

**ANALYSIS OF DETERMINANTS OF PRIVATE INVESTMENT
IN KENYA**

By

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DECLARATION

This research project is my original work and has not been presented for a degree or diploma in any other university.

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DEDICATION

This project is dedicated to my mother F. Mundia and my uncle R. Wanjohi for their discernible goodwill towards my life's endeavours.

ABSTRACT

While applying a time series model borrowed from Blejer and Khan (1984) as a suitable investment model for developing countries, this paper explores different factors that affect domestic private investment in Kenya. The data of the investment factors have mainly been sought from Kenya Economic Survey among other national statistic sources. Statistical procedures relating principally to time series analysis are used with the help of STATA computer program including the different diagnostic tests to yield the findings of the study.

According to the results obtained, income growth has been significantly supportive to the growth of domestic private investment in Kenya. On the other hand, lagged private investment was also found to have the same kind of significant and positive effects. The effects of public investment on private investment were found to be unfavourable but insignificant, so did those of Credit to the Private Sector. Credit to the private sector as a variable portrayed an inconsistency to the expectations that it should be much influential in the growth of investment in developing countries. This is so because credit controls are prevalent in theory and practice as tools of economic policy. The finding, however, is not as strange in relation to those of many studies in this subject area.

The results of this study imply that economic players in Kenya should be committed to the production process, enhancing it intensively if they are to better domestic private investment. This means that production and investment atmosphere need to be pleasant to economic agents. On how to use the tools of credit control and fiscal control through government expenditure, the results have not been sufficiently determinate. The results on the whole nevertheless give an insight into the working of domestic private investment in Kenya. Imperatively, however, more studies and theoretical considerations modifying the variables should be sought to foster better understanding of the investment function in Kenya and the whole world.

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ABBREVIATIONS

ARDL	Autoregressive Distributed Lag models
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
GDP	Gross Domestic Product
IPAR	Institute of Policy Analysis and Research
KIPPRA	Kenya Institute for Policy Research and Analysis
PI	Private Investment
GIR	Real Government (Public) Investment
DCR	Real Credit to the Private Sector

CHAPTER ONE

INTRODUCTION

1.1 Background

1.1.1 The concept of Private Investment

Investment has been defined variously by different authors. Reilly and Keith (2009) defined investment as the current commitment of dollars (money) for a period of time in order to derive future payments that will compensate the investor. While, ordinarily, some goods are goods with no opportunity cost such as the air we breathe and sunshine what we invest in is not. Mayo (2006) argues that this term is ambiguous. He points out that in an Economics class the term refers to the purchase of a physical asset while in a Corporate Finance course the term could apply to any asset including market securities. Private Investment therefore, is in investment by individual people or firms as opposed to the government as an entity.

1.1.2 Private Investment Determinants and Their Relationships

Economic theory suggests that there may be many determinants of private sector investment. Evidence tends to support the idea that the level of investment is determined by a number of variables (Anderton, 2007). Empirical studies in this subject in Africa, Kenya included, and other parts of the world seem to concur with this point of view. Factors that have been explored as attributable to investment changes include; changes in income, the cost of capital, the rate of return, public sector investment, credit to private sector, taxation, the terms of trade, the debt level, the exchange rate, among others.

Changes in national income are expected to move together with investment levels. As the Accelerator theory postulates, changes in investor's expectations about future economic conditions influence the levels of investment, the particular or main channel or variable to affect is the question of debate between the Keynesians and the Neo-Classical thinkers (Anderton, 2007). On that note, the same applies to such factors as expected profits and the rate of return on investment while the converse is true for cost factors such as taxes and the cost of capital which are expected to be negative influencers.

Many of the studies in this area such as Bakare (2011) are of the view that infrastructural public investment is the one that complements private investment. For public investment, it is just a matter of whether it competes or complements private investment. As Yaw (2000) observes, a recent track record of private investment is an indication of good investment climate and therefore is expected to encourage present and future private investment. Therefore a positive correlation is expected with its present levels.

As observed in many studies involving developing countries including Ouattara (2004) and Magnus and Marbuah (2010) among others, credit to private sector is an important determinant of private investment for developing countries. It is expected to exhibit a positive sign in our model as a booster of private investment. As Ronge and Kimuyu (1997) discusses financial repression and controls (especially of credit availability) in developing countries make it such an important factor impacting on the effects of other policy interventions such as fiscal and monetary policies.

Interest rates effects have been, depending, hypothesized to be either positive or negative as many researchers have observed. This would depend on whether they would follow the Mckinon-Shaw hypothesis - of interest rates boosting savings and so investments - or the Neo-Classical view - of interest rate as a cost factor being negatively related to investment (Muraga, 2006).

