ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

PRIVATE INVESTMENT AND ECONOMIC GROWTH: EVIDENCE FROM ETHIOPIA

ABDULKADER HUSSEN MUSSA

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ABDULKADER HUSSEN MUSSA

A thesis submitted to the school of graduate studies of Addis Ababa University in partial fulfillment of the requirements for the Degree of Master of Science in Economics (Economic Policy Analysis).

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"Private Investment and Economic Growth: Evidence from Ethiopia."

By

Abdulkader Hussen Mussa

Approved by the Board of Examiners:

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Abdulkader Hussen
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Table of Contents

List of Tables

Abstract

The paper investigates the relationship between private investment, economic growth and Public investment in a neoclassical growth framework over the period 1971-2006. To account for the problem of endogeneity and non-stationarity, it employs cointegrated vector autoregressive model. Results suggest that both private and public investment contributed positively to economic growth in Ethiopia for the period under study. The impact of private investment on real growth has been greater than that of the public sector investment. Public sector investment also has complementarity with private capital formation, implying that crowding in impact of public investment on the private investment. Such a crowding in effect for a country like Ethiopia where the private investment is at its low development stage is essential to improve its productivity and enhances economic growth.

CHAPTER 1

INTRODUCTION

1.1 Statement of the Problem

For Less Developed Countries (LDCs) like Ethiopia the fundamental challenge in their economy is how to achieve a large increase in output over a long period of time and improve the standard of living of their people so that there will be dramatic change in their economic political and social conditions. To achieve this target, various tools are considered. Among these tools promoting investment is the most common one. Though investment is the primary engine of growth, all investments undertaken in an economy cannot be taken as productive and crucial to economic growth.

Investment in an economy is composed of public and private sector investment. Public investment refers to investment by the government sector primarily, not exclusively in the area of social and economic infrastructure. Private investment refers to investment by private business for the purpose of profit generation (Kumo, 2006). There have been theoretical and empirical studies that show the relationship between investment and economic growth. These studies can be classified into two categories; the neoclassical as first described by Solow (1956) and New Growth Theory also known as Endogenous Growth Theory formulated by Romer (1986 and 1990) and Lucas (1988) .

The neoclassical model originally focused on investment in tangible assets

and resulting accumulation of physical assets to help explain economic growth. For the last two decades after Romer (1986) and Lucas (1988) the concept of investment has been broadened to include human capital, R&D expenditure and investment in public infrastructure. The new growth theory moves away from the neoclassical model and uncovers alternate productivity channels through which investment affects growth. This model attaches greater significance to certain types of investment that create externalities and generate an additional productivity increment through production spillover or associated diffusion of technology.

These two models are similar in their recognition of the central importance of investment/capital accumulation to economic growth. Whether the investment is done by the public sector or the private sector or by both, each type of investment has its own contribution to the growth process of an economy. Empirical studies in developing countries showed that economies led by the private sector achieved better economic performance than the one led by the state. This does not mean that all investments run by the state play an insignificant role hence that the state should leave the economy to the private sector. Public investment in social infrastructure like road, telecommunication and power generation contributes positively to economic growth through enhancing the productivity of private investment.

Studies that focused on the role of private investment jn economic growth show that it makes a positive and significant contribution to economic growth. To gain all possible benefit from private investment sound macro

economic policy, liberalization of goods and factors market, greater flexibility in the financial system, the political stability, the availability of skilled labor force and institutions are important.

In Ethiopia, during the Imperial years, the economic system was guided by the principle of the market economy. In this period, the government encouraged private investors by providing various incentives and the state was engaged in infrastructural development, which is a tool to attract private investment. Hence, the share of private investment was more than the public investment. After overthrowing the Imperial government of Ethiopia in 1974, the military government took socialism as a guiding philosophy of the economy and the private enterprises were nationalized. In addition, there was a restriction on the number of businesses a private investor could own and on the capitalization of this business. Due to these and other similar reasons, private investment was marginalized in the economy for one and half decades. During this period, the share of private investment dropped to 20% of the total investment in the economy. At the end of its regime, the government adopted a mixed economy strategy to consider private investment as a partner to public investment. However, this new policy was not maintained to show its impact on the overall performance of investment in the economy.

Since the liberalization of the economy in 1992, the current government is providing various incentive packages to attract domestic and foreign private investors. The role of private investment in various sectors of the economy is

increasing except for certain economic activities, which are exclusively reserved to the government. At this time the role of private investment in the economy is clearly noticed especially in employment generation and GDP contribution. In terms of employment creation this sector has employed a total of more than 457,000 permanent and temporary jobs in different sectors and its share in total investment has grown to 53%.

