economic growth in order to reduce its debt problems and, more essentially, to liberate itself out of low income yoke makes it necessary to investigate how far internal indebtedness would affect future growth. Using Growth-cum-debt models to address issues relating to debt sustainability, our focus was how and how far debt affects growth prospects of debtor countries.

Borensztein (1990) empirically tested the debt overhang effect using data for the Philippines and found that debt overhang had an adverse effect on private investment. The effect was strongest when private debt rather than total debt was used as a measure of the debt overhang. In an effort to estimate the debt overhang effect. The equation estimated was specified as:

$$PCIinv = b_o + b_1 r_1 + b_2 MPK + b_3 gdpgr + b_4 (DOD/Y) + b_5 (TDS/Y) + \mu t$$

Where;

PCIinv	=Investment per head
r	= Interest rate (average commercial lending rate)
MPK	=Marginal productivity of capital
DOD/Y	= Debt/GDP ratio (a measure of debt overhang)
TDS/Y	= Debt service to GDP ratio (a measure of "crowding out" effect)

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GDPGR   = Output growth rate (captures the accelerator principle)

The variables explained 89 percent of the changes in the investment per capita. The interest rate variable is insignificant. Debt variables were correctly assigned and were not significant from zero at 5 percent level, but were highly significant when the experiment was repeated with one variable at a time. He concluded that debt burden undermines investment through both debt overhang and the "crowding out" effect. This conclusion was also arrived at by use of two-stage least squares (TSLS) method. Both historical and policy simulation was carried out .The policy simulation showed that a 50 percent decline in debt stock and this would reduce debt service.

Cohen (1993) analyzed the correlation between developing countries' debt and investment in the 1980s. An investment equation for a sub-sample of 81 LDCs over three sub-periods: 1965-1973, 1974-1981 and 1982-1987 to capture the change of regimes which occurred between these periods was first estimated. The independent variables in the investment equation included human capital, per capita income, share of exports in GDP, inflation, population growth, time and regional dummies. All variables were significant except population growth and Africa dummy. The time dummies showed that investment was above average in the 1970s and below average in the 1980s.

In order to link the stock of debt to slowdown of investment in 1980s, debt to export ratio multiplied by a dummy for the years 1982-1987 as another explanatory variable was added. Further analysis showed that the level of stock of debt does not appear to have much power to explain the slowdown of investment. It is the actual flows of net transfers that matter. He also analyzed whether the 'surprise' increase in the debt service was significantly correlated to the

'surprise' decline in the investment in the 1980s. Cohen (1993) concluded that the actual debt service 'crowded-out' investment.

Iyoha (1996) carried out an econometric study on external debt and economic growth in Sub-Saharan African countries using a small macroeconomic simulation model with four equations of which two were stochastic (output equation and investment demand equation) while the remaining two were identities (capital accumulation and debt accumulation identity). The traditional neoclassical production function was adopted for the output equation, where output is assumed to depend positively on labour and capital inputs. For estimation purposes, a Cobb-Douglas production function in logarithmic form was used. Using the ordinary least squares (OLS) regression technique and data for 1970-1993, Iyoha found that the two explanatory variables (labour and capital) explain over 93 percent of the changes in output. However, the capital variable failed the significance test at 5 percent level.

Elbadawi *et al* (1996) investigated the effect of debt overhang on economic growth using cross-sectional regression for 99 developing countries covering Sub-Saharan Africa, Latin America, Asia and the Middle East. They identified three mechanisms through which indebtedness in SSA works against growth; current debt flows as a ratio of GDP, which stimulate growth while past debt accumulation (debt overhang) impacts negatively on growth. These two mechanisms produce a Laffer curve showing the limit at which debt accumulation stimulates growth, beyond which further debt accumulation inhibits growth. The third direct channel is through a liquidity constraint where debt service obligations reduce export earnings. The final indirect channel works through the impact of the above mechanisms on public expenditures that affect growth negatively. Policy, fundamental and shock variables are also included in the model, which is specified as follows:

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GDPCAP = f(EDTGDP, EDTGDPL2, DSX, DEFGDP, DEFGDPL, GINV, CVTOT, RPOF, LRGDP, RERMIS, LSCHOOL, REVOLS)

Where;

GDPCAP = per capita GDP growth.

EDTGD = stock of debt to GDP

EDTGDPL2 = past debt accumulation (reflects the debt overhang)

DSX = debt service as a ratio of export earnings

DEFGDP = current fiscal deficit to the GDP ratio

DEFGDPL = past fiscal deficit to the GDP ratio

DEFGDPE = lagged fiscal deficit to the GDP ratio

GINV = gross investment as a ratio of GDP

ESfFL = inflation rate

RERMIS = real exchange misalignment

CVTOT =coefficient of variation in terms of trade

REVOLS = a dummy reflecting internal shocks

RPOF = population growth rate

LSCHOOL = human capital development

LRGDP = initial incomes (captures the convergence effects)

The model was estimated in steps, starting with EDTGDP and EDTGDPL2 as the explanatory variables. The results for both fixed and random effects models were obtained. They showed that there is a Laffer curve reflecting the debt overhang problem. Debt accumulation inhibits growth while debt inflows spur growth. Addition of variables showed

that debt service obligations and public deficits retard growth. External shocks (CVTOT), real exchange rate misalignment (RERMIS) and internal shocks (REVOLS) retard growth.

The investment model estimated was specified as:

IPY= f (EDTGDPL, GDPCAP, DSX, DEFGDP, DEFGDPL, PUINV, TOTSHK, RPOF, LRGDP, RERMIS, REVOLS)

DEFGDP (fiscal policy) and PUINV (public investment) are included to capture the effect of crowding out private sector investment while public investment supplements private investment. TOTSHK = terms of trade shocks

IP/Y = private investment to GDP ratio.

The results showed that debt stock to GDP was not significant. This implies that debt overhang is working through growth to affect private investment. Inclusion of other variables showed that public sector deficit to GDP lagged one-step retard private investment and thus debt service obligations reduce credit available, hence reduces investment. Debt service obligations also reduce export proceeds, thus impacting negatively on growth per capita incomes and private investment levels. The study confirmed that debt overhang works indirectly to affect other policy variables and undermines the economies' flexibility to absorb or adjust to domestic and external shocks.

Debt repayment inevitably imposes constraints on a debtor country's economic growth prospects since it involves the transfer of resources to the creditors. To appreciate the problem of indebtedness the total debt and repayment were compared with some key macroeconomic aggregates. This in turn assesses the debt burden of a country.

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The following ratios are quite useful, total debt outstanding to GDP, Total debt service to GDP, Interest payment to GDP, Total debt to total exports and the Interest payment to total government expenditure.

