



**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**PRIVATE INVESTMENT, PUBLIC
INVESTMENT AND ECONOMIC
GROWTH IN ETHIOPIA**

By

MUHAMMED WORKU

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By

MUHAMMED WORKU

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School of Graduate Studies**

Private Investment, Public Investment and Economic Growth

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ABSTRACT

This thesis investigates the direction and magnitude of the linkages between private investment and public investment, as well as their relative impact on economic growth in Ethiopia. To that end, an error correction model employed on a time series data for the study period ranging from 1970/71-2004/05. The study reveals that both private and public investment has stimulated economic growth in Ethiopia. In addition to that, the impact of private investment on economic growth has been found to be more pronounced than public investment in the long run while public investment shows a more pronounced impact in the short run. With respect to the relationship between public and private investment, Public investment is found to deleteriously impacted private investment in the short run while in the long run it has insignificant impact, implying that the crowding-out impact of public investment have been large enough to offset any crowding-in effects in the short run. Moreover the study shows the significant and positive impact of output growth in stimulating private investment. The paper thus concludes that the long run impact of private investment is higher than public investment, and involvement of public capita in sectors far from being an infrastructural nature may jeopardize favorable effects of public sector infrastructural investment on private sector. The result implies that government needs to create more room for private sector participation.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In recent years, there has been an increasing discussion in policy making and academic circles on the impact of government spending on private investment as well as the respective roles of public and private investment in the growth process of developing countries [Badawi, 2002; Khan and Kumar, 1997]. One important aspect of this is the impact of government capital spending and finance decisions on private sector investment.

The demand side impacts of government capital expansion on private sector activity may take two forms - direct and indirect. The direct form is where the corporate sector subsumes government saving and spending behavior in their structural behavioral decisions on investment. It is the same as saying that government saving and spending variables may feature as exogenous variables in private sector utilities and expenditures function. In this hypothesis, an increase in government capital spending may crowd out private investment if the private sector views public capital investment as a substitute for private investment, and if the private sector conceives that the deficit created by public capital expenditure is tax financed [David and Scadding, 1974].

The relationship between the two types of investment is either complementary or substitute. Such a relation, however, should be understood by distinguishing different contents of public investment. If government expenditure is geared towards investment in required infrastructure instead of in non-infrastructure it can help relax existing constraints, reducing transaction costs for private sector thereby raising expected profitability and encouraging private investment. It can further complement private investment when it targets activities, which have strong linkages with the rest of the economy [Tunwai and Wong, 1982].

The displacement of private investment by public investment is likely to be large in economies where private consumption is fairly stable and output is supply constrained. In such situations the direct crowding out would prevail where an extra dollar of government investment would discard a dollar private investment expenditure.

Unlike direct crowding out where the negative effect on private investment is due to private sector's conception that the public sector's investment is a substitute for private investment, indirect crowding out arises from an increase in cost of finance, i.e. interest rate, following the claims of public sector on scarce financial resources. This upward pressure on interest rates due to expansion in government spending leads to a substitution of public investment for private investment. If resources are less than utilized and the economy is within its production possibility frontier, expansion in public investment may partially crowd out private investment, and the magnitude of displacement of private investment depends on the responsiveness of

investment and demand for money functions to interest rate changes. This partial long run relief to private investment is due to expansion in real output following an expansionary fiscal policy.

As it is explained above, the demand side impacts of government capital expansion takes two forms-direct and indirect. However, competition of public and private sectors is not only confined to the demand side of the economy. It extends to competition over supply of resources. In an economy operating on its production possibility frontier, the involvement of the government sector in production and distribution activities may precipitate a competition with the private sector in factor markets of labor, funds, intermediate goods and so on. Crowding out in the financial sector would be serious, given the relatively large dependence of business enterprises in developing countries on bank loans. Therefore the private sector is prone to face stringent credit supply constraints effected by banking sector, and also exclusion from resources of non banking financial institutions such as insurance and pension fund [Badawi, 2002].

Another issue worth discussing is the relative affects of public and private investment on growth process of a country. There appears to be a general consensus now that the contribution of private investment to economic growth and development is larger than public investment. This is based on the contention that the marginal productivity of the former is greater than the latter [Khan and Reinhart, 1990; Serven and Solimano, 1990], though some studies have shown the possibly larger contribution of public capital to economic growth [Ram, 1996].

1.2 Statement of the Problem

Both private and public investment has a very important role in the growth process of both developed and developing countries. As it is cited in Befekadu and Berhanu (1999/00), empirical findings have shown that 30-55% of the growth of more than 20 countries is the share of capital formation in 1970s. It is also found that 40%, 30 to 35% and 35% of the growth of Argentina and Mexico, Israel, and Greece respectively was the share of capital formation in the 1970s.

Nevertheless, some empirical studies have shown that the role of each investment types to economic growth significantly differs. It has been contended that the marginal productivity of private investment is greater than that of public investment and thus the contribution of the former to economic growth and development is larger than the latter [Beddies, 1999; Khan and Kumar, 1997; Khan 1996]. On the other hand, Ram (1996) has indicated a possibly larger contribution of public capital to economic growth.

In relation to this, looking at our economy, the growth performance of the Ethiopian economy has shown variability and in general poor performance over the past three decades. In the Imperial regime the government has largely pursued a market based economic policy and the economy during that period (1960-74) as measured by real GDP has grown on average by 4% per annum (the per capita growth being 1.5%). As opposed to this, the derg regime has attempted to establish a socialist economy in which the socialized sectors as opposed to private sectors started to attract the focus of the government policy. During this period (1974/75-1989/90) the average growth rate of real GDP has decelerated to 2.3% (the percapita growth being -0.4%). The

economic policy emphasis in the post-derg regime however shows a marked departure from the derg regime, and during this period (1991/92-2001/02) the real GDP has grown on average by 3.6% per year. This implied a 1.5 percent increase in per capita income. It is possible, here, to notice that, the performance of the Ethiopian economy has been fragile and growth uneven in the three regimes that have different emphasis on the two components of investment. Thus it is worth identifying the magnitude and contribution of each type of investment to economic growth in Ethiopia.

In addition to this, the empirical evidence is not unambiguous about the relationship between the private and public investment. While some studies indicate that public investment substitutes and hence crowds-out private capital formation [Ghali, 1998; Voss, 2002] others showed that public investment crowds-in private investment and thus contributes significantly to economic growth [Argimon et. al., 1997, Aschauer, 1989]. Thus it is worth investigating the relation between public and private investment in the Ethiopian case.

In general the paper seeks to address issues such as: how much public and private investment explains the performance of the economy in Ethiopia, which one of the two components of investment does have a markedly stronger impact on growth, and whether public investment in Ethiopia is a substitute or a complement to private investment.

1.3 Objectives of the Study

This study will attempt to identify the magnitude and direction of the relationship between private investment and public investment, as well as their respective impact on economic growth of the country. The specific objectives of the study include:

1. To assess the trends and magnitudes of private investment, public investment and economic growth in Ethiopia,
2. To analyze the relationship between public and private investment;
3. To identify the relative significance of public and private investment to economic growth; and
4. To recommend some possible policy measures based on the analysis.

1.4 Significance of the Study

A number of studies on investment especially in developing countries have been carried out. Nevertheless, empirical evidences on the relative effects of public and private investment on growth have been limited [Khan and Kumar, 1997]. Among few studies on the issue, Ethiopia's case has been analyzed in a few studies such as in a cross-country study of Khan and Kumar (1997). In this study, Ethiopia is one of the countries pooled from four developing country regions-Africa, Asia, Europe and Middle East, and Latin America. It is, therefore, impossible to isolate the specific impact of these investment components on economic growth of Ethiopia.

Moreover, analysis on the relative effects of public and private investment in Ethiopia is of interest both from a policy and academic perspective. Thus in due course, as policy is concerned, if private investment does have a markedly stronger impact on growth, it would further underscore the need to rationalize public investment, as well as provide additional support for the privatization of state-owned activities.

The study is also an important addition to the existing literature on the relative effects of public and private investment on growth as well as among themselves, which has been a source of increasing discussion in policy making and academic circles.

1.5 Organization of the Study

The remaining part of the study is organized as follows. Chapter two reviews the related theoretical and empirical literatures in the area of study. It is followed by chapter three, that is devoted to the analysis of policies and trend of both private and public investment as well as economic growth in Ethiopia. In chapter four model specification and data type and source would be discussed. The estimation process and findings are discussed in chapter five. And finally, conclusion and recommendation are given in chapter six.

CHAPTER II

LITERATURE REVIEW

2.1 Theories of Investment Behavior

The theory of investment has remained to be one of the unsettled issues in economics. Different approaches have been used to explain the investment behavior, mostly based on the experience of developed countries. Consequently, the term investment has been defined differently by different economists. Coen and Eisher (1992), for instance, defined it as follows:

Investment is capital formation-the acquisition or creation of resources to be used in production. In capitalist Economies much attention is focused on business investment in physical capital building, equipment and inventories. But investment is also undertaken by governments, non-profit institutions and households, and it includes the acquisition of human and intangible capital as well as physical capital (Coen and Eisher; 1992; 508).

In relation to investment theories, we find the works of Keynes. Keynes in his book, "General Theory" introduced the idea of an independent investment function in the economy. He argues that investment depends on the future marginal return to capital relative to the cost of invested fund, reflected by some interest rates.

Keynes further showed that investment decisions are made on uncertain basis. As a result, any rational assessment of the return on investment was bound to be highly uncertain. Thus, he argued that private investment is intrinsically volatile. As a result investment decisions are very much affected by how pessimistic or optimistic the investors feel. He called this as the “animal spirit”, which implies there may be no good basis for the expectations on which investors base their decisions. As a result, the volume of investment could well change with the expectations.

Following Keynes, the accelerator theory of investment become popular in the 1950s, and 1960s, however its first complete discussion is usually given to J. M. Clark. According to this theory, investment is a linear proportion of output changes. Generalized accelerator theory holds that changes in sales and income will cause a change in investment. Here the investment requirement for a certain desired target of output growth is computed from a given incremental capital output ratio.

The simplest version of the acceleration theory is the fixed acceleration. There are two distinguished assumptions of this version. First, we assume that the ratio between the current desired capital stock (k_t^*) and current output (Q_t) is fixed. That is

$$r = \frac{K_t^*}{Q_t} \dots\dots\dots (2.1)$$

$$K_t^* = rQ_t \dots\dots\dots (2.2)$$

The specific value of r (which is greater than one) depends on the time frame of analysis, that is the longer the time period, the lower its value.