1.1.3 Private investment in Kenya

Investment growth in absolute terms in Kenya has exhibited a sporadic character. Growth in gross real investment in Kenya was 7.1% on average in the 1970's and relatively low at 2.7% in the 1980's (development plan, 1997-2001). In the 1990's it went up slightly to 3.38%. The period 2000-2010 was characterized by a major recovery of gross investment with the growth rising from 3% in the year 2000 to 13.6% in 2007 but only to fall back to 9.5% in 2008 and further to -0.2% in 2009 as part of the effects of the Kenyan post-election violence of 2007/2008. In 2010, however, the growth jumped back to 7.3% (Economic Survey, various issues).

Relative to Gross Domestic Product, the changes in investment have not been as notable. It, however, declined on average from 31% in the 1970's to 21% in the 1980's and further to 21% in the 1990s (Development Plan 1997-2001, 2008). Kenya's projected gross investment level as a proportion of Gross Domestic Product in 2001 was 25-30% according to the Development Plan (1997-2001) and lower at 23% of GDP by 2007 (Investment Programme for Economic Recovery Strategy for Wealth and Employment Creation, 2004). Kenya's Private sector investment has continued to perform below expectations although it still does account for 60% of the GDP (Investment Programme for Economic Recovery Strategy for Wealth and Employment Creation, 2004). In the 1990's the real private investment averaged 17%

and in the following decade it evened out to 16.7% in 2006, 17.3% in 2007, 18.6% in 2008 and 17.7% in 2009 (Kenya Institute for Policy Research and Analysis, 2010).

1.2 Statement of the Problem

Generally, the objective of a business firm is mainly to maximize profit while that of the government is ideally to maximize the welfare of its citizens among other objectives. This entails that these entities create capacity for future production through investment. The government has increasingly recognized the importance of private investment as the main driver of economic development and has shifted to policies and reforms aimed at giving the sector more enabling environment. This is clear in the Economic Recovery Strategy for Wealth and Employment Creation (ERSWEC) and the longer term Vision 2030 strategies. Reforms have also shifted towards making the public sector oriented to being more of a facilitator of the private sector (Were, Ngugi, Makau, Wambua & Oyugi, 2005). Satisfactory results in these directions are, however, yet to be achieved.

The lower than expected or desired level of investment over time has been highlighted as a major cause of the slow economic growth in the country (Investment Programme for ERSWEC 2004). Analogous to any other commodity, derivation of demand and supply curves for investment is difficult given that, particularly, investment determinants are numerous and not very clear and that these factors affect both supply and demand simultaneously. In fact many studies have, not quite correctly, purported to study the demand for investment while what we observe, according to theory, is not simply the demanded investment but a semblance of the equilibrium investment. The various empirical studies in this area have not produced equivalent results or considered the same variables while at the same time, in the case of Kenya, the observation period has not been sufficiently long enough. This is especially so for

Multiple Regression, the standard method in such situations, which requires many data points (Lipsev and Alec, 1999). Times are also changing fortunately affording us more observations for our better study of the subject.

Private investment is a subject area that requires continued study as no conclusive empirical studies or models have been completed. As observed in our Literature Review, there are several similar empirical studies in Kenya including Muraga (2006), Odongo (2004), Ronge and Kimuyu (1997), and Kiptui (2005). Our study intends to make improvements through the use of more data which is also more recent especially in the more liberalized Kenyan economy of today. It also intends to avoid the wrong attempt to solve the complex Identification Problem - according to Lipsey and Alec (1999), the separating of concurrent factors of demand and supply - of private investment as many of the past researches in this area have done. The models by Sundararajan and Thakur (1980), and Blejer and Khan (1984) have also not been tested in Kenya while they were derived with the third world countries in mind. These models have at least made attempts to justify or explain the linear relationship employed in the multiple regression analysis method used unlike in the many other studies.

Many private investment studies have used a variant of a given model and so their variables are closely associated with the specific underlying investment theory. Moreover other studies have tended to concentrate on examining a single determinant. While it is usually important in the case of so many influencing variables interlinked to each other, substantial weakening of the model can result as Kiptui (2005) recognizes. Our study will take the approach of combination of two models that have specifically derived some of the variables and relationships from wider theories of investment, production and cost minimization.

From the foregoing, the firm or the government need to address itself to the questions of what major variables influence the level of private investment in Kenya, how they affect it and what policy interventions are important including what are the important data processes to maintain or rationalize.

1.3 Research Objectives

This research paper was inspired by the need to study exogenous factors - from the point of view of the business firm - affecting investment in Kenya. It is specifically concerned with the objective of finding out the main determinants of private investment in Kenya between 1971 and 2012.