The higher the debt -service ratio, the greater the debt burden a country faces. The debt-export ratio and the debt-GDP ratio determine a country's ability to generate higher growth in exports and general income. It is common to use the debt-service ratio and the debt-GNP/GDP ratio as the indices of liquidity and solvency, respectively (Elbadawi *et al.* 1996).

A liquidity problem is the inability of a country to service its debts now in the amount initially contracted. This is when a country lacks adequate cash on hand to pay its current obligations (Eaton and Taylor, 1986). The solvency issue relates to whether the value of a country's liabilities exceeds its ability to pay at any time; a country is insolvent when it is incapable of servicing its debt in the long-run (Ajayi, 1991). This erodes a country's credit worthiness and discourages capital inflows. Capital flight may be another effect. Excess domestic borrowing is associated with high real interest rates. This in turn raises the cost of borrowing, hence discouraging private investment. Here, the government is forced to repay its own domestic debt at higher interest rates.

A country faced with huge domestic debt acts as a disincentive to the foreign capital inflows, and domestic savings mobilization. It further undermines the efforts to import key raw materials, necessary for industrial development.

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Chenery and Strout (1996) identified three constraints faced by developing countries which are the supply of skills and organizational ability, the supply of domestic savings and the supply of imported commodities and services.

The first two constraints describe a country's situation, as "Investment limited growth" while the last constraint is the "trade limited growth". It is important to note that a strong increase in debt makes households and enterprises more vulnerable to a rise in interest rates or a drop in income. When interest rates rise or the economic situation changes, a high debt burden may amplify an economic downturn, and at worst trigger a financial crisis. A high debt burden may also prompt enterprises to take on great risk than is desirable because owners with limited liability have less to lose on a high risk project, but a great deal to gain if the project succeeds.

Chritensen (2004) examined the consequences of domestic debt on private investment by covering twenty seven sub-saharan Africa during a twenty year period 1980-2000. A simple panel data model was estimated, regressing private sector lending on domestic debt (both variables were in percent of broad money). The results from this regression found significant support for the crowding out hypothesis on average across countries. An expansion in domestic debt of one percent relative to broad money causes the ratio of lending to the private sector to broad money to decline by 0.15 percent. This was with the exception of South Africa which was attributed to the small commercial bank holdings of government debt, which helped reduce the negative impact of debt on private sector lending. Domestic debt markets in these markets were found to be generally small, highly short-term in nature and often have a narrow investor base.

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Majumder (2007) focused on the crowding-out effect of public borrowing on private investment in the Bangladesh context. A private investment demand function was estimated considering domestic public borrowing. The variables used for the estimation were defined as investments made by private entrepreneurs. public borrowing sourced from the domestic lenders and GDP weighted average of interest rates on advances in order to avoid the influences of inflation. Data for all the variables except for the interest rate were taken in real terms and then in log level. The main findings of the study confirmed with statistical significance that there is no crowding-out effect in Bangladesh, rather, the crowding-in effect is evident a paradoxical result in terms of the conventional. In order to explain these findings from a macroeconomic point of view, it was assented that the presence of crowding –in instead of crowding-out was attributed to excess liquidity in the banking system, imperceptible government competition with the private sector, relatively sustainable public debt scenario, government expenditure for transfer payment program and so on.

2.4   Overview of the literature

The theoretical models on investment have indicated a positive link between investment and returns which, are further linked to the interest rates on borrowed funds. Whereas the debt theories have indicated a positive link between interest rate and the debt a country has.

This paper adopted the debt overhang hypothesis. It is shown that the expected debt service (which is interest and principal on the debt) is an increasing function of a country's output level.

This paper has borrowed mainly from Chritensen (2004) and established the link between investments and internal debt in Kenya, the effects of the growth in domestic debt on the investments in the country.

The variables were of importance to this study as mentioned in the theories are domestic debt, fiscal deficit and GDP. Others were the government expenditure and debt service.

Chritensen (2004), concluded that indeed domestic debt had a negative effect on the investments. However, Majumder (2007), conclude that there was no crowding out effect in Bangladesh.

Borensztein (1990), while conducting analysis on one country Philippines, concludes that the effect of private debt rather than total debt was strongest in having adverse effect on investment.

The Cohen (1993) and Elbadawi *et al* (1996) papers despite confirming that the actual debt service crowded out investment, the sample analyzed was taken from several LDCS and therefore was not specific to one country.

Several studies have been carried out on external debt's effect on investments. The probable reason for this trend is because at the time these studies were carried out the donor countries were concerned with the high and continuous indebtedness of HIPCs and the inability of these countries to service the debts. It is during this period that the donor countries started reducing the lending to HIPCs. It is only after lack of funds from donor countries that the increase in domestic borrowing emerged. There is no specific research undertaken to

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investigate the impact of domestic debt on private investment in Kenya. Some of the reviewed studies have also used cross-country data to investigate the effects of debt on investment and economic growth.

It is important to undertake a country specific study in the context of a developing country. This study, therefore, has utilized appropriate econometric tools to analyze the effect of Kenya's domestic debt on private investment. The models based on time series data have captured the existence and effect of debt overhang and tested whether the level of private investment in Kenya is positively and significantly determined by the level of domestic debt.

Borensztein (1990) and Ihoya (1996) studies had similar independent variables in their investment equation which were average commercial lending interest rate, marginal productivity of capital, external debt/GDP ratio (a measure of debt overhang), debt service to GDP ratio (a measure of crowding out effect) and output growth rate (to capture accelerator principle). Cohen (1993) used the following independent variables in the investment equation, human capital, per capita income, the share of exports in GDP, inflation, population growth and time and regional dummies. Elbadawi *et al.* (1996), estimated the investment model with fiscal policy, public investment terms of trade, debt accumulation, internal shocks, real exchange rate misalignment as the variables and the ratios of total debt outstanding to GDP, total debt service to GDP, interest payment to GDP, total debt to total exports and interest payment to total government expenditure. Christensen (2004) had variables that included private sector lending and domestic debt. Majunder (2007) estimated using these variables private investment, domestic public borrowing, GDP, weighted average interest rate on advances in order to avoid the influences of inflation.

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The variable that this study has used like Cohen (1993) and Elbadawi *et al* (1996) are lagged public sector investment, stock of internal debt to GDP ratio, debt service government expenditure ratio, debt service, budget deficit, GDP growth rate, inflation rate and fiscal deficit.

This study has therefore shown the effects of the existing domestic debt and thus modelled out the effect of future borrowing by the government from the domestic market.

CHAPTER THREE

THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 Introduction

This chapter outlines the mathematical approach used to analyze private investments. The analysis is based on the neo-classical accelerator model with the inclusion of other factors of interest.