The second assumption of it is that currently net investment, I_t , will be equal to the difference between the current desired capital stock and last period's actual capital stock (k_{t-1}), i.e.

$$I_t = K_t^* - K_{t-1} = \Delta K \dots\dots\dots (2.3)$$

Now, if net investment is always sufficient to assure that the capital stock is optimal, it follows that:

$$K_{t-1} = K_t^* = rQ_{t-1} \dots\dots\dots (2.4)$$

By substituting equation 2.4 into equation 2.3, we find:

$$I_t = rQ_t - rQ_{t-1} = r\Delta Q \dots\dots\dots (2.5)$$

As long as $r > 1$, even small changes in output will have an “accelerated” impact on net investment [Brown, 1988].

The accelerator model, however, disregards the role of profitability, expectation, and the cost of capital. It has been criticized for the assumptions of inconsistency between perfect competition and exogenous output. It overlooks that investment is a forward-looking process. The model also criticized for its static expectations about the future price, interest rate and output.

Jorgensen (1967) and Hall and Jorgensen (1971) popularized the neoclassical theory to rectify the limitations of accelerator model. It postulated that investment is a function of output and the user cost of capital, which in turn depend on the rate of physical depreciation, price of capital goods and real interest rate. An investment equation emanates from the time gap between desired capital and the actual capital

stock. The gap is the result of time lag between the decision to acquire assets and the actual delivery. Therefore, there is a close relationship between desired capital stock and firm's level of output. If firms invest without delay to keep actual level of capital stock and desired level of capital stock equal, then net investment increase as output accelerates.

James Tobin in 1969 postulated as well a dynamic theory of investment. The theory suggests that investment is a function of the ratio of the market value of the existing capital stock to its replacement cost, the q – ratio. Tobin reasoned that firms should invest when $q > 1$, and that they should disinvest if $q < 1$. For him, there would be no reason to invest if a dollar invested didn't increase the market value of the firm more than a dollar; spending a dollar to increase value less than a dollar would be senseless. In the long run equilibrium, of course, the price of capital should equal its productivity so that $q = 1$. In the short run, however, there will be lags and disequilibrium so that q may not equal one. Some economists, still, criticized the q -ratio because it is an average ratio, not marginal ratio and it is the marginal ratio that is important for investment decisions [Brown, 1988].

In general, Agenor and Montiel (1996) argued that, the assumptions underlying the Tobin's- q theories of investment are restrictive. They assume perfect capital market, perfect flow of information and little government investment and so on. It makes their application limited in developing countries, where there is macroeconomic instability, domination of imported capital goods and absence of equity market.

On the other hand, a research by Blejer and Khan (1984) argued that the problem to apply the neoclassical model lies on the analytical and data problem in developing countries. Especially, the study argued that, resource and data constraints are the main constraints facing private investors in developing countries. He further showed that, applying the neoclassical model leads to the conclusion that private investment is negatively related to real output per capital, as is common in developed countries.

2.2 Macroeconomic Factors and Private Investment

From the theoretical as well as empirical point of view a number of macroeconomic variables influence private investment. These factors include: the real per capita growth rate, per capital real income level, the credit policy, interest rate, changes in exchange rate policy (devaluation), monetary policy, inflation rate, the size of debt burdens (as measured by debt service ratios and magnitude of external debt), the rate of public sector investment, and uncertainty.

It has been hypothesized that private investment is positively related to the growth of real output. Some empirical studies also confirmed that the rate of growth of real GDP per capita should be positively related to the private investment rate [Blejer and Khan, 1984; Oshikoya, 1994]. Income per capita is hypothesized to affect private investment positively. The positive correlation is due to the ability of high-income countries to devote much more income to saving, so that to investment.

Availability of finance is another factor for private investment. There is a problem of adequate finance for investment projects, especially, in developing countries. To insure equity in distribution, rationing becomes the equilibrium feature of the credit

markets. In these countries capital markets are segmented and there are regulatory rules for credit allocation. Low administered interest rates are offered to some firms and other borrowers are relegated to informal credit markets where they may obtain credit but at a much higher interest rates, that negatively affects private investment [Akpalu, 1997].

The application of neoclassical model leads to the conclusion that the real interest rate as a measure of the user cost of capital should be related negatively to the rate of private investment. In relation to this Mishkin pointed out that:

Business firms make investment in physical capital (machines, factories and raw materials) as long as they expect to earn more from the physical capital than the interest cost of a loan to finance the investment. When the interest rate is high, few investment in physical capital will earn more than the cost of borrowed funds so planned investment spending is low [Mishkin, 1992: 572]

On the other hand, some argue that the cost of money to investors is less important than any other cost such as the cost of labour or capital equipment. Moreover, these studies suggest that because of repressed financial markets in developing countries, it is credit policy, not interest rates that directly affect the level of investment. Thus, the study concludes that empirical studies do not support the negative relationship between investment and real interest rates in developing countries [Husain, 1993].

The net effect of devaluation on the private investment is a composite of several factors. Therefore, their relation is theoretically indeterminate. Chhibber and Shafik

explained the different channels through which devaluation affects investment as follows:

Devaluation affects investment through several channels. Firstly, devaluation alters the real supply price of capital goods. Secondly it affects the real price of imported inputs, which are used in conjunction with capital goods to produce output. Thirdly, devaluation produces changes in real income which affects the demand for domestically produced goods. Finally, devaluation affects nominal and real interest rates which in turn have an impact on investment [Chhibber and Shafik, 1990:1]

The short and long run effects of devaluation on private investment can also go in opposite directions. Because of increases in real cost of imported capital and inputs, in the short run the effects of devaluation on private investment are negative. But as the economy responds to its competitiveness with higher exports, the long run effects on investment can be significantly favourable.

Another mechanism that affects private investment is monetary policy. Monetary policy affects investment in different ways. Restrictive monetary policy, for instance, adversely affect investment one by raising the real cost of bank credits and second it increases the opportunity cost of investment. Both mechanisms negatively affect private investment by raising the cost of capital [Serven and Solimano, 1992].

High domestic inflation rate, a signal of macroeconomic instability will have an adverse effect on private investment. Macroeconomic stability such as low and

predictable inflation is a necessary condition for private investment responds to economic incentives. Higher domestic inflation rate enhances the riskiness of longer-term investment projects. It reduces the average maturity of commercial loans and distorts the information conveyed by prices in the economy. In addition to the high inflation rate, the country's inability to control macroeconomic policy contributes to an adverse investment climate.

It is argued that large external debt burden, which is usually proxied by the ratio of external debt to GDP or debt service ratio, adversely affect private investment activity in different ways. One way is by reducing the fund available for investment due to high debt service payments. It may make imports of capital goods difficult. Moreover, the existence of a large debt overhang in the form of high ratio of external debt to GDP can reduce the incentives for investment. This is because much of the forthcoming returns from investment must be used to repay the existing debt, therefore, acting as a tax on domestic investment [Greene and Villanueva, 1991].

At the theoretical level the effect of public sector investment on private investment is ambiguous. On the one hand, public investment activity may be complementary to and thus support private investment, particularly where public investment involves useful infrastructure. It includes schools, transportation system, communication facilities, water and sewage systems and the like. Projects in these areas tend to raise the expected rate of return on private investment.

On the other hand, Public sectors investment may detract from private investment activity to the extent that it substitutes or "crowd out" private investment. This may

occur when the investment involves parastatal enterprises producing goods that compete with the private sector, or when heavy spending for public capital projects leads to high interest rates, severe credit rationing [IBID].

Recently, literatures have emphasized on the impact of uncertainty on private investment decisions. Changes in uncertainty usually associated with unpredictability, instability of the incentive structure as well as lack of sustainability and imperfect credibility of macro economic policy reforms. Thus, Private investors will be reluctant to commit large expenditures on fixed investment when they are uncertain about the fixed investment when they are uncertain about the future political, social and economical environment [IBID].

2.3 Empirical Studies on the Relationship between Public and Private Investment

In principle, there is a consensus that expansion or contraction in public investment would affect private investment. Nevertheless, the empirical evidences on the direction of such an effect have been subject to controversy. On the one hand, it is argued that by undertaking lumpy and risky investment, the public sector complements private investment by way of creating necessary infrastructure and relaxing existing constraints: It reduces transaction costs, and increases per unit return of private investment (Aschaur, 1989; Greene and Villanueva, 1991). It is apparent that an important factor in determining the overall impact of government expenditure is its structure; the more it targets investment in infrastructure and in activities complementary to private investment, the stronger the crowding-in effect is

likely to be (Aschauer, 1989). It can further crowd in private investment when it targets activities which have strong linkages with the rest of the economy (Tun Wai and Wong, 1982).

✎ Empirical research on this topic was stimulated by Aschauer (1989) who suggested that public capital has a powerful impact on the productivity of private capital. Using a vector error-correction approach, Belloc and Vertora (2004) find a complementarity relationship between public and private investment and positive effect of investment on output in 6 out of 7 highly indebted poor countries (HIPC). In a study of eight Latin American countries during the period 1980-95, Ramirez (2000) also finds that public investment has a positive (albeit lagged) effect on private capital formation, suggesting a “crowding in” effect. Demetriades and Mamuneas (2000) find that public infrastructure capital has a significant positive effect on the demand for private inputs and the supply of output in a sample of 12 industrialized countries.

On the other hand, public investment can crowd out private investment both directly and indirectly. Direct crowding out takes place when public investment competes in activities within the scope of private investment and/or places claims on scarce financial resources. The latter is especially relevant when public investment is favoured in allocating credit in repressed financial markets. Indirect crowding out occurs when excessive public expenditure leads to rising interest rates and increased inflationary pressures due to pressure on resources and/or inflationary finance (Friedman, 1978).

Expected higher taxes to finance public expenditure and loss of confidence in public policy may act as additional factors to discourage investment. The impact of uncertainty leading to a more volatile environment and to possible distortions in the information content of relative prices. Furthermore, financial constraints become even tighter under inflation, especially for long-term investment, as the average maturity of commercial lending is likely to be reduced (Greene and Villaveva, 1991). We can also find empirical studies that show the crowding out effect of public investment (Chhibber and Van Wijnbergen, 1988; Ghali, 1989; Voss, 2002; Badawi, 2002).

Some studies also come up with different results. For instance, Erenburg and Wohar (1995) identified the existence of feedback effects between public and private investment. The study by Pradhan, Ratha, and Sarma (1990) in the case of India, found that public investment crowds out private investment. Nevertheless, the study shows that in terms of its effect on total investment, and growth and distribution of income, the economy of India is found to be better off with increased public investment.

Martinez-Lopez (2004) has studied the issue for the case of Spanish regions for the period 1965-1997 using panel data methodology. The result shows a positive effect of productive and social public investment on private investment. It has also analyzed the spillovers effects of productive investment located in the other regions on the private investment of individual region. And, it is found out that productive investment in the other region does not seem to encourage private investment in the individual region. Ahmed and Miller (2000), using a sample of 39 industrial and developing countries for the period 1975-84, find that expenditure on social security and welfare

reduces private investment, through the crowding out effects allude to earlier in both groups of countries, where as expenditure on transport and communication raises aggregate investment in developing countries.