Studies conducted in Ethiopia using famous growth models to relate growth of output to the role of capital formation, among other factors such as labor force growth, imported inputs, and technical progress did not distinguish between the private and public component of investment. Hence it is not possible to determine if policies designed to encourage private investment at the expense of public investment will necessarily improve the growth rate. Whether private sector investment is more productive and efficient, the judgment has to be based on empirical evidence. Despite the importance of this relationship, there is no empirical evidence that can be mentioned to support or disprove the notion that, private investment is better than public investment as far as the long run economic growth of Ethiopia is concerned.

1.2 Objective of the Study

The general objective of the paper is to examine the contribution of private investment to economic growth in Ethiopia over the past 36 years.

Specific objectives of the study are:

- To review and evaluate the investment policies under various regimes with specific reference to their contribution to economic growth,

- To asses the contribution of private investment to economic growth and its robustness in explaining the growth performance of Ethiopia using a time series framework. Hence to evaluate a priori whether policies aimed at promoting private investment will be successful in raising the long run growth rate.
- To derive policy implications from the empirical analysis for the future.

1.3 Hypothesis to be tested

So far, little has been done on the impact of private investment on economic growth in Ethiopia. However, a number of studies have been undertaken based on cross country analysis of less developed countries. In this study the hypothesis to be tested is that private led growth holds true for Ethiopia and private investment contribute positively and significantly to the economic growth of the country. The contribution of the sector is also robust in explaining the growth performance of the economy.

1.4 Significance of the Study

Private investment is now recognized as an engine of economic growth for most LDCs and it is becoming an important area of study in recent growth related analysis of economic literature. In Ethiopia, the absence of empirical analysis in this context make this study vital to show the role of the private investment in the economy and to help the policy formulation and incentive provision to the sector.

1.5 Organization of the Paper

The rest of the paper has five sections. Chapter 2 provides a brief description of the performance of the Ethiopian economy as a background for the study and the investment policy in Ethiopia. Chapter 3 highlights some theoretical and empirical evidence mainly concerned with the nature of relationship between private investment, economic growth and public investment. Chapter 4 discusses methodology employed. In Chapter 5, an empirical investigation of relationship between growth, private and public investments is undertaken. Chapter 6 presents the conclusion and policy recommendations.

CHAPTER 2

ECONOMIC GROWTH AND INVESTMENT CLIMATE IN ETHIOPIA

2.1 Economic Growth Performance

The growth performance of Ethiopia during the 1960/61 to 1973/74 was remarkable. Between 1960 and 1970, for example, Ethiopia enjoyed an annual 4.4 percent average growth rate in per capita gross domestic product. The growth rate in the manufacturing sector more than doubled from 1.9 percent in 1960/61 to 4.4 percent in 1973/74, and the growth rate for the whole sale, retail trade, transportation and communication sectors increased from 9.3 percent to 15.6 percent.[1]

The transformation of the country into socialist principle and objective following the empowerment of military government between the period 1974 and 1991, forced the structure and objective of the economy to be changed alongside. The economy growth rate was the worst during this period, in which real GDP registered an average growth rate of 2.0% per annum (See Table 2.1 below). From Table 2.1 we can also see the improvement of the economic growth rate during the current regime real GDP grew on average by about 5.1% from 1991/92 to 1996/97, it declined for the period1997/98-2002/03 to 2.5 % and achieved the highest growth in 2003/04 of 14.1%. Overall, the economy registered real growth rate of about 5.23% for the last sixteen years.

[1] According to data from Varies CSA annual reports

Table 2.1 The growth rate of Real GDP (1960/61-2005/06)

Year	1960/61-1973/74	1974/75-1990/91	1991/92-1996/97	1997/98-2002/03	2003/04	2004/05	2005/06
Growth rate	3.7	2.0	5.1	2.5	14.1	9.8	9.3

Source: Ministry of Finance and Economic Development and own computation

As can be seen from the above Table, though there are ups and downs in the rate of growth, on average there is improvement since the introduction of market economy. However, making the growth rate sustainable is a great challenge due to fluctuation in weather and unpredictable engagement of the country in international war.

2.1.1 Saving and Investment

In order to analyze the performance of the economy, there is a need to evaluate the trend of some components of the gross domestic product. Among these components, saving and investment take the first consideration. As summarized in Table 2.2 below, the share of saving to GDP ratio was 14.20% from 1960/61-1969/70. This share experienced a fall from 1970/71-1979/80 on average to 9.7% and even showed a dramatic fall on average to 7.5% and 4.02% for 1980/81-1989/90 and 1990/91-1992/93 periods respectively. Though there is minor improvement in the period between 1993 and 2005/06, the general trend shows a declining tendency. While gross domestic saving was falling over the period, the gross capital formation registered the opposite trend. From Table 2.2 we see that even if the figure showed a declining trend in period between 1970 and 1992/93, it has shown persistence rise for the rest of the period.

