

# Establishing the Relationship between Public and Private Investment in Kenya

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## Abstract

This study undertakes to establish the relationship that exists between public investment and private investment in Kenya during the period of 1971-2011. The study adopts the flexible accelerator model using the time series data for the period in consideration. Variables in the model are real GDP, inflation, interest rate, domestic credit, exchange rate, exports and external debt. The data for these variables was collected from various sources including The Central Bank of Kenya, Economic Surveys, Statistical Abstract and International Financial statistics. Using econometric techniques, the empirical results show domestic credit, real gross domestic product and exports have positive impact on private investment both in the long run and short run while exchange rate, external debt had both short run and long run negative impact on private investment. This study recommend the use of efficient and modern technologies in the manufacturing and agricultural sector to increase their productivity, more domestic credit to the private sector, debt relief among other policies are suggested to boost private investment in Kenya.

**Keywords:** Private and Public investment

## 1.0 INTRODUCTION

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

Kenyan economic performance has been characterized by positive and negative economic growth, immediately after independence, economic growth was positive up to 1972 thereafter that growth was not sustainable 1973-74, 1979, 1990-91, and 2003, and donors withdrawals 1992 and 1997. The effects of this poor economic performance has led to the worsening of the balance of payment, unemployment, increased current account deficit, depreciation of the exchange rate and acceleration of inflation rate. As a result, there was increased investment cost leading to the reduction in economic growth. In recent years, economic growth rate fluctuated i.e.6.3% in 2006, 6.9% in 2007, 1.5% in 2008, 2.8% in 2009, 5.8% in 2010, 4.4% in 2011 and 4.6 in 2012(Government of Kenya, 2008 and 2013.This was due to low external flows to finance capital formation, poor infrastructure, low domestic credit, and low output. Furthermore, the poor performance of the economy has been attributed to the inappropriate agricultural, land, and industrial policies compounded by poor international terms of trade.

## 2.0 THEORETICAL LITERATURE REVIEW

### 2.1 Accelerator Model

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

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

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

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

Where  $\beta$  is the accelerator coefficient.

$B = K/Y = \text{Capital-Output Ratio.}$

## 2.2 Flexible Accelerator Model

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

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

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

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

## 2.3 Marginal efficiency of capital (MEC)

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

### (a) Present value approach

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

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

$$I = I(r)$$

### (b) Marginal efficiency of capital approach

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

Where,  $M$  is the rate of interest that discounts the present value of the project equal to zero. Investment projects are ranked in order of their  $M_s$ . According to Keynes, investment is a function of interest and the marginal efficiency of capital. The two methods are equivalent, if it is assumed the in the calculation of the internal rate of return. All returns are re-invested at the same  $M$  and that the rate of interest ( $M$ ), are constant overtime. However, there could be a problem with the internal rate of return in that,  $M$  may not be unique or it may be a real number.

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

## 3.0 METHODOLOGY

The study was conducted Kenya. The period chosen for economic analysis is 1971-2011 using annual data. This period is chosen in consideration to data availability and also in an effort to retrieve how variables under study, have been determining the trend of private investment. The data used was obtained wholly from secondary sources, specifically; Statistical abstract, and Kenya's Economic Surveys, International financial Statistics, and Central Bank of Kenya. The study used both ECM and Co-integration using Engle-Granger two step procedures to determine the long run and short run models. The idea in the formulation of private investment model is that, investment in the private sector follows the flexible accelerator hypothesis. This model assumes that the larger the gap between the existing capital stock and the desired capital stock, the greater the firm's rate of investment. Firms will plan to close the gap between the desired capital sock,  $K^*$  and the actual capital stock,  $K$  in each period.

### 3.1 Analytical and Empirical Strategy

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

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

Where:

- PI is the private investment
- RGDP is the Real GDP
- INT is the Real Interest rate
- DCR is the Domestic credit given to private sector
- INF is the inflation
- EXPO is exports
- EXTD is external debt
- EXCH is the exchange rate
- PUBIN is public investment

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

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

### 4.0 RESULTS AND DISCUSSION

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

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

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

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

### 5.0 CONCLUSION AND RECOMMENDATION

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

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

Real gross domestic product has a significant positive impact on private investment; its coefficient

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

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

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**Table 1: The ADF test for unit root**

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

Source: Author, 2016

**Table 2: Correlation matrix**

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

Source: Author, 2016

**Table 3: Breusch-Godfrey test**

Breusch-Godfrey Serial Correlation LM Test:

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

Source: Author, 2016

**Table 4. The regression estimation results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.374158	6.321425	-0.059189	0.9532
D(DCR)	0.269859	0.092443	2.919184	0.0066
D(EXCH)	-1.219738	0.554674	-2.199017	0.0357
D(EXPO)	0.371012	0.142585	2.602050	0.0143
D(EXTD)	-0.141813	0.053545	-2.648511	0.0128
D(INT)	0.676831	0.906535	0.746613	0.4611
D(PUBIN)	-0.183740	0.119153	-1.542055	0.1335
D(RGDP)	0.270182	0.108199	2.497080	0.0182
INF	-0.264298	0.373883	-0.706901	0.4851
ECM(-1)	-1.108708	0.186861	-5.933333	0.0000
R-squared	0.719353	Mean dependent var		4.917929
Adjusted R-squared	0.635159	S.D. dependent var		19.51890
S.E. of regression	11.78983	Akaike info criterion		7.984669
Sum squared resid	4170.001	Schwarz criterion		8.406889
Log likelihood	-149.6934	F-statistic		8.543971
Durbin-Watson stat	1.829643	Prob(F-statistic)		0.000003

Source: Author, 2016