✧ Among the few studies done on Ethiopian case, a research paper by Shebeshi (1994) on the determinants of private investment in Ethiopia shows that lack of public investment in infrastructure is one constraining factor. He has shown that low and poor infrastructural supply retards private investment in the Ethiopian economy. The concentration of new investments on Addis Ababa, among other things, is basically attributable to infrastructure supply and demand. On the other hand, government investment in directly productive activities discourages it because of crowding out effect.

✧ Another empirical study on Ethiopia by Workie (1997) attempts to identify the macroeconomic determinants of private investment in Ethiopia. The econometric analysis, for the study period 1975 to 1994, shows that private investment is determined in Ethiopia by the availability of finance, the real exchange rate policy and external debt. On the other hand, the study confirms that the real interest rate, growth of per capita GDP, public investment and changes in terms of trade did not significantly affect private investment during the period of the study.

2.4 The Role of Investment in Economic Growth

One of the indisputable stylized facts of economic development has been the wide disparity in economic performance across countries of the world. Over the past 40 years, economic performance of a small number of countries has been remarkable,

with per capita GDP increasing five fold if not more. At the same time, a number of countries have experienced a startling decline in per capita GDP (Bouton and Sumlinski, 2000).

Economists have been trying to explain the sources of economic growth since the days of Adam Smith. According to Adam Smith, capital is the major source of the number of useful and productive laborers who can be set to work. Labor is put into motion by capital accumulation and provides workers with better equipment and makes possible a more extensive division of labor. Therefore, capital accumulation serves to increase total output per worker so that the economy's rate of progress (Meier, 1995).

- ◀ Investment is considered as one of the principal and important factors in economic development of a nation. Investment brings about fuller utilization of available resources. As a result, it leads to increase in the size of national output, income and equipment. Thus it can solve the problems of inflation, balance of payments, and makes the country free from the burdens of foreign debts.

According to Nurkse the vicious circle of poverty in developing countries can be broken through capital formation or investment. Due to low levels of income in such countries, demand, production and investment are deficient. This results in the deficiency of capital goods, which can be removed by capital formation. Thus, the supplies of machines increase, the scale of production expands and creates social and economic overheads (Jhingan, 1988).

However, until the works of Harrod (1939) and Domar (1947) understanding of economic growth was not formalized. At the heart of their view of economic growth, there is the very intuitive notion that the steady accumulation of physical capital through saving and investment translates directly into higher levels of production. Under this framework, the higher the economy is able to save and invest as a percentage of GDP, the greater output would the economy be able to produce. Here the capital output ratio is assumed fixed, thus the rate of growth of capital stock that is investment, is the crucial determinant of the rate of output growth [IBID]. ✓

✓ As stressed by the classical and neoclassical economists and by the works of Keynes, investment in capital equipment not only increases production but also employment opportunities. Eisher argued that:

The major importance of investment is two fold. First, output in the future depends upon the maintenance of existing means of production.... Second, the maintenance of "full employment" or, in general, the full utilization of existing resources, requires that aggregate investment plus aggregate consumption equal the total output that would be produced if all individuals who wished to work could find employment (Eisher, 1972; 185).

Solow's work in 1956 introduced a different perspective on the role of investment to economic growth. The production function he postulated had a long tradition in economics. Output is produced by combining capital and labor under constant returns to scale. According to this model positive level of investment is needed to

replace capital as it depreciates and to maintain the size of capital stock constant relative to labor forces. Countries with higher levels of capital investment and therefore higher levels of capital per worker will have higher levels of per capita output. A conclusion from this model is that countries are rich because they have a lot of capital (Bouton and Sumlinski, 2000).

Similarly, other empirical studies (Henandez-Cata, 2000; Ghura and Hadjimichael, 1996) conducted in Africa, Asia and Latin America have established beyond a doubt, the critical linkage between investment and the rate of growth. Throughout the 1990s, the ratio of total Gross Domestic Investment (GDI) to Gross Domestic Product (GDP) in Asia, which experienced a high average rate of growth compared with the rest of the world, was about 27 percent, while in Latin America and sub-Saharan Africa the corresponding ratios were 20 percent and 17 percent, respectively (Seruvatu and Jayaraman, 2001).

In a growth accounting exercise that looked at the experiences of 88 developed and developing countries for the period 1960-94, Abdulhaq Senhadji (1999) examines the sources of cross-country differences in the levels as well as the growth rates of total factor productivity. Out of the six regions (sub-Saharan Africa, East Asia, South Asia, Middle East and North Africa, Latin America, and industrial countries), he found that the sub-Saharan Africa had the lowest annual Total Factor Productivity (TFP) growth rates. The region's low output growth, 2.83% for sub-Saharan Africa versus 3.8% for the whole sample, is a result of lower physical and human capital accumulation and lower TFP growth. Dividing the period 1960-94 in to three sub periods (1960-73, 1974-86, and 1987-94), Senhadji asserts that output growth in Sub-Saharan Africa

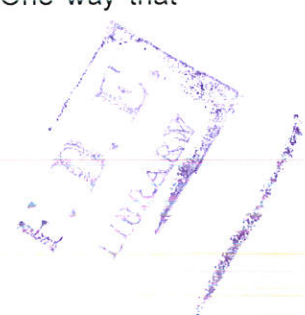
declined steadily over the three periods as a result of the lower TFP and lower investment growth.

In his paper entitled "Growth and Poverty in Ethiopia in the 1990s" Dercon (2000) identified limited entrepreneurial activity as one of the key challenges to achieve growth and poverty reduction in Ethiopia. According to the paper urban Ethiopia is characterized by remarkably small informal economy based on self-employment and remarkably high unemployment rate especially among skilled young people. He noted that despite the much improved business environment, not many are willing to consider self employment.

Alemayehu and Befekadu (2002) has explored the long run growth determinants by using Hoffer's augmented Solow model that uses coefficients derived from a cross-country regression based on data from 85 developing countries. They use the mean growth performance of 85 countries as a benchmark to compute how much Ethiopia's growth deviates from the mean growth of the countries in the sample. They found that most important explanatory variables of Ethiopia's slower than expected growth rate are initial income level, investment rate, openness to trade, and the structure of transformation.

2.5 Public Investment and Economic Growth

✈ Macroeconomists have long felt that the stock of public capital is an important factor input in the production of total output. Thus the role of public investment in the growth process has received much attention in the recent years. In general, there are several channels through which public investment can affect growth. One way that



public investment (especially infrastructural investment) affects growth is through increase in private capital formation and thus the overall rate of accumulation of physical capital. On the other hand, public investment may also displace private capital formation, and therefore reduce the economy's capacity to sustain a higher level of output [Agenor et. al., 2004].

The other way that public investment may affect output growth is by influencing the rate of productivity growth, independently of its effects on factor accumulation. Physical capital may enhance the productivity of (skilled) human capital, if there is, a high degree of complementarity between these factors. Similarly, if there is sufficient complementarity between the services produced by public capital, in infrastructure and private physical capital, an increase in public investment outlays would not only lead to higher private investment but would also make the existing stock of private capital more productive.

The empirical evidences on the link between public investment and economic growth have grown significantly in the past few years. Some of them consider public investment by disaggregating while others consider as a whole. For instance, Milbourne, Otto and Voss (2003) using an extended version of the Solow-Swan Neoclassical model, find evidence of a positive conditional correlation between public investment and economic growth in a sample of 74 industrial and developing countries. Aschauer and Lachler (1998) using cross-country growth regressions for a group of 46 developing countries, find that public capital contributes significantly to productivity growth, as long as it is financed by lower current government spending- as opposed to a higher level of public debt, which may signal higher current and

future taxation, or a future increase in the cost of borrowing.^{*} Bose, Haque and Osborn (2003), using panel data for 30 developing countries and an econometric methodology that explicitly accounts for the government budget constraints and possible biases arising from omitted variables, find that the share of government capital expenditure in GDP is positively and significantly related to income growth per capita, whereas current expenditure is insignificant.

Badawi (2002) has also found that public capital spending have stimulated economic growth in Sudan over the period 1970-98. Nevertheless, he has noted that the crowding out effect has weakened the favourable positive effect that public sector's investment has exerted on growth by jeopardising private sector capital undertakings.

A time series analysis in the case of Mexico suggests that the economy's total factor productivity growth responds positively to increase in the ratio of public to private investment. In light of this result, increases in public investment should have a positive net impact on economic growth, despite significant crowding out effects. The study has also suggested that the only way to assure that the public investment program makes a significant contribution to growth is by improving its "quality" through careful attention to its rate of return and complementarity with private investment [Aschauer and Lachler, 1998].

Khan and Kumar (1997)¹ using a sample of 95 developing countries found out that during the 1970s public investment had a statistically insignificant impact in both Asia and Latin America, but a significant one in Africa, Europe and Middle East group of

¹ Their model considers a data for the period 1970-90. They have grouped these sampled countries into four: Africa, Asia, Europe and Middle East, and Latin America.

developing countries where the size of the coefficient exceeded that on private investment. During the 1980's, for both Africa, the Europe and Middle East groups, the size and significance of the coefficients of public investment declines, while for the other two regions(Asia and Latin America) there is no noticeable change. The study has in general shows that the impact of public investment in the low-income group was noticeably greater than in the high-income group.

Some studies have disaggregated public investment. For instance, Agnor et. al. (2004) have studied public investment disaggregating into education, infrastructure and health². In their study, they have experimented on the impact of a change in the composition of government spending in Ethiopia. They have tested the impact of a 7 percent reduction in consumption expenditure, coupled with an offsetting increase in public investment, and accompanied by a reallocation of outlays involving an increase in investment in infrastructure that is twice as high as the increase in health and education. The result of the experiment shows that to the extent that changes in public consumption and investment tend to offset each other in the initial period, and the net effect on output growth is negligible. However, in the intermediate run, because supply-side effects develop only gradually, the reduction in aggregate demand tends to dominate and to exert a downward effect on output. Overtime, as the supply side benefits associated with higher public investment start kicking in, output begins to grow, increasing in the long run by about 0.2 percentage points. The rate of growth of real private disposable income follows a similar pattern over time and increases by 0.18 percent in the long run.

² The macroeconomic framework developed by the authors captures linkages between aid, public investment, growth and poverty. The model has been applied to Ethiopia.

Alemayehu and Befekadu (2002) have also applied the Ndulu and O'Connell (2000) conditional mode to the Ethiopian data. The break of the policy contributions of exchange rate and government spending were the culprits in the Derg regime, while public spending is the sole problem in the imperial and post-Derg periods. Moreover, unproductive public spending, where defence spending constitute more than half the budget, was a major problem. They also found that, other policy failures such as running inefficient public enterprises, bias against the private sector, low diffusion of farm technology, the closed nature of the economy as well as low capacity utilization in industries (below 50% in most cases) owing to the import compression problem found to explain the negative contribution of policy during the Derg period. Though the impact has declined, public spending remains to be a major problem in evaluation of the contribution of policies to the relatively slow economy growth.