Table 2.2: Gross Domestic Saving (GDS) and Gross Fixed Capital Formation (GFGF) as share of GDP.

Year	1960/61-1969/70	1970/71-1979/80	1980/81-1989/90	1990/91-1992/93	1993/94-1999/00	2000/01-2004/05	2005/06
GDS	14.20	9.70	7.50	4.02	5.40	4.88	5.65
GFCF	16.50	12.70	14.60	11.27	16.50	23.43	21.56

Source: National Bank Ethiopia and Ethiopian Economic Association

The decline in savings is not likely due to inappropriate financial policies since the most significant decline has taken place after financial liberalization. Instead, what it shows is that per capita income positively affect the level of savings and that the low level of per capita income is potentially one major factor behind the low level of private savings in the economy. It is an indication of the increasing destitution of a large portion of the population and its declining capacity to save (EEA,2003/04).

Since domestic savings have been declining during the last period of the current regime, foreign sources of capital, mainly loans and grants, have played a crucial role in financing investment further deepening the economy's dependence on foreign sources for financing its investment projects (EEA 2003/04).

2.1.2 The Foreign Sector

Ethiopian export is dominated by coffee, which is susceptible to exogenous external and internal shocks. In the 1970s, the share of coffee to export was on average 55% of the total. This figure was raised on average to the level of

62% in the 1980s. During 1991-1995 the share declined to 54.1% and grew to 65.8% between 1996 and 2002. Since 2000, while the share of the non-coffee export has indicated improvement, the share of coffee to total export has experienced a declining trend (see Table 2.3 below). This declining was due to shock in the international coffee price.

Table 2.3: Growth rates and structure of exports

	Annual growth rates of export (value)		Percentage share	
Year	coffee	non-coffee	coffee	non-coffee
1971-1980	7.56%	1.84%	55%	45%
1981-1990	1.50%	5.20%	62%	38%
1991-1995	4.43%	-3.40%	54.1%	45.9%
1996-2000	5.00%	3.20%	65.8%	34.2%
2001	-4.8%	14.90%	39.3%	60.7%
2002	-8.25%	5.35%	36.1%	63.9%
2003	-5.07%	2.86%	34.2%	65.8%
2004	8.70%	-4.53%	37.2%	62.8%
2005	10.21%	-6.05%	41%	59%
2006	13.65%	9.48%	35.4%	64.6%

Source: National Bank of Ethiopia and own computation

The overall performance of the export sector of the economy had been very weak over the past four decades as evidenced by lower export to GDP ratio and the declining share of exports in financing import. One of the main sources of foreign exchange to import capital goods and technology, which are believed to be important ingredients to economic growth, is export revenue. The decline in the supply of foreign exchange due to the decline in exports of goods and services could therefore lead to a decline in the imports of such important factors of production. In the case of Ethiopia, the decline

in export revenue relative to the import bill has led to import compression of essential goods and to the rise of the debt burden. The relative decline in export revenue coupled with the insignificant foreign direct investment puts a strain on the ability to import intermediate and capital goods (EEA 2003/04).

Generally, sustained economic growth becomes difficult due to low human capital, insufficient infrastructure leading to low marginal productively of capital, a low saving rate and a growing population. These conditions are serious constraints to the development of an integrated economic base. Overall the growth performance of Ethiopia has been irregular and unstable as it is heavily dependent on the vagaries of nature and shocks like political instability and war.

Alemayehu and Befekadu (2002) concluded the following about the Ethiopian economy: over quite a long period of time and despite very different policy regimes the structure of the economy has changed relatively very little, growth performance is still dependent on a fragile economic sector and on exogenous conditions, and over the long period of time the economy has performed below expectations, given initial conditions.

2.2 Investment Policy in Ethiopia

The level of investment in Ethiopia compared to other developing countries is very low. This is reflected by the low share of investment in Gross Domestic Product. For better performance of the sector the country's policy towards

the private investment plays, among other factors, a crucial role. By providing a favorable environment to private sector investment, it is possible to reap attractive returns from the sector in terms of employment creation, better income generation, poverty reduction and improvement in the standard of living.