3.2 Theoretical Framework

The analysis reviewed in the past sections shows that debt variables are negatively correlated with investment (Cohen, 1993; Elbadawi et al, 1996 and Ihoya, 1996). The negativity of domestic indebtedness affects private investment. The channels through which domestic indebtedness in Kenya work against private investment are identified as: stock of internal debt as a ratio of GDP, past debt accumulation (lagged debt-GDP ratio), which impact negatively on growth; debt-service ratio that reduces the export earnings; and monthly interest payment on the domestic debt which increase the total government expenditure, and the rising interest rates as a result of the increased domestic debt. All these affect private investments.

This paper has presented an econometric model of investment behaviour based on the neoclassical theory. The paper incorporates the debt accumulation as a determinant of investment expenditures through the returns on capital via interest rates.

Domestic debt affects private investment through the interest rates which fluctuate with the domestic debt. As the stock of debt and cost of servicing it rise, credit market is left dry and

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very little funds are available to the government, this, results in a highly compressed government budget especially on key sectors of the economy and or huge and persistent fiscal deficits. Increased budget deficits mean more borrowing domestically and externally or an increase in the tax rates to cover the deficits. Hence, the fiscal deficit to GDP ratio is negatively correlated to growth.

3.3 Model specification

The private sector investment to GDP was estimated in order to fully capture the accelerator principle. This is important in indirectly showing the effects of public debt through internal debt on sustained economic growth by its impact on private investment, through accelerator principle. Private sector investment is affected by interest rate, which is included in the investment model. Below is the investment model specification:

PINV = f(SDGDP, DDER, FSGDP, GDPGR, EGOV, INFLR)

Where;

PINV	= Private sector investment to GDP ratio
SDGDP	= Stock of internal debt to GDP ratio (indicates debt accumulation)
DDER	= Debt service (reflects the crowding-out effect)
FSGDP	= Budget deficit to GDP ratio
GDPGR	= Gross Domestic Product Growth Rate
EGOV	= exports as a ratio of government expenditure
INFLR	= Inflation rate (reflects macro-economic stability)

3.4 Definition and measurement of variables

Private sector investment to GDP ratio (PINV), represents the total private investments in Kenya. It was measured as a ratio of the total GDP.

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Stock of internal debt to GDP (SIGDP), this indicates the debt accumulation by the country. The unit of measurement is a ratio.

Debt service as a proportion to government expenditure (DDER), this reflects the crowding-out effect. It is measured as a ratio.

Budget deficit to GDP ratio (FSGDP). This represents the accumulated fiscal deficit. It is measured as a ratio.

Gross domestic product growth rate (GDPGR), represents the rate at which Kenya's GDP increases and was measured as a percentage.

Exports to government expenditure (EGOV), captured the ratio of exports to the government expenditure. This was measured as a ratio.

Inflation rate (INFLR) represents the macro- economic stability. The unit of measurement is percentage.

3.5 Data collection

Operational Definitions Sheet was be used in this study to define the metrics so that data collection across the board is consistent.

This is because the various data to be used are defined in varying metrics so standardizing is necessary for the appropriate and accurate analysis.

3.6 Data analysis and refinement

The data used was from 1964 to 2009. Trends have been used to analyse the data. Since, the data ranges from 1965 which is just after independence, the data collected from 1965 to 1974 underwent refining by being converted to Kenya shillings in order to standardize the units of measurement. This is because pre 1975 the monetary unit currency was in pounds. These

figures have been converted into Kenya shillings because this is what the bulk of data in this study has used 1975-2009.

Prior to 1975 some of the data was collected quarterly these too have under gone refining in order to be converted in annual tallies as the study used annual totals.

3.6.1 Testing for stationarity

The study has used time series data and therefore, tests for stationarity were carried out on the variables. Stationary series have finite variance, transitory innovations from the mean and a tendency to return to its mean value as opposed to non-stationary series. Thus there was the need to ensure that the variables to be estimated had their means and variances as well defined constants independent of time. This is the case with stationary series.

When OLS is used to estimate the relationships of variables of a non-stationary series, there is the likelihood to have misleading inferences which appear either as spurious regressions or inconsistent regression problems. Conventional tests of hypotheses based on statistics computed from such variables are likely to be biased towards rejecting the null hypothesis even when it should in reality be accepted. This study has used ADF tests to test for stationarity.

3.6.2 Testing for cointegration

Cointegration is a technique used to estimate equilibrium or long-run parameters in relationships with variables in a non-stationary series. This technique enables use of the estimated long-run parameters into the estimation of the short-run equilibrium relationships.

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Before testing for cointegration, the order of integration of the individual time series was determined. According to Granger (1986) and Engel and Granger (1987), a non-stationary time series X_t is said to be integrated of order d or I(d) if it achieves stationarity after being differenced d times. Cointegration implies that even though the series are non-stationary, there exists a linear combination that is itself stationary. Cointegration also implies that I(1) variable can be estimated by OLS method to produce an OLS estimator of β that is super consistent in the sense that as the sample size grows larger; the estimator of β converges to its true value much faster.

To test for cointegration, Engel-Granger (EG) two-step method was used. This involved testing for unit roots in the residuals of the cointegrating relationships. The null hypothesis is that the residuals are non-stationary (have unit roots) against the alternative of stationary residuals. The study used the augmented Dickey-Fuller method to test for unit roots in the residuals of cointegrating relationships.

Using the long run model, to construct an error correction term, which is, used together with stationary variables in cointegrating relationship, to construct the error correction model (ECM) which integrates short-run and long-run dynamics of the model. The coefficient of the ECT should be negative and significant if the disequilibrium is to be corrected in the subsequent period and long run equilibrium restored. This coefficient represents the speed of adjustment to the long run equilibrium.

3.6.3 Diagnostic tests

Diagnostic tests are typically used as means of indicating model inadequacy or failure. In the case of linear regression model for example which is estimated by OLS, a series of the

assumptions required for OLS to be the best linear unbiased estimator (BLUE) appear to be violated. These assumptions include serially un-correlated and homoscedastic error-term, absence of correlation between the error-term and regressors and correct specification of the model. Applied econometric work can be viewed as consisting of a number of steps, including specification of the model(s) estimation and model evaluation. Diagnostic testing plays an important role in the model evaluation stage of econometric studies. This study has carried out various diagnostic tests including AR for autocorrelation of residuals, the ARCH for heteroscedasticity of errors, normality test for distribution of the residuals test for will be carried out.

3.7 Data type and source

This study has made use of published data for the period ranging from 1965 to 2009. The main sources of these data included: Central Bank of Kenya statistics and publications, Government of Kenya Statistical Abstracts and Economic Surveys, Central Bureau of Statistics publications, World Bank debt publications, IMF country reports and OECD publications.