2.6 Empirical Studies on the Relative Effect of Public and Private Investment on Economic Growth

The article of Khan and Reinhart (1990), published on Journal of World Development, have analyzed the impact of the two components of investment by formulating a simple growth model that separates the effects of public and private sector investment. The model has been estimated for a cross-section sample of 24 developing countries. Their finding indicates that private investment has a larger effect on growth than does public investment.

Similarly, Khan and Kumar (1997) have examined the relative contribution of public and private investment to per capital GDP growth in developing countries using the basic neoclassical model of growth. They estimate the model for a sample of 95 developing countries over the period 1970-90 using both cross sectional and panel data. Their study has grouped the sampled 95 developing countries into four regions: Africa, Asia, Europe and Middle East, and Latin America. The results suggest that, once other determinants of growth are taken into account, both types of investment has a positive impact in the estimates for the full period 1970-90, with private investment having a much stronger impact than the public one.

However, the magnitudes for the two subperiods-1970s and 1980s- diverge markedly. During the 1970s, both public and private investment had a similar effect and it was only during the 1980s the greater impact of private sector investment emerged. According to the study, one explanation for this difference could be that in the earlier period the stock of infrastructure capital was lower in most developing countries and thus the returns from such investment was higher than the last decade.

There are also significant variations among income group and regions on the effects of the two components of investment on growth. For Africa, and to some extent for Europe and the Middle East, both types of investment exercise a similar impact, while in Latin America public investment appears to have had, on average, very limited impact and private investment a pronounced positive effect. It has also indicated the evidence of higher rates of return to public investment in low-income countries than in high-income countries.

Beddies (1999) has also examined the relations between investment, capital accumulation and growth in the case of Gambia for the period 1964-98. The result indicates that the Gambia's aggregate production function exhibit increasing returns to scale, thus supporting the endogenous growth-type model. Furthermore, the impact of private and thus private capital accumulation on output is large and significant. In addition to this, it is found that increases in public investment boost output substantially.

Another empirical study undertaken on specific country is the one done by Badawi (2002) on Sudan for the period 1970-98. The model has applied a co-integrated vector Autoregressive model and find out that both private and public capital spending have stimulated economic growth for the study period. Moreover, it indicates that the impact of private investment on real growth is more pronounced than that of public sector investment. On the other hand, some empirical studies such as the study by Ram (1996) have indicated the larger contribution of public capital to economic growth.

CHAPTER THREE

POLICY ENVIROMENT AND PERFORMANCE OF PRIVATE INVESTMENT, PUBLIC INVESTMENT AND ECONOMIC GROWTH IN ETHIOPIA

This chapter highlights the trend, and performance of private investment, public investment and economic growth in Ethiopia as well as the various policies and strategies adopted and implemented. Towards this end, different government documents and policy studies are used as reference.

3.1 Policy Environment and Growth Performance in Ethiopia

The growth performance can be seen along three distinctive periods, which are categorized on the basis of ruling regimes. The period until the 1973/74 is in the imperial, 1974/75 to 1990/91 in the 'Derg' and 1991/92 to 2004/05 in the Ethiopian Peoples Revolutionary Democratic Front (EPRDF). The average annual economic growths in these regimes have greatly varied.

The imperial regime has largely pursued a market based economic policy. In the last years of the regime [over the period 1970/71-1973/74] the real GDP was seen to be growing on average by 2.8% per annum.

After the 1973/74 revolution, the country followed a socialist path, and radical changes were introduced into the economy including the widespread nationalization. The economy stagnated and growth declined from the pre-revolutionary decades. Particularly, during 1974/75 to 1977/78, the growth of the economy in terms of real GDP was about 1.3% only. This was partly due to the war with Somalia. This was then followed by a period of recovery 1978/79 to 1982/83, where real GDP grew at a rate of 4.0% on average. The campaign which tried to mobilize resources to increase production contributed to the recovery. This trend was reversed in the years 1983/84 and 1984/85 because of the drought and famine that hit the country and the economy registered 2.9 and 11.5 growth rates below zero respectively in real GDP. These were periods of Sevier drought.

In order to reverse the trend, the government formulated a ten-year perspective plan for 1984/85 to 1993/94. It was aimed at tackling the structural problems of the country (i.e., to industrialize the country that policy makers believed were the major reasons for poor growth performance in the country. The target of the plan was to increase the investment level over the period at average annual rate of 16.8 percent and gross domestic saving at a very high annual rate of 23.9 percent. It also envisaged a tremendous effort to increase export earnings so as to meet the rising import requirement.

At the end of planning period, the share of agriculture in GDP is expected to decline from 48.3% at the beginning of the planning period to 39.1%; increase the share of industry from 16% to 23% and achieve a real GDP growth of 6.9% per annum during the target period.

However, much of the targets were not realized. Economic growth remained about 3% on average. Sectoral share remained more or less same. Following timely rain, the economy registered a growth of 10.3 and 14.1 percent in real GDP in 1985/86 and 1986/87 respectively. But, due to the increased civil unrest and the drought that hit the northern part of the country in 1987/88 all economic indicators deteriorated.

In 1991, after the EPRDF took over the power, New Economic Policy (NEP) issued. The policy in this period, witnessed a marked departure from the socialist system of private sector repressive command economy of the derg regime. The NEP has been operational through an Economic Reform Program (ERP) with structural adjustment facility loan from the IMF, structural adjustment loan from the World Bank, and debt relief and loans from members of the Paris club and other donors.

Since the government first embarked on the Economic Reform Program in 1992/93, four policy framework papers have been issued and implemented. These are the policy framework papers [PFP]: 1992/93-94/95, 1993/94-95/96, 1994/95-96/97 and

1996/97-98/99. The reform program, as cited in the first PFP has been envisaged to be in three overlapping phases. The first focusing primarily on economic stabilization through tightening the fiscal policy, strengthening monetary control, and adjusting the exchange rate; the second on structural reform aiming at generating a supply response; and the third phase strengthening the initial structural reform measures by subsequent structural measures focusing primarily on the financial sector, public enterprises and civil service reform.

The government has also endorsed a long-term development strategy-Agricultural Development Led Industrialization (ADLI), which takes the agricultural sector as the basis for the development of other sectors. This argued to be due to the existing size of the agricultural sector both in terms of its contribution to GDP and export, and the proportion of the population engaged in agricultural activities.

Unlike some countries that take economic growth as the primary policy goal, Ethiopian government's core objective is poverty reduction. Here economic growth is taken as the principal but not the only means to this objective [SDPRP, 2002]. Thus ADLI is just expected to do so.

Ethiopia is endowed with a large number of working age population, and a sizable arable land, though it is scarce in some parts of the country. However, the economy is in acute shortage of capital. Thus ADLI is a strategy that uses labor intensively and land extensively [Rahel, 2003].

For the poverty reduction strategy program period, between 1999/00 and 2004/05, the government envisages a real GDP growth rate of at least 7% on average and aims to reduce the poverty head count ratio by 10%, from 44% to 40%. While overall economic growth is projected at 7% [IBID].

As it is shown in Table 3.1, the economy during this period (1990/91-2004/05) has shown growth, where real GDP and per capita GDP on average grew at 5.6% per annum. This figure would have risen to 10.2% if we exclude the abnormal years 1991/92, 1997/98, 2001/02 and 2002/03. However, looking on a year-to year basis growth was uneven for it is heavily dependant both on vagaries of nature and external shocks including the war with Eritrea.

To materialize the targets, the government has identified four priority areas in formulating its growth strategy. These are agricultural sector and rural development strategy; capacity building in public and private sector; creation of a conducive environment for private investment and capital inflow; and the prevalence of sound and competitive financial sector.

In relation to creating conducive environment for private investment and capital inflow, the main measures taken or to be taken by the government includes: making the existing policies work better by removing regulatory impediments and improving implementation capacities of government. The other measures are encouraging public-private sector partnership through establishment of platforms of dialogue;

making the business environment and the incentive structure attractive for manufacturing in particular; promote exports through production of high value agricultural products and increased support to export oriented manufacturing sectors [Rahel, 2003].

Table 3.1 Average Economic Performance

Periods	Growth rate of RGDP	Private Investment as % of RGDP	Public Investment as % of RGDP	Gross Investment as % of RGDP
1970/71-1973/74	2.8	12.2	2.3	14.5
1974/75-1977/78	1.3	7.8	3.4	11.2
1978/79-1982/83	4.0	7.2	5.5	12.7
1987/88-1990/91	0.1	5.7	8.8	14.4
1974/75-1990/91	2.0	6.7	6.6	13.3
1992/93-1996/97	7.7	7.0	8.9	15.9
1998/99-2000/01	7.7	9.0	7.9	16.9
1991/92-2004/05	5.6	8.2	9.0	17.2

Sources: *Author's Computation Based on Annual Publications of MoFED and NBE*

3.2 Policy Environment and Performance of Private and Public Investment in Ethiopia

Investment in Ethiopia especially private sector development has been witnessing different experiences in the three regimes. The review of the policy environment and the performance of private and public investment presented below:

3.2.1 The Imperial Era

Immediately after the end of Italian occupation, the imperial government was occupied in setting the foundation for modern Ethiopia. In essence, the private and public sector work hand in hand to achieve the common objective economic growth. The role of the government, therefore, was to provide means for development of procedures, which will enable the country to achieve a high level of economic performance.

The imperial government of Ethiopia devoted the first decade of the post 1942 years to reconstruction. A new administration was established and the laying of the foundations for basic infrastructural development started. By the late 1950s a system of public administration, a network of roads and the Ethiopia Air Lines as well as the beginnings of banks and the generation of electric power were set in motion, providing a conducive environment for the start of planned development. It is based on this background, that, the government of Ethiopia introduced legislations to encourage investment growth. During this period, the government was also taking steps to encourage private sector development, and hence notices, decrees, and proclamation were enacted several times. The first such legislation was issued in

1950 as a notice [Notice No. 10, 1950]. It has focused on encouraging the absorption of private foreign capital.

Following this, new investment proclamation was issued in 1954 with some improvements over the notice. The proclamation was significantly different in conceptual framework and area of coverage. It was extended to cover both agricultural and industrial investment by domestic and foreign investors.

The above notice and legislations to encourage private sector development were consolidated in 1963 as the investment decree and ultimately issued as a proclamation in 1966 [IGE, proclamation No. 242/1966]. The important feature of this last proclamation of the Imperial era is that no provision is made to reserve certain factors for the state, implying that private investors could invest in all sectors of the economy. In addition to that, it provides an attractive incentive structure including import and export tax exemptions, income tax holidays, and foreign investors were also allowed to acquire land.