1.4 Value of the Study

Investment activities or decisions have many stakeholders or participants. This study is meant to improve the understanding of the private investment function for Kenya and the following parties may find it important in their decision making:

- i) Investors and managers by improving their understanding of the investment environment for better prediction and lobbying to maximize their profits and other goals
- ii) The national policy makers especially the government to know specific variables to manipulate to affect private investments in order to improve the economic welfare of citizens
- iii) The citizens of the country to understand how handling of investment variables by their government affects them as citizens or producers
- iv) Any other interested parties in the affairs of Kenya like scholars and researchers keen on expanding knowledge; the donors and other partners interested in the investment environment in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Investment concepts date back to before Keynes and have been studied ever since. Many studies in this area around the world can be identified and the subject of private investment cannot be examined without a wide review of the available literature. Empirical aspects have also been of major interest and can have a lot of implications to any undertaking in this area of study.

2.2 Theoretical Review

The theories of investment clearly emerged with Keynes 1936 publication. *The General Theory of Employment Interest and Money* but the ideas were well in advance of Keynes (as cited in Galbraith, 1987). The theories of capital and investment have also long been intertwined and related (Gould, 1969). Approaches to the study of investment can be categorized in at least five broad theories. They consist the Accelerator theory, Cash flow theory, Neoclassical theory, Modified Neoclassical (or Bischoff) theory and the Tobin's Q theory. There are also several combinations of these models.

These standard alternative theories can be classified in various ways. Key among them based on the optimal adjustment path for the firm's capital stock and, secondly in terms of the relative importance of price variables like taxes and interest rates (Cherian, 1996). Under the first division, of the five models only the Q theory explicitly considers the optimal adjustment path for the firm's capital stock. Along the second criterion, for the neoclassical model, only price variables matter, for the accelerator and cash-flow models only quantity variables matter. For the Q theory,

what is relevant is autonomous shocks and for the Modified Neoclassical model, what matters is a combination of price and quantity variables with the latter being somewhat more important. The quantity variables include output, liquidity and shocks such as technological shocks.

2.2.1 The Accelerator Theory

Samuelson's accelerator theory suggests that investment is a function of past changes in income (Anderton, 2007). It follows the Keynesian view that changes in investor's expectations about future economic conditions influence the levels of investment. The desired investment stock depends on planned output. Neoclassical writers believed that investment is very sensitive to the interest rate while Keynes and his followers took the position that changes in investor's expectations about future economic conditions are far important in explaining changes in levels of investment. Both groups agreed that equilibrium investment occurs when the expected rate of return in investment equals the rate of interest (Byrns and Stone, 1981). On government spending, it is postulated that decreases in government spending directly deflate the demand for goods and services. According to Keynesian view point this leads to decreased investment activities (Bodie, Alex and Marcus, 2009).

2.2.2 Cash Flow Theory

Current and past profits or cash flows have been thought of as good proxy for future profit expectations which in turn determine investment (Bischoff, 1971). Additionally, cash flow is also seen as a source of funds so the cost of funds to the firm rises when internal funds are exhausted given imperfect market condition. According to Cherian (1996), the managerial and the information theoretic approaches to investment were the latest. Both approaches emphasize the role of internal finance as the fundamental determinants of investment and can be regarded as the modern versions of liquidity

theory. In the managerial view, internal finance is preferred as it facilitates discretionary behavior by managers while in information theoretic viewpoint, due to information asymmetries between insiders and outsiders.

2.2.3 Neoclassical Theory

The Neo-classical theory argues that the rate of interest is the important determinant of investment. In contrast with the accelerator model, the neoclassical model assumes that the desired stock depends not only on planned output but also on the ratio of output price to the implicit rental price of the services of capital goods (Bischoff, 1971). Basically it is derived from a profit maximization process aimed at desired capital given a Cobb-Douglas production function. Bodie, Alex and Marcus (2009) note that Keynesian (demand-side) economists look at effects of taxes on consumption demand whereas supply-siders (Neoclassical) argue that lowering tax rates will elicit more investment and improve incentive to work. Accordingly, monetary policy works largely through its impact on interest rates. Increases in the money supply lower interest rates which in turn stimulates investment demand.

2.2.4 Modified Neoclassical Theory

The Modified Neoclassical (Bischoff) model is a version of Neoclassical model in which the distributed lag is altered to accommodate the empirical observation that capital-output ratio are embodied in new equipment and structures rather than the existing ones (Clark, 1979). Since factor proportions are fixed at the time the equipment is designed, changes in factor intensities dictated by changes in the price of capital take place only as the old capital is replaced; so called the putty-clay hypothesis. Bischoff suggested that real output and the cost of capital should have separate lag structures in the determination of investment expenditure (Hall, 1977).