CHAPTER FOUR

EMPIRICAL RESULTS AND INTERPRETATION

4.1 Introduction

This chapter discusses the empirical results and their interpretation based on the model in Chapter Three.

4.2 Time Series Properties

The time series data used in the study is such that the mean may change with time and have a variance that is not constant due to the fact that it is trend data. Cointegration analysis and diagnostic tests were carried out on the data to establish a sound econometric model.

a) Stationarity Results

To curb the problem of non stationarity tests were carried out with the view of de-trending the data. This study used the Augmented Dickey Fuller Test (ADF) to check the stationarity of the variables and the results at level are as shown in Table A4 (in the appendix). All variables were found to be non-stationary. This necessitated carrying out an ADF test of the first difference. Table A5 (in the appendix) shows the results obtained. The tests results established that all the variables are stationary after the first difference. This implies that they were integrated of order one at the 5 percent level with an ADF of 2.93 percent.

b) Cointegration Results

The data was stationarized by differencing which, however can lead to the loss of long run properties. This was remedied by the use of error correction mechanism or feedback

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mechanism in the cointegration analysis. Non stationary variables are considered cointegrated if they have a long run relationship amongst themselves. The results of the cointegration test are as shown in Table A6 (see Appendix). From the analysis it can be concluded that there is no cointegration among the variables at the 1 percent level.

c) Diagnostic Tests Results

After the tests of stationarity were carried out and the model was found to be non-stationary at level the diagnostic tests were carried out on the first difference. Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as X^2 with two degrees of freedom. The reported probability is the one that a Jarque-Bera statistic exceeds (in absolute value) the observed value under the null, thus a small probability value leads to the rejection of the null hypothesis of a normal distribution.

In this study, the value of the Jarque-Bera (65.72883) is greater than that of the given probability (0.000) (see Table A7 in the appendix). This therefore means that the series are normally distributed.

The statistic labelled "Obs*R-squared" is also the ARCH Table A9 (see appendix) test statistic for the null hypothesis of autoregressive conditional heteroskedasticity (ARCH) in the residuals. The probability value (0.619397) indicates a very slight presence of heteroskedasticity in the residuals at five percent significance level.

The LM-Test in Table A8 (see appendix) showed that the observed R squared was 0.593 with a probability of 0.441. The diagnostic tests carried out to establish a sound econometric model were found to be reliable. Conclusions could thus be drawn from the results that were obtained.

4.3 Factors affecting Private Investment

A regression analysis was carried out using a linear model with private investments as the dependent variable and interest rate, inflation rate, GDP growth rate, fiscal deficit, debt service, and stock of internal debt as the independent variables. The regression was carried out on variables after the first difference. In Table A14 (appendix) the R squared is 45.07 and an adjusted R squared of 34.08. The variables were lagged once. In Table A12 (appendix) the R squared was 48.02 and adjusted R squared of 43.93. There were only three variables that were significant. The non-significant variables were thus eliminated from the next regression in order to get the best possible results from the analysis (see Table A13 in appendix).

The aim was to establish the levels of significance of the coefficients of the independent variables. The regression results with the error correction model after the 1st difference and after the 2nd lag are as shown in Table 4.1

Table 4.1   Regression Results for private investment in Kenya

VARIABLE	Results of 1st Difference		Results of Dynamic analysis of the model	
	COEFFICIENT	T-STATISTIC	COEFFICIENT	T-STATISTIC
Inflation rate	0.0002	0.0773	-	-
GDP growth rate	0.0022	0.3341	-	-
Fiscal deficit	0.1208	0.1965	-	-
Debt service	6.36E-06*	2.3301*	4.95E-06*	4.1801
Stock of domestic debt	-0.2080*	-2.7678*	-1.3006*	-4.6548*
Term of trade	-0.0058*	-3.7602*	-0.0055*	-8.1529*
ERR	-0.1771	-1.0572	0.5329	8.2556
C	0.0436	0.9239	-0.0277	-1.7911
R^2	45.07		59.83	
Adj R^2	34.08		58.17	
F- Statistic	4.1023		35.9616	
SE of reg.	0.1118		0.0307	
Akaike	-1.3782		-4.0834	
Durbin Watson	2.0192		2.0616	

*Indicates that the coefficients are significant at 5%.

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The gross domestic product growth rate, fiscal deficit, inflation and debt service have a positive influence on private investments in Kenya. Meanwhile, the stock of internal debt and the export government expenditure ratio (EGOV) had a negative influence on private investments in Kenya.

The results after the first difference indicate that the variables explain 45.07 percent of the changes of private investment in Kenya. The Durbin-Watson shows that there was no autocorrelation. The standard error of the regression was 0.1118 showing an accurate fit (see Table A8 in the appendix). However with the dynamics, the best results were achieved after the 2nd lag result in Table A13 (appendix). The three significant variables explained 59.83 percent of the changes of the private investments in Kenya. The standard error of this regression was 0.0307.

Like in the Borensztein (1990), debt overhang, was found to have an effect on private investment. The coefficient of the stock of internal debt took a negative sign with a value of 0.20800. Meaning that as the stock of internal debt increases will have a negative effect on the private investment in Kenya. Precisely, for every unit increase in the stock of internal debt, there is a 0.20800 decrease in the private investment in Kenya. The investors would rather lend to the government as its borrowings from the local market increases, rather than do an actual investment venture. This is because the security and guarantee the government offers is greater than the risk of an investment venture. Further, the growth in the stock of internal debt retards the country's economic growth. For as long as a country's economy is growing, the levels of private investment will definitely not increase. The stock of internal debt had a t-statistic of 2.7678 confirming it as a significant variable. On carrying out the dynamic analysis of the model after lagging the significant variables twice, the stock of domestic debt had a t-statistic of 4.6548 and a coefficient of -1.3006.

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The coefficient of the debt service had a t-statistic of 2.3300 making it significant in determining the levels of private investment in Kenya. Borensztein (1990) found the coefficient of the debt service variable to be significant. The coefficient of this variable was 6.36E-06 meaning that if the debt service increases by one unit the private investments in Kenya will increase by 6.36E-06 units. Debt service on the dynamic analysis of the model had a t-statistic of 4.1801 and a coefficient of 4.95E-06.

The fiscal deficit had a coefficient of 0.1208 meaning that for a unit increase in fiscal deficit, private investment will increase by 0.1208. This was expected because as the country's fiscal deficit increases so does the borrowing in order to meet the deficit being experienced. This increases the stock of debt held by the country if the trend continues and therefore has an effect on the investment decision of a private investor. As the fiscal deficit increases, it reduces the credit available in the economy and thus private investment which heavily relies on borrowing. Fiscal deficit was an insignificant variable with a t-statistic of 0.1965. In the dynamic analysis of the model, fiscal deficit was dropped because it was not significant after the first lag.