Hence, with the issuance of the decrees and the proclamation (1966), the rate of private investment has increased. In the early 1970s [1970/71-1973/74] the private sector investment averaged 12.2% of real GDP while public investment averaged 2.3% of real GDP in the same period. As the figure indicates, the private sector was expected to play a leading role until the policy was reversed by the Derg regime.

3.2.2 Derg Era

Up on assuming power in 1974, the Derg declared the National Democratic Revolution (NDR) in which it stated that the country peruses socialist principles both for economic and social development. The Derg policy of nationalization started by proclamation No.26/1975 (the nationalization proclamation). According to this proclamation, the military government nationalized a large number of domestic and foreign production, distribution and service rendering private enterprises. Consequently, the government took over ownership and operation of over 100 private manufacturing enterprises, such act of nationalization significantly decreased participation of the private capital and specifically the foreign investor to foster the economic development of the country.

In the same line, successive proclamations were issued. All these served to mandate government involvement in the economy and to achieve control of all productive sectors. Moreover, successive proclamations were issued to mandate government involvement in the economy. It includes the proclamation No. 31/1975 that declares public ownership of rural land, and public ownership of private school (proclamation No. 54/1975). Moreover, private investors were limited to a few lines of activities and imposed capital ceilings on them. Only individual businesses were allowed, and for those organized private businesses, membership was restricted to five persons [Proclamation No. 76/1975].

After making stagger movement with in the rim of socialism, the government issued a proclamation to provide for the establishment of joint venture (proclamation No. 235/1983). According to this proclamation, the government invited foreign investors

to participate in joint venture with state capital with the intention of introducing technology and know how. Here the government holds at least 51% of the share. At this time, only six joint ventures were established over the years between 1983 and 1988. Latter in 1989, Special decree No. 11 permitted domestic private capital participation on the duration of joint venture agreement and the provision for majority share holding by the government.

The restrictive policy of the Derg results in a very low rate of private sector development. The average rate of private investment to real GDP during the period 1974/75-1990/91 was 6.7%. This ratio is very low even by the standards of sub-Saharan Africa countries where the average rate of private investment to GDP was 8.0% for the period 1975-89 [IFC, 1993]. The figure is much below the average in the early 1970s of the imperial era.

During the last days of the regime, the Derg administration pursues the mixed economy development approach. Proclamation No. 17/1990 was passed that removed most restrictions imposed on domestic private business and foreign investment in previous legislations. The proclamation gives various privileges and incentives to both foreign and domestic investors. They were exempted from income tax and custom duty and land was given on leased basis for those investors conducting agricultural activities. In general, the investment policy of the Derg period was characterized by restrictions on private investment and was biased towards the development of the public sector.

3.2.3 Post-Derg Era

Unlike the last regime, presently the government has recognized the need for increased participation of the private sector. The economic policy of the government indicates that investment by the state will be restricted to activities that have strategic roles in economic development or in areas where the private sector could not adequately cover investment needs.

Accordingly, the Transitional Government Economic policy encourages private capital participation. To rehabilitate and revitalize economic performance the proclamation that encourage private sector development was issued [proclamation No 15/1992]. It envisaged the speeding up of the economic and social development of the country through increasing supply of goods and services, promoting domestic investment, particularly in the production sector in order to insure linkages and suitable development, and there by promoting the benefits of both the country and the investor.

The proclamation encouraged the private sector to invest in most sectors except some areas, which are exclusively reserved for the government. It reserved areas like defense industries, large-scale production and supply of electrical energy, postal and telecommunication services, large-scale air, and marine transport service and import of petroleum and armaments for the government.

Moreover, areas like large-scale engineering and metallic industries, capital intensive and technology intensive investment in large scale mining and energy production, large scale pharmaceutical and fertilizer plant and industries which supply strategic

raw materials of chemical industries were allowed for investment by the government on its own or in partnership with private investors. The proclamation put no limitation on the capital ceiling. However, in order to issue investment certificate for the foreign investors the capital should not be less than US Dollar \$500,000 and 25% should be deposited in cash. For domestic investors capital should not be less than Birr 250,000. Moreover, foreign nationals could be treated as a domestic investors with all the privileges and rights attached if he or she resides permanently in Ethiopia and obtains a permanent residence permit.

In order to encourage private investment and to promote the inflow of foreign capital and technology in to Ethiopia, the following incentives are granted to both domestic and foreign investors:

- 100% exemption from the payment of import customs duties and other taxes levied on imports granted all investment capital goods.
- Exemption from payment of export customs duties for Ethiopia products (except coffee) and services.
- Exemption of any income tax derived from an approved new investment for a periods ranging from 1 to 4 years depending on the priority area of investment activity and the location in which it is undertaken.
- Business enterprises that suffer losses during the tax holiday period can carry forward such losses following the expiry of the exemption period.
- Capital repatriation and remittance of dividends and interest is guaranteed to foreign investors.
- Guarantees against measures of expropriation and nationalization

- Ethiopia has also become the member of the Multilateral Investment Guarantee Agency (MIGA) so as to encourage the inflow of foreign investment [EIA, 1992;28]

Moreover, the investment office of Ethiopia has been established to provide one-stop services to foreign investors. Regional investment offices have also been set up and began operations to provide one-window services to domestic investors in their respective regions.

In order to measure the effect of the above policy, we need to see the performance of investment since the promulgation of proclamation No. 15/1992. Starting from this time till the next proclamation in 1996 [1991/92-1995/96] the private investment averaged 6.9% of real GDP. Particularly, in 1992/93 it has reached 7.9% of real GDP. In the same period the public investment averaged 8.8% of real GDP.

The performance until 1996 is quite encouraging. But compared to the country's requirement, it is still very low. Therefore, in June 1996, the newly revised proclamation No. 37/1996 has just been put in to practice by improving some of the short comings of proclamation No.15/1992. The new proclamation differs from the previous one in a number of aspects. Under this proclamation incentives are guaranteed to domestic investors with an investment capital of less than Birr 250,000 channeled to sectors of priority. For a foreign investor who reinvests profits or dividends drawn from an existing investment, the proclamation lowered the capital requirements to USD 100,000 or its equivalent. It also extended duty free exemptions to services such as hotel, tourism, health and educational services.

So as to enable the private sector regain its key status in the economy, the need to open up yet more sectors to private investors were crucial. Hence, a bold policy initiative has been taken to further amend the previous proclamation to ensure the participation of private investors in key strategic sectors such as telecommunication, energy and defense industries. Unlike the previous proclamations, the newly promulgated investment code No. 116/1998 fully opened hydropower generation for private investors [EIA, 2000].

In addition to this, recently two proclamations [proclamation No 280/2002 and its reenactment proclamation No. 373/2003] are legislated. The proclamation provides more areas for private sector participation and to enhance transparency and efficiency of service provision. The proclamation preserves investment on air transport service with more than 20 passenger seats for government. After the issuance of the revised investment proclamation in 1996 and subsequent amendments, the private sector participation has increased. Accordingly, in the period 1996/97-2004/05 the private investment averaged 9.1% of real GDP.

As the above discussion indicates private investment as a ratio GDP has increased in relation to policy environment. Nevertheless, as the Ethiopian Investment Commission data shows, between 1992 and 2003, even though significant number of private investors took license from the commission, only 20.8% of the projects with a total capital of 21% have started operation [EIC, 2004]. This figure indicates the low level of implementation by private sector.



CHAPTER FOUR

MODEL SPECIFICATION, DATA DESCRIPTION AND METHODOLOGY

The empirical framework of this study consists of two models that are discussed here. The first model tests the complementarity or substitutability of private and public investment in Ethiopia; and the second model tests the contribution of private as well as public investment to economic growth of Ethiopia. Moreover, description of data and the methodology used are discussed in this chapter.

4.1 Specification of Model for the Private and Public Investment

Relation in Ethiopia

The study intends to use the flexible accelerator model, in the tradition of the works of Solimano (1990), and Chhibber and Shafie (1990), but will be modified to accommodate the situation of Ethiopian economy. In modeling the accelerator mechanism, there are two approaches: one is to take account of lagged effects. This is the basic idea behind the flexible accelerator model. Alternatively, we can also use the partial adjustment model [Geda and Ndung'u, 2001]. One way to apply the partial adjustment model here is by assuming that the desired capital stock (K_t^*) is proportional to expected output (Q_t^e) as follows.

$$K_t^* = aQ_t^e \dots\dots\dots 4.1$$

Where a = Capital output ratio

180 P
Date

In deriving an investment function from the above equation “a” is kept constant. The desired investment (I_t^*) can be expressed as:

$$\begin{aligned}
 I_t^* &= K_t^* - K_{t-1} + \delta K_{t-1} \\
 I_t^* &= K_t^* - (1 - \delta) K_{t-1} \\
 I_t^* &= [1 - (1 - \delta)L] K_t^* \dots\dots\dots 4.2
 \end{aligned}$$

Where L is the Lag operator thus $LK_t^* = K_{t-1}$ and δ is depreciation rate.

Due to the time needed to build, and install capital, there is a lapse between the time of investment decision made and the time period investment is actually materialized. Thus using partial adjustment for the time lag

$$[I_t - I_{t-1}] = b[I_t^* - I_{t-1}] \dots\dots\dots 4.3$$

Where b is the speed of adjustment and its value ranges between 0 and 1 i.e.

$$0 \leq b \leq 1$$

If $b=1$, $\Rightarrow I_t^* = I_t$ meaning complete adjustment

If $b=0$, $\Rightarrow I_t = I_{t-1}$ meaning no adjustment.

The response of private investment to the gap between desired and actual investment, as measured by b , is assumed to vary systematically with economic factors that influence the ability and initiatives of private investors to achieve the desired level of investment. The response of private investors to that gap is assumed to depend on: the availability of credit, real interest rate, public investment, profitability of investment, the level of the real exchange rate, inflation rate and macroeconomic instability. Thus, the adjustment coefficient (b) is specified as:

$$b = b_0 + \frac{1}{(I_t^* - I_{t-1})} [b_1 PSC + b_2 RIR + b_3 GINV + b_4 \Pi + b_5 REXCR + b_4 INFL] \dots\dots\dots 4.4$$

Where, PSC =private sector credit, RIR =real interest rate, $GINV$ =public investment, Π =Profitability of investment, $REXR$ =real exchange rate, and INF =inflation rate.