2.2.5 The Tobin's Q Theory

In contrast to the foregoing output-based models the Q theory attempts to explain investment in terms of portfolio balance. This is based on the q-ratio, proposed particularly by James Tobin, of the market value of capital to its replacement cost (Clark, 1979). To maximize the market value of the firm, capital stock will be added whenever the marginal addition to the firm's market value exceed the replacement cost of the capital stock and vice versa (Cherian, 1996). Accordingly, net value is realized. Chronologically, the early writers of the subject of investment emphasized the accelerator approach. The emergence of liquidity theory in the late 1950's and early 1960's followed, where investment is seen as a function of cash flows. Then in the 1960's came along the neoclassical model by Jorgenson and in the late 1960's the Q theory of investment (Cherian, 1996).

Yaw (2000) has categorized the variables of private investment into Keynesian, Neoclassical and Uncertainty variables. The Keynesian factors include GDP growth rate, internal funds and capacity utilization. In the neoclassical category is Tobin's Q, real interest rate, user cost of capital and public investment ratio. The uncertainty values are three: variability in the user cost of capital, real exchange rate, inflation rate, distortions in the foreign exchange market and real GDP; debt/GDP ratio and debt service as a ratio of exports of goods and services. Investment is also affected by terms of trade with improvements in the terms of trade stimulating investment demand. Because of adjustment costs for changing the stock of capital, investment demand will respond mainly to long-lasting shifts in the term of trade, Barro (1993). As Bodie, Alex and Marcus (2009) notes, appreciation of the home currency creates a problem for the country's producers that must compete with other international

producers. Therefore, on exchange rates, the appreciation of home currency would be expected to discourage investment.

The standard investment theories have been considered as not fully applicable to developing countries becoming the subject of further hypotheses and studies in this area. Such studies include Fry (1998), Greene and Villanueva (1991), Bledjer and Khan (1984) and Sundararajan and Thakur (1980). Developing countries have been associated with several inherent problems mainly relating to analytical and data problems and general imperfections in financial and labour markets (Bledjer and Khan, 1984) such as financial repression (Kimuyu, 1997).

In conclusion, as Case and Fair (2007) sums it up many other hard-to-measure and hard-to-predict factors also affect the level of investment spending. These might include government policy changes, election results and global affairs. Investment ideas have also been developed further in finance. For instance Bodie, Kane and Marcus (2009) observes that the idea of diversification is age-old, but it was not until 1952 that Harry Markowitz published a formal model of portfolio selection embodying diversification principles; termed the identification of the efficient frontier of risky assets.

2.3 Empirical Studies

Investment theories have been tested in various economic or financial settings Kenya being one of them. Kironji (2006) undertook to find the determinants of private investment in Kenya and estimated a time series model. The results of the study suggested that infrastructure investment surprisingly had a negative effect on demand for private investment. They attributed that to long periods of same levels of road investment due to limited resources, ease of road maintenance deferment compared to

social welfare projects, large upfront costs, and the risks of expropriation (deprivation of private possession). On interest rates, the study seemed to support the idea that interest rates move together with investments in accordance with speculative portfolio holdings theory (Preference of assets of differing risks and returns to cash due to fear of capital losses on cash) and the Mckinon-Shaw hypothesis. The coefficient of per capita income was positive as expected but insignificant. The relationship between exchange rate and private investment was found to be negative. This result was found to compare well to that of Oshikoya (1994) where for low income countries including Kenya effect of exchange rates was approximated as negative, small and insignificant while for middle income countries it was positive and significant. Finally the research arrived at a positive relationship between the consumer Price Index and private investment indicating that rising prices could have favoured private investment.

Ronge and Kimuyu (1997) studied the trends, composition and determinants of private investment in Kenya. The analysis indicated that the general availability of credit, foreign exchange reserves and public investment had a positive impact on the level of private investment. On the other hand, the implied impact of public debt and exchange rate depreciation on private investment was negative. Lagged GDP growth rate and real interest rates did not seemingly exhibit much influence on private investment, possibly attributable to the financial repression of the period under that study to the extent that interest rates had been mostly negative.

Odongo (2004), while looking at effects of debt on private investment, arrived at yet another set of findings. The factors that seemed to have a significantly positive association with private investment were the external debt stock, public investment and per capita GDP growth. Inflation rates, real lending interest rates and population growth also tended to move in the same direction with it but insignificantly.

Apparently, the negatively impacting factors seemed to be more; the ratio of the external debt service to exports, external debt squared to GDP ratio, the lagged private investment ratio (representing dynamics arising from adjustments), Terms of Trade (differenced), the lagged Error Correction Term and insignificantly, the real exchange rate and financial liberalization. The research as the researcher points out has used different forms of debt as variables explaining private investment in an effort to segregate debt crowding out effects and debt overhang effects. This, however, may have compromised the model because as the results indicated these variables were, as expected, highly co-related. The research nevertheless hinted at external debt stimulating private investment while debt overhang effects work against it. Debt servicing also appeared to crowd out private investment.