The coefficient of the exports as a ratio of government expenditure is significant with a t-statistic of 3.7602 and is negative 0.0058. For every unit increase in the exports as a ratio of government expenditure, there is a 0.0058 unit decrease in the levels of private investment. This was the most significant variable. Terms of trade had a high t-statistic of 8.1529 and a coefficient of -0.0055 on the dynamic analysis.

The GDP growth rate had a coefficient of 0.0022. This implies that for every unit increase in the GDP growth rate, there is a 0.0022 unit increase in the private investment. As an economy experiences growth, there is need for investment in various sectors. With the

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increase in the GDP, there will be increased credit available in the economy. The terms of trade in this economy will be improved thus increasing the foreign currency available. This variable was however insignificant with a t-statistic 0.3341. The GDP growth rate was dropped in the dynamic analysis of the model after the first lag because it was insignificant.

The inflation rate had a positive coefficient of 0.0002 but is insignificant with a t-statistic of 0.0773. This means that, for every unit increase in the inflation rate, the private investment in Kenya increases by 0.0002 units. Inflation rate thus affects private investments via other economic channels like prices but not directly. Inflation was insignificant in determining the levels of investment. After the first lag of the dynamic analysis, the inflation variable was dropped because it was insignificant.

The constant term had a coefficient of 0.0436 and the t-statistic of 0.9239. This showed that there are other variables which were not captured in this study that have a minimal effect on the private investments decision in Kenya. The constant term in the dynamic analysis of the model had a negative value of 0.0277. This was after the second lag.

The error correction model had a coefficient of -0.1771. This is the value of the rate of adjustment of the model. The error correction model coefficient of the best possible results in the dynamic analysis of the model is 0.5329.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.1   Summary

This paper analyzes the growth of domestic debt to GDP ratio and its effect on private investments to GDP ratio in Kenya from 1963 to 2009. Heavy domestic borrowing puts upward pressure on interest rates and consequently private investment. The objectives of this paper were to examine the factors that influence private investment in Kenya and draw policy implications from the research findings. Further, a dynamic analysis of the model was carried out in order to achieve the best possible results.

On average, government domestic debt grew much faster than GDP between 1994 and 2004 and became larger than foreign debt. The data used is secondary data obtained from recognized publications like the Statistical Abstracts, Statistical Bulletins and Economic Surveys.

This study found that growth in the stock of domestic debt crowded out private investment in Kenya. The coefficient of the stock of domestic debt was found to be significant implying that domestic debt crowds out private investments in Kenya. This was true even of the results of the dynamic analysis of the model.

5.2   Conclusion

The terms to trade, debt service and the stock of domestic debt were significant at the 5 percent level. This was true of both the regression at first difference and the results of the dynamic analysis of the model. The variables that had a negative effect on the private

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investment were the stock of internal debt and the export to government expenditure ratio. The meaning of this result is that any time each of these variables increases, private investment is reduced.

The reduction in the stock of internal debt would encourage private investment. If the government reduces borrowing, then the market interest rates will reduce. This will in turn reduce the cost of borrowing and therefore encouraging investment. This is dependent however on the returns on the investment being above the interest rate charged. However for an increase in the variables that had a positive coefficient (fiscal deficit and debt service) increases the private investments. If the government is able to increase its debts service the private investments would increase. The money held by the government would be returned back into the market increasing the funds available for lending. This in turn would reduce the interest rates there would be an incentive to borrow for investment.

An increase in the GDP growth rate would increase the private investments. As an economy grows, so does the demand for various goods and services therefore encouraging the growth in investment. This variable however was not significant.

From the results it can be concluded that the domestic debt crowds out private investments in Kenya as the domestic debt variable had a t-statistic that is significant and a negative coefficient.

5.3   Policy implications

The government ought to encourage the reduction of the lending interest rates in the country in order to influence and encourage borrowings for investment, in turn increasing private investment.

The government should encourage exportation as compared to its expenditure. The growth in exports would mean more foreign earnings to the country. The effect of this is that the country would now be able to import more particularly equipment needed for production.

The reduction and manipulation by the government on the stock of internal debt would mean a direct influence on the private investment. This is because as has been shown in this paper, the stock of internal debt is a very significant variable to the private investment. If the government were to borrow less internally, there would be an increase in funds that could be used to invest elsewhere as opposed to the government.

From this paper, it is clear that there are other factors that influence the levels of investments in Kenya. Meaning that, the government, apart from carrying out the recommendations of this paper ought to improve on other investment incentives like the technical skills, introduction of tax holidays, reducing the costs of electricity in order to encourage private investment etc. This is because the variables used in this paper only explained 45.07 percent of the changes in the private investment in Kenya this therefore means that the 54.93 percent are explained by other unknown factors.

5.4   Areas of further research

There is need for further research to be undertaken on the various other variables that affect investment decisions. These include variables like organizational skills, levels of education, savings and so on.

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APPENDIX

Table A1: Stock of Kenya's public debt for the period 1975-2007.

year	External debt(Ksh. M)	Domestic debt (Ksh.M)	Total debt (Ksh. M)
1970	23.78	1494.74	1518.52
1971	220.74	1473.28	1694.02
1972	217.60	1691.00	1908.60
1973	214.56	2105.70	2320.26
1974	212.28	2302.46	2514.74
1975	209.94	2926.00	3135.94
1976	208.68	3773.12	3981.80
1977	203.48	4185.92	4389.40
1978	202.30	4790.82	4993.12
1979	201.62	9758.58	9960.20
1980	201.38	9946.82	10148.20
1981	201.18	12884.64	13085.82
1982	218.06	17184.00	17402.06
1983	200.74	23354.00	23554.74
1984	200.26	30639.80	30840.06
1985	200.26	30851.60	31051.86
1986	2033.10	40580.00	42613.10
1987	1495.00	46854.60	48349.60
1988	1218.42	53818.60	55037.02
1989	14099.44	53525.20	67624.64
1990	16011.18	68380.00	84391.18
1991	21478.36	89179.00	110657.36
1992	35387.66	122259.60	157647.26
1993	40598.52	272094.20	312692.72
1994	52189.38	208071.20	260260.58
1995	27190.16	246027.00	273217.16
1996	29285.98	234708.40	263994.38
1997	24578.52	218106.40	242684.92
1998	24347.80	254388.80	278736.60
1999	23753.16	325261.15	349014.31
2000	206059.00	363149.25	569208.25
2001	211813.00	366127.40	577940.40
2002	235968.00	359370.47	595338.47
2003	245630.40	353264.13	598894.53
2004	254647.00	443157.00	697804.00
2005	253493.00	434453.00	687946.00
2006	286451.00	431236.74	717687.74
2007	318402.12	397138.75	715540.87

Source: Republic of Kenya *Statistical abstracts* and *Economic surveys*; Government printer,

various issues.