Substituting equation (4.4) into (4.3) and using the definition $K_t^* = aQ_t^e$ gives:

$$I_t = b_0[1 - (1 - \delta)]aQ_t^e + b_1PSC + b_2RIR + b_3GINV + b_4\Pi + b_5REXR + b_6INF + (1 - b_0)I_{t-1} \dots\dots\dots 4.5$$

The inclusion of explanatory variables in such model is determined by the interest of the study and the availability of data. Thus to meet the basic objective of the study [i.e. to test the complementarity or substitutability relationship between private and public investment in Ethiopia] and by considering the availability of data the model is modified for estimation purpose as follows³:

$$LRPINV_t = \alpha_0 + \alpha_1LRGDP_{t-i} + \alpha_2LRPSC_{t-i} + \alpha_3LRLIR_{t-i} + \alpha_4RGINV_{t-i} + \alpha_5LCPI_{t-i} + \alpha_6DV_1 + \varepsilon_t \dots\dots\dots 4.6$$

Where: t =time
 i =Number of lags in years,
 $RPINV$ =Real private investment,
 $RGDP$ =Real gross domestic product,
 $RPSC$ =Real domestic credit to the private sector,
 $RLIR$ =Real lending interest rate,
 $RGINV$ =Real government investment,
 CPI =Consumer price index,
 DV =Dummy for regime change (0 for Derg i.e. command economy and 1 otherwise)
 ε = Independently and identically distributed stochastic shock.

Note that L ahead of the variables is to denote the natural logarithm.

³Variables are chosen based on the literature that most importantly affects private investment.

4.2 Model Specification for the Contribution of Public and Private Investment to Economic Growth of Ethiopia

This section reviews the model in order to study the contribution of public and private investment to economic growth of Ethiopia. As in Beddies (1999) and Ghura (1997), this paper utilizes a Solow-Swan type aggregate production function that is modified to meet the objective of this study. By dividing the total capital stock into three different types of capital - private, government physical capital, and human capital - the aggregate production function can be written as:

$$Y_t = A_t (K_t^p)^\alpha (K_t^g)^\beta (Z_t)^\gamma, \dots\dots\dots 4.7$$

Where: $Z_t = H_t L_t$, Y_t denotes aggregate output in period t ; A_t is a measure of technology in period t ; K_t^p and K_t^g denote the private and the government physical capital stock in period t , respectively; Z_t is labor L_t in period t augmented by human capital developments H_t . The parameters: α, β and γ denote the elasticities of output with respect to the three types of capital stocks- private, government physical capital, and Human capital.

There are a couple of issues worth noting at this point. As mentioned earlier, a key element of the neoclassical growth theory is that technical change is exogenous and that the same technical opportunities are available across countries. This assumption implies that steady state growth solely depends on exogenous population growth and exogenous technical progress.

Rewriting equation (1) in terms of growth rates (with lower-case letters denoting growth rates) gives;

$$y = \alpha + \alpha k^p + \beta k^g + \gamma z \dots\dots\dots 4.8$$

Without data on the capital stock, one has to make simplifying assumptions to transform equation (4.8) into a form that can be estimated. The next section attempts to construct data on both the private and public capital stocks and compares the results to the ones obtained in this section, where investment data are used. Following Ghura (1997), consider the following equations representing the growth of both private and government capital stocks:

$$\frac{\Delta K_t^p}{K_{t-1}^p} = \frac{I_t^p}{K_{t-1}^p} - \delta^p \dots\dots\dots 4.9$$

$$\frac{\Delta K_t^g}{K_{t-1}^g} = \frac{I_t^g}{K_{t-1}^g} - \delta^g \dots\dots\dots 4.10$$

Where: I_t^p denotes real private investment, I_t^g represents real government investment, δ^p and δ^g are the rates of depreciation for the private and government capital stocks, respectively. Assuming both private and government capital stocks are a constant share of real GDP, which is:

$$K^p = \mu^p Y \dots\dots\dots 4.11$$

$$K^g = \mu^g Y \dots\dots\dots 4.12$$

Where μ^p and μ^g are the respective fixed coefficients on private and government capital, one can rewrite equation (4.8) to obtain:

$$y = a' + \alpha' \left[\frac{I_t^p}{Y_{t-1}} \right] + \beta' \left[\frac{I_t^g}{Y_{t-1}} \right] + \gamma z, \dots\dots\dots 4.13$$

$$\text{Where, } a' = (a - \alpha \delta^p - B \delta^g), \quad \alpha' = \frac{\alpha}{\mu^p}, \quad B' = \frac{B}{\mu^g}.$$

The equivalent of equation 4.13 above, which will be used for estimation purposes, can be written as:

$$LRGDP_{t-i} = \beta_1 + \beta_2 LRPINV_{t-i} + \beta_3 LRGINV_{t-i} + \beta_4 LALF_{t-i} + \beta_5 LHC_{t-i} + \varepsilon_t \dots\dots\dots 4.14$$

Where:

RGDP = Real gross domestic product,

PINV = Real Private investment,

GINV = Real government investment,

ALF = Active labor force,

HC = Human capital,

ε = Independently and identically distributed stochastic shock.

Note that 'L' ahead of the variables is to denote the natural logarithm.

4.3 Data Type and Source

The data used in this study came from different sources. In particular the study uses annual time series data. Data on GDP, private investment, public investment, credit to private sector, and lending interest rate were collected from the National Bank of Ethiopia and from Ministry of Finance and Economic Development (MoFED). Consumer price index data is found from Central Statistical Agency (CSA).

In addition to this, human capital data is calculated based on the primary and secondary school enrollment data from the ministry of education. Similarly, active labor force data is calculated as the product of total population and participation rate.

The study uses data ranging from 1970/71 to 2004/05 due to the limitations in the availability of consistent data, especially investment data segregated into private and public investment for the period ahead of the study period.

4.4 Description of Variables

Real lending interest rate (RLIR) is computed as nominal lending interest rate less inflation rate. It is expected to show the cost of capital to investment. The higher the rate of lending interest rate, the more the cost of investment. Thus, it is expected to affect private investment negatively.

Real private sector credit (RPSC) is the total sum of credit available to private sector deflated by GDP deflator. The increase in the availability of credit to private sector would enhance private investment by easing financial resource shortage to the investor. The variable is thus expected to have positive effect on private investment.

Real private investment (RPINV) is proxied by private capital formation deflated by GDP deflator. It is expected to have a positive impact on economic growth.

Real public investment (RGINV) is proxied by government gross fixed capital formation deflated by GDP deflator. It may have a positive or negative effect on private investment depending on which one outweighs i.e. the crowding in/ out effect of it. It is expected to have a positive impact on private investment and economic growth, due to the acute shortage of infrastructure in the country.

Real gross domestic product (RGDP) is also gross domestic product deflated by GDP deflator. Real GDP is expected to have a positive impact on private investment growth as its growth would increase demand for the private investor's product.

Consumer price index (CPI) is used as measure of inflation. High inflation rate is often considered as an indicator of macroeconomic instability and thus negatively affects investment. The direction of the effects of inflation on private investment is thus expected to be negative.

Human Capital (HC) variable is computed based on primary and secondary school enrollment data. The variable is expected to have a positive impact on economic growth.

Active labor force (ALF) is calculated as the product of total population and labor force participation rate. The higher the employment rate the higher the growth of output. But since labor participation rate includes also the unemployed labor force, the contribution of labor force can be negative. Therefore, the expected sign can not be predetermined.

4.5 Econometric Approach of the Study

It is widely argued that most macroeconomic time series data are non-stationary in the sense that their mean and variance are functions of time. Moreover, regressions that use non stationary series may also give rise to spurious results⁴ [Maddala, 1992].

To solve these problems of non stationary regression using differenced series is widely suggested. Nevertheless, it is argued against it on the ground that it ignores any reference to the long run aspects of decision making. Consequently, the idea of cointegration suggested as a solution to the problem.

Engle and Granger (1987) argue that the presence of cointegration implies that even if the dependent and the independent variables are non stationary, the residual from the estimation of the equation are stationary. Accordingly, if there is cointegration, the equation with non stationary variables is best estimated by the error-correction model [ECM] for long run and short run dynamics. It combines the short run disequilibrium dynamics to the long run relationship through a feed back mechanism and thus statistically consistent model.

The test for cointegration is carried out using the Engle-Granger two step procedure. Here, we first save the residual from the levels equation and in the second step we test for a unit root in the residual of the cointegrating regression obtained in the first step. Due to the properties of super convergence the estimated parameters in the

⁴ Spurious regression with a non-stationary series that renders what are called nonsense results. This is because variables that are likely to be non-stationary will have a stochastic trend, and where variables share a trend it will be difficult to disentangle the true relationship from the trend influence.

levels equation are viewed as long run estimates while the estimated parameters of the lagged residual can be used as an error correction term.

Here, it is worth noting that, Johansen's and simultaneous estimation methods are avoided due to their large sample properties and by considering the degrees of freedom (which is about 30) in the study. In addition to this, ECM is chosen for its robustness to misspecification errors in small samples. Available small sample studies show that when the estimated equation incorrectly omits relevant explanatory variables, OLS are less sensitive to misspecification than simultaneous estimation methods [Goldsbrough, 1996].

Given the importance of the methodology, the two models in this paper have been made to use the same technique. Hence, first the long run relationships in all cases are modeled using the variables at their levels. In order to have meaningful long run relationship, it is necessary for the error term of the long run model to be stationary. To address this problem of non stationarity, the Engle and Granger two step procedures will be used. In addition to this, the Johansson test for cointegration will be done. This is necessary because assuming there is only one cointegrating vector, while there is more, leads to inefficiency in the sense that we can only obtain a linear combination of these vectors when estimating a single equation model [Harris, 1995]. Once they pass the test for cointegration, an error correction model has been estimated for each valid regression.

CHAPTER FIVE

ECONOMETRIC ANALYSIS, RESULT, AND INTERPRETATIONS

This chapter presents the main empirical findings of the study. First, we discuss the unit root tests performed on the variables at the level and difference stage. Second, the cointegration test would be undertaken followed by estimation results of the two models and their interpretation.

5.1 Stationarity Test

It is necessary to know the time series properties of the data, to make a decision on whether the subsequent estimation should be done on the level or differenced form of the variable. Testing for unit roots in data conventionally precedes cointegration analysis. Testing for stationarity of our time series ensures that the variables used in the regressions are not subject to spurious. The problem of spurious correlations can also emerge when variables are deflated by a stochastic series such as GDP.

Augmented Dicky-Fuller (ADF) test is often employed to determine degree of integration of variables and how many times should a variable be differenced to attain stationary [Dicky and Fuller, 1979]. ADF is preferred over Dicky Fuller (DF) in that the latter holds based on the assumption that the disturbance term is an identically and independently Distributed (IID) process. It is also better in that the augmentation in the ADF leads to empirical white noise residuals [Holden and

Perman, 2001]. All series look non stationary but could be trend stationary. Thus, we run the following ADF test equations both with trend and without trend respectively.

$$\Delta y_t = \mu + \gamma T + \beta y_{t-1} + \sum_{i=1}^k \lambda_i \Delta y_{t-i} + U_t \tag{5.1}$$

$$\Delta y_t = \mu + \beta y_{t-1} + \sum_{i=1}^k \lambda_i \Delta y_{t-i} + U_t \tag{5.2}$$

Where y_t is the variable in question, T is a time trend, k is lag length, and U_t is a random variable assumed to be ‘white noise’.