Kiptui (2005) uses a general regression model examining the fiscal policy for its impact on private investment in Kenya. He analyses the effects of budget deficits, government consumption expenditure, tax burden and public debt on private investment. The approach, however, by omitting even single one of the other important factors of private investment can have profound negative effects on the outcome of the Multiple Regression analysis. Nevertheless, the study finds economic growth as the most important positive determinant of private investment. It also observes increases in imports and, surprisingly, government consumption expenditure as promoters of private investment. Budget deficits had significant lagged negative effects with the related debt service, debt stock and tax burden negative effects heightening it. The other factors that seem to undermine private investment in this study are public investment and volatility in foreign aid flows.

Ronge and Kimuyu (1997) apply what has been called eclectic version of the flexible accelerator model; modified to accommodate a greater emphasis on the effects of resource constraints in developing countries. Such constraints pertain to credit, foreign exchange and the level of debt. Factors apparently supporting private investment were credit availability, foreign exchange reserves and public investment. Those that seemed to deter it were public debt and exchange rate depreciation.

A similar analysis by Muraga (2006) uses a variant of the neoclassical flexible accelerator model. Private investment is specified as a function of interest rate, exchange rate, per capita income, average wage earnings, per employee, consumer price index, total bitumen roads length and dummy variables representing liberalization. The factors that seem to promote private investment according to this study were interest rates, per capita income and surprisingly inflation. Those factors that apparently undermine private investment were, surprisingly, infrastructure and exchange rates although insignificantly.

From the foregoing, considering the factors that were common among the studies, Odongo and Muraga's findings are the closest to a convergence. Interest rates, income and inflation were apparently good for private investment and exchange rate depreciation discourages it. These particular findings differ though in the level of significance with exchange rate, inflation and interest rates being insignificant by Muraga's findings and per capita income by Odongo's findings. Moreover, in almost all cases they differed with the findings of Ronge and Kimuyu (1997). When it comes to public investment complementing private investment, Ronge and Kimuyu (1997) agrees with Odongo (2004). Many of the factors considered by Kiptui except public investment- and that resulted in different findings with the others-were not considered by the other researchers. Odongo (2004) also considered debt service, private

investment ratio, terms of trade, population growth and financial liberalization which none of the other researchers did.

Yaw (2000) while exploring the determinants of private investment in Ghana found that, apparently, the most important determinants were the trade regime (level of the controls), real credit to the private sector and political and economic instabilities. The factors which seemingly strengthened private investment were public investment, credit to private sector, public debt, real exchange rates, real interest rates (as per Mckinnon-Shaw hypothesis) and lagged private investment. The GDP growth rate was, contrary to expectations, insignificant. Those seeming to work against private investment were; trade regime, investment deflator (to proxy user cost of capital) and macroeconomic and political instabilities. The study suggested that individual macroeconomic instability constituent factors used – inflation rate, debt burden, black market premium and real exchange rate - may not have had significant impact on private investment when considered separately.

Frimpong and Marbuah (2010) carried out another study of the Ghanaian investment situation using time series econometric techniques within ARDL framework. The implicit factors influencing private investment were public investment, inflation, real interest rate, openness, real exchange rate and the constitutional rule. In the long-run output and external debt would be the additional factors of importance while public investment was not much significant. Of all the significant factors only effects of external debt and openness happened to be negative going by the results of the study.

An understanding of the working of the investment function was also the subject matter of Ouattara (2004) for the economy of Senegal. The researcher uses an econometric process of estimating an equation of private investment while subjecting

it to various statistical diagnostic procedures. The long-run equation was derived using Johansen cointegration techniques. The results indicate that public investment, real income and foreign aid flows positively affect private investment, while the impacts of credit to private sector and terms of trade were negative.

Similar efforts are made by Bakare (2011) with the interest being private domestic investment in Nigeria. A time series and error correction mechanism is employed. The results basically indicated that both political, especially, and economic instabilities had been bad for private domestic investment in Nigeria. Corruption, inflation, and exchange rate depreciation were used as proxies for instability. Depreciation of the home currency did not give the desired effect neither did the public investment going by these results, apparently due to poor investment in infrastructure.

Finally, Seruvatu and Jayaraman (2001) sought to explore factors influencing private investment in Fiji. A time series analysis was complemented with a qualitative assessment from a past survey. It concluded that changes in real investment in Fiji appeared to have been best explained by changes in terms of trade and by a dummy variable representing a coup and its after effects. Changes in other economic variables examined had an insignificant effect on the variations in private investment, due to possibly, as the study speculated, poor quality of data.