Table A2: **Private Investment as percentages of GDP & lending interest rate in Kenya 1970-2007.**

year	Private Investment	Lending rate
1970	0.13	0.085
1971	0.13	0.090
1972	0.20	0.090
1973	0.26	0.090
1974	0.26	0.095
1975	0.17	0.100
1976	0.19	0.100
1977	0.23	0.100
1978	0.30	0.100
1979	0.21	0.100
1980	0.30	0.106
1981	0.28	0.124
1982	0.21	0.145
1983	0.21	0.158
1984	0.20	0.144
1985	0.25	0.140
1986	0.21	0.140
1987	0.24	0.140
1988	0.24	0.150
1989	0.24	0.173
1990	0.23	0.188
1991	0.20	0.190
1992	0.15	0.211
1993	0.18	0.300
1994	0.19	0.362
1995	0.21	0.288
1996	0.20	0.338
1997	0.18	0.303
1998	0.17	0.295
1999	0.16	0.224
2000	0.15	0.223
2001	0.14	0.197
2002	0.13	0.185
2003	0.12	0.166
2004	0.17	0.123
2005	0.18	0.132
2006	0.23	0.137
2007	0.16	0.133

Source: Republic of Kenya *Statistical abstracts* and *Economic surveys*; Government printer, various issues.

Table A3: Private investment, domestic debt, fiscal deficit (all as ratios of GDP), interest rate, inflation, export to government expenditure ratio 1964-2008.

YEAR	PINPV	INTREST	INFLATION	GDPGR	FSGDP1	FSGDP	DDER	SDGDP1	SGDP	EGOV
1964	0.8	7 2	2 3	0.27	NA	0.03582	2.17	NA	0.048006	61 5
1965	0.79	6 7	4 09	15.2	0.03582	0.03108	3 48	0.048006	0.049279	53
1966	0.86	8 3	4 17	6 41	0.03108	0.025209	2.44	0.049279	0.044557	51 7
1967	0 95	8 35	1 86	9.64	0.025209	0.033452	1.77	0.044557	0.056919	50.2
1968	0.11	9.1	0 59	8 56	0.033452	0.008452	1.74	0.056919	0.054159	96
1969	0.11	8 7	0.21	10.4	0.008452	0.037679	2.24	0.054159	0.072325	94
1970	0 13	8.5	7 5	11.71	0.037679	0.031093	5.32	0.072325	0.076379	99
1971	0.13	9	3 7	7.25	0.031093	0.030054	3 42	0.076379	0.092033	93
1972	0.2	9	5 4	14 62	0.030054	0.058264	1 65	0.092033	0 128631	91
1973	0.26	9	8 9	18.91	0.058264	0.066411	1.71	0 128631	0 147422	92
1974	0.26	9 5	16 3	12 59	0.066411	0.035434	1 93	0 147422	0 146073	75
1975	0 17	10	17 8	20 92	0.035434	0.05496	1.9	0 146073	0 1662	78
1976	0 19	10	10	27 92	0.05496	0.06221	3 85	0 1662	0.165836	91
1977	0.23	10	12 7	8 87	0.06221	0.027912	3 88	0.165836	0 142542	120
1978	0 3	10	12 6	11 07	0.027912	0.030407	5.2	0 142542	0.158445	105
1979	0.21	10	8 4	12 91	0.030407	0.081586	5.6	0.158445	0.202315	97
1980	0.3	10 58	12 8	15 66	0.081586	0.03805	9.1	0.202315	0.193094	89
1981	0.28	12 42	12 6	12 73	0.03805	0 103906	12.7	0.193094	0 237225	105
1982	0.21	14 5	22 3	13.75	0 103906	0 126358	13.4	0 237225	0 275623	100
1983	0.21	15 83	14.6	9 56	0 126358	0.076994	13.09	0 275623	0.265342	94
1984	0.2	14.42	9.1	38.98	0.076994	0.075011	15.28	0.265342	0.280399	110
1985	0.25	14	10 8	16.5	0.075011	0.078982	15.63	0.280399	0 242002	92
1986	0.21	14	10 5	11.66	0.078982	0.124045	18.45	0 242002	0.271814	103
1987	0.24	14	8 7	15 27	0 124045	0.141572	17.05	0.271814	0.314175	85
1988	0.24	15	12 3	13 49	0.141572	0.058372	18 46	0.314175	0.300601	88
1989	0.24	17 25	13 5	13 96	0.058372	0.056591	14.61	0.300601	0.293475	79
1990	0.23	18 75	15 8	14 68	0 056591	0.046565	20.32	0.293475	0.280663	71
1991	0 2	19	19 6	17 95	0.046565	0.056858	17.29	0.280663	0.293025	82
1992	0.15	21 07	27 3	26 14	0.066858	0.026043	7.02	0.293025	0.274232	79
1993	0.18	29 99	46	20 11	0 026043	0.074839	20.7	0.274232	0.271333	90
1994	0 19	36 24	28 8	16 21	0.074839	0.055205	18.59	0.271333	0.275367	101
1995	0.21	28 8	1 6	47 75	0 055205	0.012527	17.3	0.275367	0.253988	95
1996	0 2	33 79	9	11.96	0.012527	0.001186	15.1	0.253988	0.168867	93
1997	0.18	30 25	11 2	10 45	0.001186	0.001713	17	0 168867	0.178573	102
1998	0.17	29 49	6 6	6 6	0 001713	0.006609	16 5	0.178573	0.177678	100
1999	0.16	22.38	5 8	6 72	0.006609	0.002633	16 5	0.177678	0.172155	86
2000	0 15	22 34	10	5.39	0 002633	0.008945	6.88	0 172155	0.174656	84
2001	0.14	19 67	5 8	1.5	0.008945	0.029599	11.7	0.174656	0 166488	79
2002	0 13	18 45	2	9 92	0 029599	0.044921	11.5	0.166488	0 192337	78
2003	0 12	13 5	9 8	13.04	0.044921	0.024616	7.9	0 192337	0.214903	81
2004	0.17	12 3	11 6	12.36	0.024616	0.05669	3.9	0.214903	0 197122	77
2005	0.18	13 2	10 3	13 62	0 05669	0.035565	4	0 197122	0.174643	72
2006	0 23	13 7	6	11 18	0 035565	0.080099	3 8	0.174643	0 173766	72
2007	0.16	13 3	4 3	13 77	0 080099	0.056128	4 2	0.173766	0.173962	70
2008	0	14 8	16 2	-100	0 056128	0.057021	3.8	0.173962	0.160892	77

Source: Republic of Kenya *Statistical abstracts* and *Economic surveys*; Government printer, various issues.