Unit root tests are applied to variables: LRGDP, LRPINV, LRGINV, LALF, LHK, LRLIR, LCPI, LRPSC (variables as defined above) in their level and difference for the period 1970/71 to 2004/05. Unit roots test results for all variables are reported in the following table.

Table 5.1: Unit Root Test Using ADF Procedure

Variables	Lag length	ADF		Order of Integration
		Without Trend	With trend	
LRGDP	0	1.039071 (0.9960)	-1.240561 (0.8844)	At least I(1)
DLRGDP	0	- 7.029097 (0.00)	-7.209321 (0.00)	I (1)
LALF	0	0.282439 (0.9737)	-1.284877 (0.8743)	At least I(1)
DLALF	0	-5.138452 (0.0002)	-5.128420 (0.0011)	I (1)
LHK	0	0.141921 (0.9641)	-2.635464 (0.2683)	At least I(1)
DLHK	0	-3.326812 (0.0216)	-2.965571 (0.1566)	I (1)
LCPI	0	-1.636534 (0.4535)	-0.715830 (0.9637)	At least I(1)
DLCPi	0	-3.923725 (0.0050)	-4.349622 (0.0081)	I (1)
LRPSC	0	-0.113157 (0.9405)	-3.646865 (0.0396)	At least I(1)
DRPSC	0	-4.852513 (0.0004)	-4.767519 (0.0027)	I (1)

LRLIR	0	-0.955919 (0.7575)	-4.415574 (0.0088)	At least I(1)
DRLIR	0	-5.448090 (0.0001)	-5.605823 (0.0003)	I (1)
LRPINV	0	-1.173709 (0.6739)	-3.008158 (0.1226)	At least I(1)
DLRPINV	0	-11.59734 (0.0000)	-11.74446 (0.0000)	I (1)
LRGINV	0	-1.105985 (0.7021)	-2.532678 (0.3115)	At least I(1)
DLRGINV	0	-5.572173 (0.0001)	-5.476051 (0.0005)	I (1)

Critical values for ADF-statistics are:

1%=-3.653730 and 5%=-2.957110 for variables with out trend

1%=-4.273277 and 5%=-3.557759 for variables with trend.

Values in parenthesis are one sided probability values [values are produced by EViews].

D before the variables denote differenced, and I(1) denotes integrated of order one. Other variables as defined above.

The null hypothesis of this test is that there is a unit root. The decision criteria of ADF tests are: when the absolute value of the computed ADF statistics is greater than the absolute value of the critical statistics (reported below the table), we conclude that a

given variable is stationary. The critical values of the tests depend on whether a test was done with trend or without trend.

Based on the ADF test tabulated above, all variables are found to be non stationary (except LRLIR which is stationary with trend) with a significant trend at 5% and less level of significance. Running ADF tests for change in variables indicates that all variables are integrated of order one [I(1)], i.e. they need to be differenced once to attain stationary. Having conclusively accepted the non stationarity of the variables in both models, we now proceed to check whether the dependent variables (real private investment and real GDP) drift too far apart from the respective explanatory variables or not (i.e. whether they are cointegrated).

5.2 Cointegration Test

The level stage regressions of the two models are presented in this section. First let us see the level stage regression of LRPINV equation that would give us the long run estimation result on condition that they are cointegrated.

$$LRPINV_t = \alpha_0 + \alpha_1LRGDP_t + \alpha_2LRPSC_t + \alpha_3LRLIR_t + \alpha_4LRGINV_t + \alpha_5LCPI_t + \alpha_6DV_t$$

..... 5.3

$$LRPINV_t = -54.74 + 2.90LRGDP_t + 0.02LPSC_t + 0.12LRLIR_t - 0.63LRGINV_t - 0.01LCPI_t + 0.13DV_t$$

(11.16)**
(0.54)**
(0.26)
(0.04)**
(0.25)
(0.26)
(0.17)

..... 5.4

**Significant at 1%.
 * Significant at 5%.

Sigma 0.284511
 R² 0.770886
 RSS 2.2665
 F(6,28) 15.7 [0.000]**
 DW 2.1

Table 5.2 ECM test of LRPINV

Variable	With only constant*	With constant and trend **
<i>ECM_LRPINV</i>	-3.8814	-3.8243

* Critical values for 5%=-2.953, 1%=-3.642

**Critical values for 5%= -3.551, 1%=-4.26

The ECM tests above for LRPINV shows the stationarity test of residual from the long-run equation. As evident from the above table, ADF test with and with out trend shows that the residual of the level regression is white noise at 5% and 1% level of significance respectively. The implication of this is that, real private investment is cointegrated with real GDP, real government investment, real private sector credit, real lending interest rate, and consumer price index.

Similarly, the level stage regression of LRGDP gives us the following long run equation:

$$LRGDP_{t-i} = \beta_1 + \beta_2 LRPINV_{t-i} + \beta_3 LRGINV_{t-i} + \beta_4 LALF_{t-i} + \beta_5 LHC_{t-i} + \beta_6 DV_2$$

..... 5.6

$$LRGDP_t = 18.94 + 0.12 LRPINV_t + 0.09 LRGINV_t + 0.43 LALF_t + 0.08 LHC_t + 0.03 DV_2$$

..... 5.7

 **Significant at 1%

 * Significant at 5%

Sigma	0.0639483	RSS	0.118592088
R ²	0.959281	F(5,29)	136.6 [0.000]**
DW	1.75		

Table 5.3 ECM test of LRGDP

Variable	With only constant*	With constant and trend **
<i>ECM_LRGDP</i>	-3.781	-3.687

* Critical values for 5%=-2.953, 1%=-3.642

**Critical values for 5%=-3.551, 1%=-4.26

As it is shown on the above table, ADF test with and without trend indicates that the residual is stationary at 1% significance level. We can, hence, say that real GDP is cointegrated with real private investment, real government investment, active labor force, and human capital.

Due to the shortcomings of the Engle and Granger process, we supplement it with Johansen multivariate test. This is expected to further reduce the problem of spurious

regression result. As it is indicated in the appendix 1, by setting the lag length to one for both models, the test shows that there is one cointegration vector. Thus, based on the result, the null hypothesis i.e. there is no cointegration vector is rejected in favor of one cointegration vector.

5.3 Estimation and Analysis of Results

In the previous section of this chapter the stationarity and cointegration test of the two models done. This section, thus reports the estimation result and its interpretation.

5.3.1 Estimation Result of Short-run Dynamic Model of Real

Private Investment

Applying ordinary OLS to the differenced stationary variables will only describe the short run behavior of private investment and information of the long run behaviour will be lost. To mitigate this problem one period lag Error correction model (ECM_{.1}) was adopted. Thus equation 4.6 was then estimated using the stationary variables with the ECM_{.1} added to the model as an explanatory variable. The lagged residual ECM is expected to have a negative sign as it captures the process by which agents adjust to the long run equilibrium.

The estimation results from the short run dynamics (using ECM_{.1}) are reported in table 5.4 below.

Table 5.4: Estimation Result from Regression of DLRPINV

Variable	Coefficient	Std. Error	t-value	t-prob	Part r^2
Constant	0.024	0.099	0.241	0.811	0.002
DLRGDP	2.938	0.897	3.270	0.003	0.292
DLRPSC	0.299	0.298	1.000	0.325	0.037
DLRGINV	-0.817	0.241	-3.390	0.002	0.307
DLRLIR	0.081	0.027	2.980	0.006	0.254
DLCPI	-0.558	0.761	-0.733	0.470	0.020
DV1	0.020	0.102	0.196	0.846	0.002
ECMLRPINV_1	-0.8392	0.2835	-2.960	0.006	0.2521

R^2 0.801282

F(7,26) 14.98 [0.000]**

DW 1.9

RSS 1.9536

Diagnostic tests

AR 1-2 test: $F(2, 24)=0.19218[0.8264]$

ARCH 1-1 test: $F(1,24)=0.49438[0.4887]$

Normality test: $\text{Chi}^2(2)=0.98596[0.6108]$

Hetero test: $F(13,12)=0.6798[0.7503]$

RESET test: $F(1,25)=0.27405[0.6052]$

Before turning to explanation of the results, it is worth considering the statistical properties of the model. The model was tested for normality, serial correlation, autoregressive conditional hetroskedasticity, hetroskedasticity and specification error. The results reported above in table 5.4 suggest that the model is well specified. The diagnostics tests indicate that the residuals are normally distributed, homoskedastic and serially uncorrelated.

The diagnostic test above indicates the statistical properties of the model. Accordingly, AR test rejects the problem of serial correlation among residuals of the function. Similarly, the autoregressive conditional hetroskedasticity (ARCH) test does not provide any indication of hetroskedasticity. Durbin-Watson (DW) statistics also shows no serious correlation problem. The normality test shows that there is no outlier in the data. Though the heteroskedasticity is not that much a problem in time series data, the test is done and shows no sign of such problem. The RESET test provides no indication that the functional form of the ECM is inadequate. And the F-statistics shows that the regressors are jointly statistically significant even at 1% level of significance.

5.3.2 Estimation Result of Short-run Dynamic Model of Real GDP

In a similar manner equation 4.14 is estimated using a one period lag ECM method. The estimation results from short run dynamics (using ECM₋₁) are reported in table 5.5 below:

Table 5.5: Estimation Result from Regression of DLRGDP

Variable	Coefficient	Std. Error	t-value	t-prob	Part r2
Constant	-0.029	0.030	-0.951	0.350	0.032
DLRPINV	0.074	0.020	3.730	0.001	0.340
DLRGINV	0.160	0.039	4.050	0.000	0.378
DLALF	1.278	0.937	1.360	0.184	0.065
DLHC	0.014	0.050	0.292	0.772	0.0032
DV2	0.018	0.019	0.945	0.353	0.032
ECMLRGDP ₋₁	-0.567	0.200	-2.830	0.009	0.229

R² 0.542932

F(6,27) 5.345 [0.001]**

DW 1.95

RSS 0.077089

Diagnostic tests

AR 1-2 test: $F(2, 25)=3.7622[0.1373]$

ARCH 1-1 test: $F(1,25)=0.18805[0.6683]$

Normality test: $\text{Chi}^2(2)=0.078644[0.9614]$

Hetero test: $F(11,15)=0.62108[0.7851]$

RESET test: $F(1,26)=0.051720[0.8219]$

Similar to the DLPINV model, the diagnostic test given above indicates the statistical properties of the model. Accordingly, the F-statistics shows that the regressors are jointly statistically significant even at 1% level of significance. AR test rejects the problem of serial correlation among residuals of the function. Similarly, the autoregressive conditional hetroskedasticity (ARCH) test does not provide any indication of hetroskedasticity. Durbin-Watson (DW) statstics also shows no serious correlation problem. The normality test shows that there is no outlier in the data. Though the heteroskedasticity is not that much a problem in time series data, the test is done and shows no sign of such problem. The RESET test provide no indication that the functional from of the ECM is inadequate. And In general, the overall diagnostic tests of the model are good. Thus given this we can strongly rely on our ECM as a representation of both the short run and long run dynamics of real GDP and private investment.