2.4 Conclusion

The sets of findings in the foregoing analysis of the various relevant literature reveal numerous disparities especially in the empirical component. These may be associated to, among other things, the different settings of respective studies. It may additionally point to the imperfections of the methods used or quality of the data employed in the studies. Evaluation of this topic, therefore, becomes even more important as efforts continue towards consistent or conclusive results.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

The basic objective of this study was to examine how major factors affect private investment, selecting them from existing theories and informed judgments. As such it has been carried out from the approach of causative research design. While the primary data could be gathered as time passed, it would take too long to collect and such other methods like performing interviews would not have produced reliable data in that case. Moreover, the dynamics of private investment mean the variables could not be controlled or the events replicated so the most reliable way was to use available records and documents which method comprise ex post facto and archival research.

3.2 Population and Sample Design

To learn the working of the private investment function in Kenya, a time series analysis of private investment variables in terms of national aggregates of the independent and dependent variables, usually nationally relatively well kept, was done. The decision to use the variables as selected was informed by theory and empirical studies including the accelerator, the neo-classical and the classical theories. Specifically, a regression was performed based on merging the work of Sundararajan and Thakur (1980) and Blejer and Khan (1984). The resultant model took the following form:

$PI = f$ (change in expected real income, real public sector investment, change in real credit to private sector, lagged real private investment),

and expressed in the following regression equation;

$$IP_t = b_0(\Delta YR^e_t) + b_2 \Delta DCR_t + b_3 GIR_t + (1 - b_0)IP_{t-1} + e$$

Where ΔDCR = Change in Real Bank Credit (money loans) to The Private Sector

GIR = Real Public Sector Investment (Monetary Values)

ΔYR^e = Monetary Change in Expected Level of Output

IP_t = Gross Private Investment (Monetary)

IP_{t-1} = Lagged Gross Private Investment (Monetary)

δ = Rate of Depreciation (Monetary)

e = error term

These two studies - Sundararajan and Thakur (1980) and Blejer and Khan (1984) - developed in similar ways multivariate linear models of private investment. The linear models are based on the effects of the relevant variables on a coefficient of adjustment towards optimum levels of capital and, also, in the case of Blejer and Khan (1984), using the process of cost optimization in the production process.

The current study has looked at annual data spanning the years 1971 to 2012, a period of 42 years. The data period was intended to be long enough for a sufficient number of observations for effective multivariate time series analysis as a solution to the problem of the variables changing at the same time. Under such circumstances, Lipsey and Alec (1999) notes that if there are many observations of the different variables it is possible to discover the separate influence of each of the variables while using Multiple Regression Analysis, the standard technique. As a matter of fact, to have sufficiently many observations is a fundamental feature for the working of Multiple Regression Analysis technique unless the variables are known to be completely independent.

3.3 Data Collection

Secondary data collection was considered the best as it was felt that it was indeed the most comprehensive source for the study and the variables concerned. It was also highly likely to be more objective than the primary sources envisaged. The secondary data sources used were the Kenya national Economic Surveys and Statistical Abstracts of various issues. The sources were complete with no data missing for the period under consideration.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Data Analysis

The collected data was first modified for uniformity into Kenya shillings, then millions of shillings and into 2001 constant prices. All the data variables were modified to be in the form applicable such as the annual change.

The preferred method of data analysis for the research was Multiple Regression Analysis. This was because there would be multiple factors affecting private investment in any economic setting and whose effects could not be segregated. The method also happened to be the best in seeking to extract individual effects but inevitably by using long periods or on adequately many data sets (Lipsey and Alec, 1999). Accordingly, the analysis has used the relevant complementally tools available with Multiple Regression Analysis such as the coefficient of determination and the diagnostic tests.

4.2 Results and Discussions

As can be seen from the statistical analysis results in table 1 below, our model yielded a high value of R-squared of 0.86. The R-squared statistic gives the proportion of total variation in independent variable that is explained by the model, a measure of the overall goodness of fit of the model. These results indicated the model explained a high percentage of the variation in domestic private investment in Kenya. To check against over-fitting the model through the inadvertent addition of too many independent variables which would lead to increased mere chance improvement in R^2 , the adjusted R^2 was computed. The adjusted R^2 statistic, the variable-corrected

population equivalent of R^2 , adjusts for degrees of freedom used up when adding the variables. In our model it is corroboratively high with a value of 0.84.

Table 1: Investment Model (STATA Results)

IPt	Coef.	Std. Err.	t	P> t 	[95% Conf.	Interval]
PubInv	-0.26196	0.407695	-0.64	0.524	-1.08803	0.564106
YRt	1.033886	0.268431	3.85	0	0.489993	1.57778
laggedIP	0.627561	0.133248	4.71	0	0.357575	0.897547
DRC	0.022417	0.11421	0.2	0.845	-0.209	0.253828
_cons	-17477.3	11165.02	-1.57	0.126	-40099.7	5145.235

The statistical program of STATA was run with the model and data producing the results which included comprehensive test outcomes. The Dickey Fuller unit root test of stationarity revealed some variables were not stationary. These were differenced until the stationarity was corrected. This test therefore took care of autocorrelation as well. Separately, Ramsey RESET test was done on the program to check for omitted variables with none having found as likely omitted. An analysis of the t statistic (the number of standard deviations away from zero the estimated coefficient was) brought out the coefficients that were significant.