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Table A4: Augmented Dickey Fuller Test at level

VARIABLE	LAGS	ADF	I(d)
Private investment	1	-3 61	I(1)
Debt service	1	-1 43	I(1)
Stock of internal debt	1	-1 83	I(1)
Exports to government expenditure	1	-2.76	I(1)
Budget deficit	1	-2.41	I(1)
GDP Growth rate	1	-1.31	I(1)
Inflation	1	-3 58	I(1)
Interest	1	-1.47	I(1)

Critical value: 1 percent   -3.59

5 percent   -2.93

Table A5:   Augmented Dickey Fuller Test of the First Difference

VARIABLE	LAGS	ADF	I(d)
Private investment	1	-5.31	I(0)
Debt service	1	-6.89	I(0)
Stock of internal debt	1	-4.62	I(0)
Exports to government expenditure	1	-4.96	I(0)
Budget deficit	1	-6.64	I(0)
GDP Growth rate	1	-3.50	I(0)
Inflation	1	7.07	I(0)
Interest	1	-6.64	I(0)

Critical value: 1 percent   -3.59

                       5 percent   -2.93

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Table A6: Cointegration Test Results

Eigenvalue	Likelihood ratio	5percent Critical value	1percent Critical value	Hypothesized No. of (CE)s
0.85	217.04	156.00	168.36	None **
0.61	136.21	124.24	133.57	At most 1 *
0.58	96.76	94.15	103.18	At most 2
0.42	60.41	68.52	76.07	At most 3
0.34	37.35	47.21	54.46	At most 4
0.26	20.07	29.68	35.65	At most 5
0.17	7.58	15.41	20.04	At most 6
8.55E-05	0.004	3.76	6.65	At most 7

*(**) denotes rejection of the hypothesis at 5% (1%) significance level

Table A7:   Normality Test Results
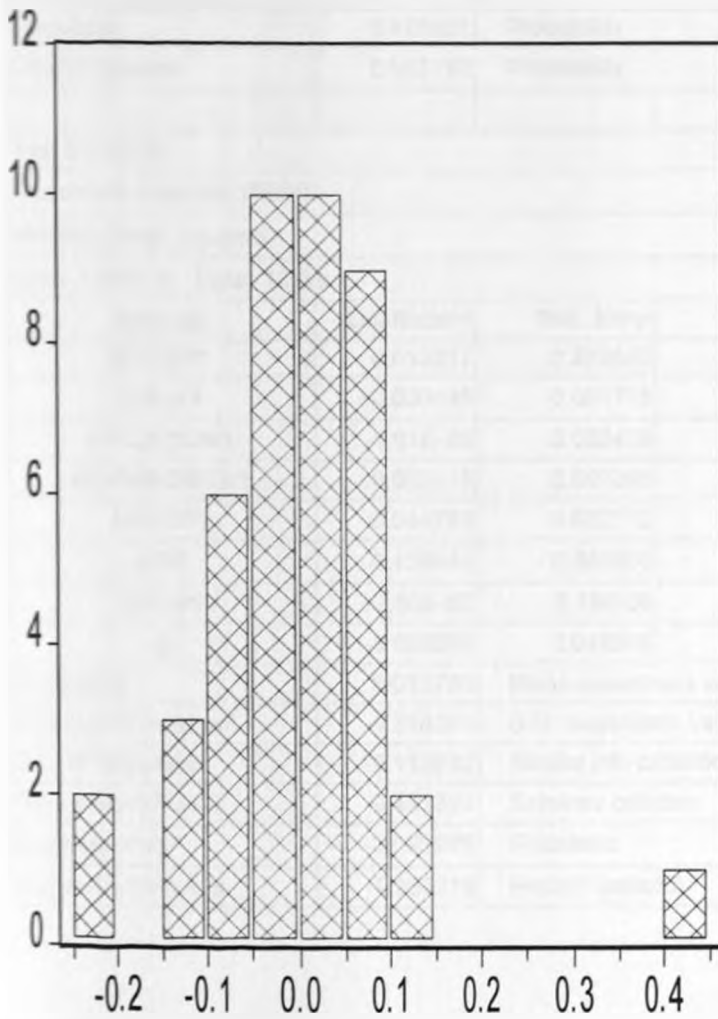
Series: Residuals	
Sample 1966 2008	
Observations 43	
Mean	-8.39E-18
Median	0.001644
Maximum	0.420470
Minimum	-0.248196
Std. Dev.	0.102045
Skewness	1.094557
Kurtosis	8.647445
Jarque-Bera	65.72883
Probability	0.000000

Table A8:   Serial Correlation Test Results

Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	0.475601	Probability		0.495102
Obs*R-squared	0.593198	Probability		0.441185
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Date: 11/09/10 Time: 13:39				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
SDGDP1	0.013217	0.273643	0.048299	0.9618
EGOV1	-0.000496	0.001715	-0.289217	0.7742
INFLATION1	-1.61E-05	0.002428	-0.006632	0.9947
GDPGROWTH1	0.002116	0.007396	0.286110	0.7765
FSGDP1	0.044753	0.622712	0.071868	0.9431
ERR	0.458441	0.685853	0.668424	0.5084
DDER1	2.50E-07	2.78E-06	0.090015	0.9288
C	-0.005566	0.048256	-0.115338	0.9089
R-squared	0.013795	Mean dependent var		-8.39E-18
Adjusted R-squared	-0.218253	S.D. dependent var		0.102045
S.E. of regression	0.112632	Akaike info criterion		-1.345617
Sum squared resid	0.431323	Schwarz criterion		-0.976993
Log likelihood	37.93076	F-statistic		0.059450
Durbin-Watson stat	1.953319	Prob(F-statistic)		0.999853

Where, SGDP- Stock of internal debt, EGOV- exports to government expenditure, DDER- debt service, GDPGR- gross domestic product growth rate and FSGDP- fiscal deficit. **The number '1' that is after every variable represents the first difference of that variable.**

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Table A9:   ARCH Test Results

ARCH Test:			
F-statistic	0.236356	Probability	0.629503
Obs*R-squared	0.246716	Probability	0.619397
Test Equation:			
Dependent Variable: RESID^2			
Method: Least Squares			
Date: 11/09/10 Time: 13:38			
Sample(adjusted): 1967 2008			
Included observations: 42 after adjusting endpoints			