As indicated in table 5.4 and 5.5 above, the sign of most of the coefficients of the estimated variables are consistent with a priori expectations.



The coefficient of real GDP has shown positive impact on private investment (refer equation 5.4 and Table 5.4). It is also significant at 1% level of significance both in the long run and short run. Thus it shows us that the growth of real GDP would have an important contribution to private sector investment in Ethiopia. Kamau (2000) has also found a similar result with 5% level of significance for the case of Kenya.

Credit allocated to private sector had a positive but insignificant impact on private investment both in the long run and short run. Goldsbrough (1996) also found similar result for the case of Ghana.

The coefficient on real lending interest rate is found to be positive and significant. This is however contrary to a priori expectation, since it is cost of investment. It could be due to the fact that higher lending interest rate rations out low return investment and hence increases the efficiency and productivity of private investment. On the other hand, inflation proxied by consumer price index has a negative (but insignificant) effect in private investment both in the short run and long run. The coefficient of dummy variable for regime change is found correctly signed but statistically insignificant. It shows the positive impact of liberalization against the command economy for private investment.

Government investment is found to have a negative and significant impact on private investment in the short run while it has shown insignificant impact in the long run. This indicates that public sector investment appears to deleteriously impacted private sector investment, implying that the impact of crowding out categories of public investment in Ethiopia over the study period has been large enough to offset any

crowding in effects in the short run. Similar results have been found by Badawi (2002) in the case of Sudan; and by Pradhan et. al. (1988) in the case of India.

The sign of the error correction term (ECMLRPINV) is negative and significant as expected. This confirms the existence and extent of adjustment of any short run disequilibrium in private investment towards its long run equilibrium. Accordingly, about 84% of the previous disequilibrium from the long run equilibrium private investment is corrected per unit period of analysis i.e. per annum.

Similarly, both the static (equation 5.7) and short run dynamic error correction regressions of real GDP (Table 5.5) gave us coefficients with signs consistent with a priori expectations. According to the result, private investment has a positive and significant impact on real GDP in Ethiopia both in the short run and long run. The result here suggests that a 1 parentage point increase in real private investment raises real GDP by 0.07 and 0.12 percentage points in the short run and long run respectively.

Real government investment also has a positive and significant impact on real GDP both in the long run and short run. The result here suggests that a 1 parentage point increase in real government investment raises real GDP by 0.16 and 0.09 percentage points in the short run and long run respectively. As it is indicated in the estimation result, the contribution of real public investment to real GDP is higher than private investment in the short run. This is in conformity with the conclusion derived by Khan and Kumar (1997) from a sample of 95 developing countries. Their finding indicates that there are higher rates of return to public investment in low-income countries than

in high income countries. Thus, it implies those government investments that are directed towards sectors that enhance the efficiency of private investment, like infrastructures, have significant contribution to real GDP growth. On the other hand, in the long run the contribution of private investment to real GDP has been found to be more important than public investment does.

Active labor force and human capital, both found to have a positive but insignificant effect on real GDP.

Similarly to the case of private investment model, the sign of the error correction term ($ECMLRGDP_{-1}$) is negative and significant as expected. This suggests the existence of adjustment of any short run disequilibrium in real GDP towards its long run equilibrium. As the result shows, about 57% of the previous disequilibrium, from the long run equilibrium real GDP is corrected per annum.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

To accomplish the objective of the study, i.e. to test the direction of the relationship between private and public investment as well as their relative contribution to growth, the study has utilized error correction model. Major findings of the empirical analysis of the study are summarized as follows:

The empirical analysis revealed that private investment exerts a positive and significant effect on real GDP growth in Ethiopia both in the short run and long run.

Public investment also does significantly and positively affect real GDP, both in the short run and long run. This could be due to the direct effect of the level of stock of government capital has on GDP.

The contribution of public investment to real GDP is higher than private investment in the short run, while the contribution of private investment to real GDP is higher than public investment in the long run. It may be due to the existing acute shortage of infrastructure in the country.

The result from the test of crowding-in effect hypothesis, suggests that in the short run the crowding-out effect of public investment overwhelms the crowding-in effect on private investment, while it is insignificant in the long run. It shows that the negative

impact of public sector investment has been large enough to cancel out any positive effect in the short run. The crowding-out effect may arise from different reasons. In the Derg period, private sector investment was limited by policy restriction no matter the size of the public investment was. In the post-Derg period, on the other hand, it could be due to inefficiencies and/or long time lags and/or weak complementarity of investments made by government capital.

Thus it can be argued that, the private sector has not significantly picked up and is far from taking over the public sector as an engine of private sector growth. The development of infrastructures (electric power generation, communication, road, education services and the like) currently the government has given due attention need long time lag to complement private sector investment. Policy ban to private sector participation in sectors such as power generation and communication sectors for years may also explain the crowding-out effect. In addition to this involvement of governments capital in sectors far from being an infrastructural nature may jeopardize favorable effects of public sector infrastructural investment.

Private investment on the other hand responds positively and significantly to real GDP both in the short run and long run. The availability of credit to private sector, real lending interest rate found to have positive impact on private investment, while inflation shows negative impact. The positive sign of dummy variables indicates the importance of permissible policies to the private sector as well as real GDP growth. In the real GDP model active labor force and human capital variable show a positive impact on real GDP.

Thus based on the findings of the study, it is legitimate to suggest the following points:

In relation to alternative public investment strategies to promote private sector productivity and hence growth, the public capital should target sectors that have strong complementarity with private investment, and areas that improve efficiency and profitability of private sector investment. That is the government need to redirect public spending towards infrastructure that has public good nature and strong complementarity with private investment.

The government needs to withdraw from economic activities that can be well filled by private sector. This can be done in two ways: one, by strengthening and enhancing the privatization process. The second one could be creating conducive environment and spacing more rooms for the private sector participation.

Given the relative significance and importance of the private sector investment in stimulating economic growth, policies designed to attract private investment should be deep enough to stimulate sustainable growth. The public service provided by the government offices need to be less bureaucratic, i.e. government need to build efficient civil service. As indicated in the analysis, though the numbers of private investment projects licensed from Ethiopian Investment Commission are significant, those that have started implementation are just about 20% in the post-Derg period. Thus close follow up of private investors should be made. In addition to this, bottlenecks that investors have faced should be identified and corrective measures should be taken.

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Appendix 1

Johansen Cointegration Analysis:

Test on LRGDP

Maximum lag in VAR=1

List of variables included in the cointegrating vector:

LRGDP LRPINV LRGINV LHK LL

RGDP	Trace test	pvalue
HO:rank<=		
0	73.0850	[0.025]*
1	35.9820	[0.402]
2	10.2670	[0.972]
3	3.9555	[0.901]
4	0.1103	[0.740]

Test on LRPINV

Maximum lag in VAR=1

List of variables included in the cointegrating vector:

LRPINV LRGDP LRPINV LPSC LINFL LRLIR

RPINV	Trace test	pvalue
HO:rank<=		
0	131.1700	[0.010]**
1	67.6060	[0.120]
2	34.5370	[0.478]
3	14.3210	[0.823]
4	5.9616	[0.703]
5	0.2748	[0.600]

Appendix 2

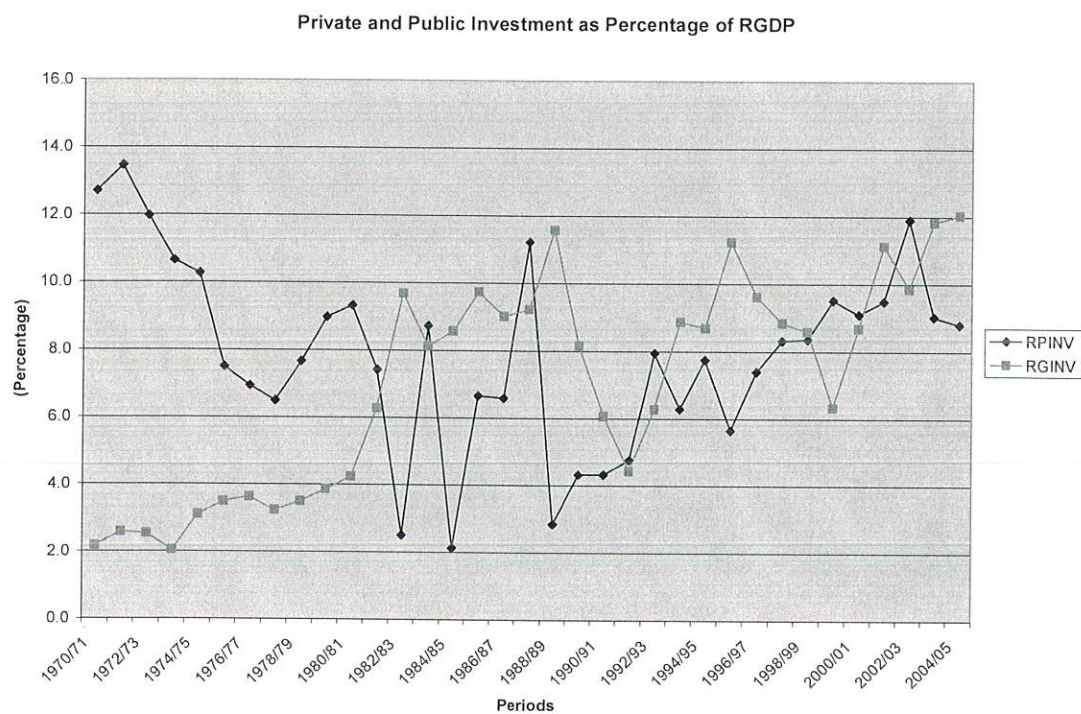


Figure 1

Declaration

I, the undersigned, declare that this thesis is my original work and has not been presented for a degree in any other university, and that all source of materials used for the thesis have been duly acknowledged.

Declared by:

Name: Muhammed Warko

Signature: W. Muhall

Date: Aug 07, 2006

Confirmed by Advisor:

Name: C. Panda (Dr.)

Signature: 

Date: Aug 07, 2006

Place and date of submission: _____.