The coefficient of GDP was significant because its t statistic was a high of 3.85 and the related P value (which indicates the level of confidence that the coefficient is significant or the probability it is not) was 0.0, less than 5%. This meant that the probability the coefficient of GDP was zero (that GDP had no effects) was slightly more than 5% indicating high significance at 95% confidence level. Income, the GDP, means the level of production. Productivity being key to investment; it is the fundamental motivation to investment with some scholars even using it to proxy the investment climate or atmosphere. Its high positive influence in the model meant the factors that favoured it should be checked closely if investment were to improve since it was as such a counterpart to investment. You could not check one and leave the other out.

On the other hand, DCR had a coefficient with a P-value of 0.845 which was higher than 5% indicating it was not a significant variable. Credit to Private Sector as can a likely factor be seen as the oil of investment. Monetary policy especially in developing countries seem to be an important source of influence on investment and credit control is one of its tools. Its dismal performance in the model casted doubt on the usefulness of such policies in influencing domestic private investment in Kenya as would be thought. Better still this was an indication of the need for more studies in this area.

The coefficient of Lagged Private Sector Investment was signaled as significant with a low P-value of 0.0 which results were very close to those for GDP. Lagged Private Sector Investment as expected was highly correlated with private domestic investment. As it appears good past investment is a motivational factor to current investment and is also usually used to proxy the investment climate or atmosphere. Not only was it an indication of desired future investment but of the structural

adjustment process involved after a change in the variables. An elaborate lag mechanism not fully utilized in this study would however be required to establish the optimal number of lags to be used for this variable.

The coefficient of Public investment was insignificant because its t statistic was found to be very small at -0.64 and the related P value being more than 5% at a value of 0.524 failing the 95% significance test. This hinted at a crowding out effect in which the public sector competed more for the resources than it did to support the private sector. A lot of research theory proposes that the supportive part of public sector is the infrastructural one and it therefore should be isolated in a more precise model. In whole, however, it did not seem to be a very helpful factor in influencing private investment.

CHAPTER FIVE

SUMMARY CONCLUSION AND RECOMMENDATIONS

5.1 Summary and Conclusions

The objective of this paper was to study the main determinants of domestic private investment in Kenya. Private Investment in Kenya was or has long been considered insufficient and there has always been a need to enhance it owing to the vital role it plays. A look at the investment situation and the past trends in Kenya was analyzed which gave more credence to this observation. Moreover, a review of different studies and theories showed it was a curious area for researchers all over the world.

The study was done using a model by Blejer and Khan (1984) modified along the form of a similar model by Sundararajan and Thakur (1980). Employing STATA program to do relevant statistical analysis, two factors turned out as having significant influence on domestic private investment. These constituted the Gross Domestic Income and Lagged Private Investment. Credit to Private Sector and Public Investment did not appear to have much effect on private investment. The case of Public Investment did not necessarily come out as consistent or inconsistent to theory since the effects were expected to be either positive or negative depending on how the public investment was applied in the economy. This depended on the composition, whether it was largely infrastructural or otherwise, with infrastructural public investment thought as supportive to investment. The real surprise, however, lay in Credit to Private Sector as it was expected that it would portray positive correlation with private investment especially in the developing countries. Many other studies as it turns out have also come to the same kind of findings nonetheless.

5.2 Conclusion

The findings of this study did not go far off from the findings of similar empirical studies and indeed theory. There is, similarly, consensus that more studies in this area are required. Efforts especially in separating the effects of public investment variable into infrastructural and non-infrastructural parts have already been made with encouraging results. A more rigorous treatment of credit to private sector also need to be applied to account for the various credit control time phases in Kenya to bring out more clearly its effects.

5.3 Recommendations

There are various implications and so number of suggestions that arose from the findings of this study. Key among them was that all efforts should be made to support production especially the investment climate in such areas as security and taxation. The monetary policy of credit control did not seem to have a lot of role to play as would be expected although this may have been due to other factors of data collection such as the suitability of the different sources. The suitable mode of application of fiscal policy of government expenditure was also quite indeterminate from these results. This was for the reason that public expenditure exhibited insignificant effects on private investment. The implication being that it may not be a very effective tool of fiscal policy as such.