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.011083	0.004761	2.327621	0.0251
RESID^2(-1)	-0.076607	0.157575	-0.486165	0.6295
R-squared	0.005874	Mean dependent var		0.010305
Adjusted R-squared	-0.018979	S.D. dependent var		0.028791
S.E. of regression	0.029063	Akaike info criterion		-4.192239
Sum squared resid	0.033787	Schwarz criterion		-4.109493
Log likelihood	90.03702	F-statistic		0.236356
Durbin-Watson stat	2.001146	Prob(F-statistic)		0.629503

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Table A10: Regression Results at 1ˢᵗ difference

Dependent Variable: PINPV1				
Method: Least Squares				
Date: 11/09/10 Time: 13:18				
Sample(adjusted): 1965 2008				
Included observations: 44 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Stock of domestic debt1	0 314362	0.265286	2.184991	0.2436
Inflation1	0 000185	0.002429	0.076244	0.9396
GDP growth rate1	0.002592	0.006718	0.385832	0.7018
Fiscal deficit1	-0.297807	0.613031	-0.485795	0.6300
Debt service1	4.05E-06	2.32E-06	1.748724	0.0886
Exports to government expenditure1	-0.005850	0.001562	-3.744534	0.0006
C	-0.059902	0.046174	-1.297310	0.2026
R-squared	0.405068	Mean dependent var		-0.018182
Adjusted R-squared	0.308592	S.D. dependent var		0.136079
S.E. of regression	0.113151	Akaike info criterion		-1.375275
Sum squared resid	0.473718	Schwarz criterion		-1.091426
Log likelihood	37.25605	F-statistic		4.198658
Durbin-Watson stat	2.257740	Prob(F-statistic)		0.002561

The number '1' that is after every variable represents the first difference of that variable.

Table A11: Regression results after 1st difference with the Error Correction Model

Dependent Variable: PINPV1				
Method: Least Squares				
Date: 11/09/10 Time: 13:35				
Sample(adjusted): 1966 2008				
Included observations: 43 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Stock of domestic debt1	-0.208005	0.270918	-2.767776	0.4478
Exports to government expenditure1	-0.005810	0.001545	-3.760174	0.0006
Inflation rate1	0.000186	0.002410	0.077337	0.9388
GDP growth rate1	0.002231	0.006678	0.334098	0.7403
Fiscal deficit1	0.120803	0.614664	0.196535	0.8453
ERR	-0.177125	0.167535	-1.057242	0.2976
Debt service1	6.36E-06	2.73E-06	2.330053	0.0257
C	0.043625	0.047219	0.923888	0.3619
R-squared	0.450686	Mean dependent var		0.018372
Adjusted R-squared	0.340823	S.D. dependent var		0.137684
S.E. of regression	0.111785	Akaike info criterion		-1.378237
Sum squared resid	0.437356	Schwarz criterion		-1.050572
Log likelihood	37.63209	F-statistic		4.102256
Durbin-Watson stat	2.019168	Prob(F-statistic)		0.002200

Where, SGDP- Stock of internal debt, TOT- exports to government expenditure, DDER- debt service, GDPGR- gross domestic product growth rate, FSGDP- fiscal deficit and ERR – error correction residual.

Table A12:   Regression results after 1st lag

Dependent Variable: PINPV1				
Method: Least Squares				
Date: 11/09/10 Time: 13:54				
Sample(adjusted): 1964:2 2008:4				
Included observations: 179 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INFLATION1	0.000643	0.001167	0.550970	0.5824
INFLATION1(-1)	0.000739	0.000404	1.830790	0.0689
GDPGR1	-0.002307	0.002998	-0.769776	0.4425
GDPGR1(-1)	0.001184	0.001366	0.866628	0.3874
FSGDP1	0.018113	0.017722	1.022058	0.3082
FSGDP1(-1)	-0.003802	0.005830	-0.652114	0.5152
DDER1	5.46E-06	1.30E-06	4.193652	0.0000
DDDER1(-1)	-3.64E-07	2.94E-07	-1.240021	0.2167
SGDP1(-1)	-0.027789	0.049679	-0.559378	0.5767
SGDP1	-1.073034	0.384495	-4.189949	0.8496
EGOV1(-1)	0.000195	0.000201	0.971663	0.3326
EGOV1	-0.005477	0.000716	-7.650243	0.0000
C	-0.023566	0.019456	-1.211212	0.2275
R-squared	0.474807	Mean dependent var		-0.005033
Adjusted R-squared	0.436842	S.D. dependent var		0.047248
S.E. of regression	0.035457	Akaike info criterion		-3.771163
Sum squared resid	0.208690	Schwarz criterion		-3.539677
Log likelihood	350.5191	F-statistic		12.50621
Durbin-Watson stat	0.910659	Prob(F-statistic)		0.000000

Where, SGDP- Stock of internal debt, TOT- exports to government expenditure, DDER- debt service, GDPGR- gross domestic product growth rate and FSGDP- fiscal deficit.

Table A13: Regression results after 2nd lag

Dependent Variable: PINPV1				
Method: Least Squares				
Date: 11/15/10 Time: 11:10				
Sample(adjusted): 1964:4 2008:4				
Included observations: 177 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
EGOV1	-0.005547	0.000680	-8.152909	0.0000
EGOV1(-1)	0.000128	0.000656	0.194951	0.8457
EGOV1(-2)	0.000186	0.000670	0.277028	0.7821
DDER1	4.95E-06	1.18E-06	4.180148	0.0000
DDDER1(-1)	-9.90E-07	1.11E-06	-0.891925	0.3737
DDDER(-2)	6.79E-07	1.13E-06	0.599968	0.5493
SDGDP1	-1.300582	0.188235	-4.654799	0.0000
SDGDP1(-1)	-0.018925	0.050012	-0.358990	0.4987
SDGDP1(-2)	-0.020115	0.053024	-0.201445	0.5305
ERR	0.532904	0.064551	8.255570	0.0000
C	-0.027666	0.015447	-1.791115	0.0751
R-squared	0.598319	Mean dependent var		-0.004921
Adjusted R-squared	0.581681	S.D. dependent var		0.047503
S.E. of regression	0.030724	Akaike info criterion		-4.083426
Sum squared resid	0.159526	Schwarz criterion		-3.939871
Log likelihood	369.3832	F-statistic		35.96163
Durbin-Watson stat	2.061577	Prob(F-statistic)		0.000000

Where, SGDP- Stock of internal debt, EGOV- exports to government expenditure, DDER-debt service.

The variables that were not significant after the 1st lag were eliminated. These were inflation, fiscal deficit gross domestic product growth rate and fiscal deficit