5.4 Limitations of the Study

The intended scope of this work did not include the derivation of a model of investment. Within the set objective of applying our select model, still an exhaustive investigation in our topic was not possible due to various constraints. Key among these was time, financial and technical resources and availability of firm-specific data. To do a thorough firm level study would have required firm specific macroeconomic

data that is usually not readily available. To gain full understanding of the actual workings of the variables, they would need to be analyzed further and comparative tests of the components done. This would in itself require a wide study into available related ideas or theories something that would require a lot of time and resources. Finally advanced technical knowledge such as in econometrics may be necessary to interpret and apply such ideas properly.

5.5 Suggestions for Further Research

There are a number of interesting aspects relating to this subject that are important to explore. Among them is the applicability of the relevant constituent components of the variables of the investment model. This includes testing the applicability of the different available models in this area. This would be instrumental in identifying the particular element's effects in the working of the investment model. Secondly, it would be useful to learn how the investment models would perform in related or like economies especially in neighbouring countries. Finally, the results of a model with a rigorous lag mechanism would also be important to discern the adjustment effects of the variables.

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APPENDIX I

PRIVATE INVESTMENT MODEL ANALYSIS: STATA RESULTS

```
. dfuller d_IPt
```

```
Dickey-Fuller test for unit root      Number of obs =   40
```

```
----- Interpolated Dickey-Fuller -----
```

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-8.204	-3.648	-2.958

```
-----  
MacKinnon approximate p-value for Z(t) = 0.0000
```

```
. dfuller yrgdp
```

```
Dickey-Fuller test for unit root      Number of obs =   41
```

```
----- Interpolated Dickey-Fuller -----
```

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	3.846	-3.641	-2.955

```
-----  
MacKinnon approximate p-value for Z(t) = 1.0000
```

```
. gen d_yrgdp = d.yrgdp
```

```
(1 missing value generated)
```

```
. dfuller d_yrgdp
```

```
Dickey-Fuller test for unit root      Number of obs =   40
```

```
----- Interpolated Dickey-Fuller -----
```

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-3.053	-3.648	-2.958

```
-----  
MacKinnon approximate p-value for Z(t) = 0.0302
```

. dfuller dd_yrgdp

Dickey-Fuller test for unit root Number of obs = 39

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t) -8.110 -3.655 -2.961 -2.613

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller PInv

Dickey-Fuller test for unit root Number of obs = 41

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t) -1.949 -3.641 -2.955 -2.611

MacKinnon approximate p-value for Z(t) = 0.3094

. gen d_PInv = d.PInv

(1 missing value generated)

. dfuller d_PInv

Dickey-Fuller test for unit root Number of obs = 40

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t) -6.635 -3.648 -2.958 -2.612

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller YRt

Dickey-Fuller test for unit root Number of obs = 41

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-1.753	-3.641	-2.611

MacKinnon approximate p-value for Z(t) = 0.4043

. gen d_YRt = d.YRt

(1 missing value generated)

. dfuller d_YRt

Dickey-Fuller test for unit root Number of obs = 40

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-8.098	-3.648	-2.612

MacKinnon approximate p-value for Z(t) = 0.0000

. regress IPt PubInv YRt laggedIP DRC

Source	SS	df	MS	Number of obs =	42
Model	2.0305e+11	4	5.0762e+10	F(4, 37) =	55.53
Residual	3.3820e+10	37	914066923	Prob > F =	0.0000
Total	2.3687e+11	41	5.7773e+09	R-squared =	0.8572
				Adj R-squared =	0.8418
				Root MSE =	30234

	IPt	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
PubInv		-.2619617	.4076947	-0.64	0.524	-1.08803 .5641062
YRt		1.033886	.2684313	3.85	0.000	.4899928 1.57778
laggedIP		.6275608	.1332479	4.71	0.000	.3575748 .8975467
DRC		.0224165	.11421	0.20	0.845	-.208995 .253828
_cons		-17477.25	11165.02	-1.57	0.126	-40099.74 5145.235

Ramsey RESET test using powers of the fitted values of IPt

Ho: model has no omitted variables

F(3, 34) = 9.33

Prob > F = 0.0001

. dfuller laggedIP

Dickey-Fuller test for unit root Number of obs = 41

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t)	-0.283	-3.641	-2.955	-2.611
------	--------	--------	--------	--------

MacKinnon approximate p-value for Z(t) = 0.9278

. gen d_laggedIP = d.laggedIP

(1 missing value generated)

. dfuller d_laggedIP

Dickey-Fuller test for unit root Number of obs = 40

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t)	-8.672	-3.648	-2.958	-2.612
------	--------	--------	--------	--------

MacKinnon approximate p-value for Z(t) = 0.0000

. dfuller DRC

Dickey-Fuller test for unit root Number of obs = 41

----- Interpolated Dickey-Fuller -----

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value

Z(t)	-5.926	-3.641	-2.955	-2.611
------	--------	--------	--------	--------

MacKinnon approximate p-value for Z(t) = 0.0000