2.2.1 The Imperial Government Investment Policy

The economic policy pursued by the Imperial government was favorable in terms of those conditions important to potential investors. Many of governmental, legal, and economic conditions under which businesses operate in the country were favorable to the creation of sustainable economic growth. In its Second Five Years Development Plan the regime clearly stated policy considerations about the private and public sector as follows:

Aiming at improving general economic and social conditions, the government will promote both private and public undertakings. In a mixed type of Ethiopian kind private and public sectors have to cooperate closely for the progress of the nation as a whole. Neither the private nor the public sector will have the priority; both of them should have equal rights, obligations and facilities. There will be no limitation to the private sector either in the kind of business or in the size of enterprise. However, the government will assume the responsibility for the development program, which are of vital national importance and can not be accomplished by private concerns (1962 P.336).

The country issued a number of laws and regulations which are of prime

importance in determining the investment climate.[2] The investment policy of the period set forth three goals which are: the increased investment of private capital both foreign and domestic, various benefits, privileges and exemptions were provided for the purpose of encouraging and stimulating private capital and finally to enact special and comprehensive law to stimulate and encourage future capital investment. The Imperial regime was characterized by relative political and economic stability. Economic agents had relatively little risk both in terms of policy shocks and natural shocks such as drought. This resulted in a relatively buoyant economy with respective growth Alemayehu (2007).

2.2.2 The Socialist Government Investment Policy

Following the overthrow of the Imperial regime, the new socialist military government designed policy emanating from the socialist political and economic ideological position. The military government nationalized all privately owned enterprises and the state undertook a dominant role in the economy. The Ten Years Plan of Economic and Social Development (1984/85-1993/94) stated that the state engages in construction of a socialist society, hence socialization of means of production employed in various sphere of the economy. This led to the marginalization of the private sector in the economy.

Private investment was discouraged by ceilings on permissible fixed assets,

[2] The investment proclamation of 1966 was the most important and pertinent of these.

licensing, high rate of personal taxation in credit allocation, public enterprises subjected to planning directives, price and distribution controls, and labor allocation and wage fund prohibitions, which have increased their costs and blunted their competitiveness.[3] The public sector was privileged in terms of investment authorization to expand and diversity. As a result, public sector investment was dominant in total investment in this period.

Recognizing the failure of public investment, a decree on investment was enacted in May 1990 to remove all restrictions on the number of business, which a private investor may own and on the capitalization of these businesses, and most of the restrictions on the sectors in which private investors were allowed to invest. Under this investment code, investment in commercial agriculture and in residential and commercial agriculture, real estate was now allowed. One hundred percent foreign ownership of productive assets was permitted and tax holiday and duty free equipment import entitlements were greatly widened.[4]

This policy change was intended to show the movement the government was making towards the mixed economy strategy in Ethiopia, with the private sector playing an increasing participatory role in the fulfillment of the country's socio economic objective. In order to act as an instrument for the implementation of the new policy and to legalize the policy objectives, special

[3] World Bank 1990

[4] World Bank 1990

decrees and regulations were issued by the government.[5] However, this new policy was not maintained very long for implementation due to the replacement of the socialist government by the currently ruling regime.

2.2.3 The Current Government Investment Policy

The economic policy of Transitional Government of Ethiopia (TGE) and the now Federal Democratic Republic of Ethiopia (FDRE) has put the private sector and private investment at the forefront. Private enterprises are expected to greatly expand their presence and role in the economic development of the country. To this effect, a number of policy instruments and incentives have been designed to limit the role of the state and to encourage the development of the private sector in direct economic activities.

The most important 'measure' that has been taken during the current government was in the area of investment policies. A number of investment proclamations have been developed to raise the participation of private investment in the economy. The 1992 investment code (Proclamation no. 15/1992), for instance, removed the capital ceiling, the area restrictions and the one man-one license principle, which were the main obstacles for private entrepreneurs for the past two decades. It also allowed entrepreneurs to own multiple businesses and opened many areas for private investment, which had previously been reserved for the public sector. The code reserved some

[5] Special decree no. 17/1990, Joint venture proclamation no.11/1990, regulation no 10/1990, regulation no 7/1990 regulation no 8/1990.

areas of investment for the state including large scale electrical power generation, postal and telecommunication services and large scale air and rail transport services.

Apart from minimizing the capital requirement for entry, foreign investors are welcomed to invest in all sectors not reserved for either the domestic investors, Ethiopian nationals or the government. According to the code, foreign investors must invest at least USD 500,000 and a domestic investor a minimum of Birr 250,000 to acquire an investment certificate. In order to facilitate these processes, institutions like the Ethiopian investment office (called Ethiopian Investment Agency) and regional investment bureaus were established in July 2002 and have been implementing a 'one-stop' shop service to facilitate their activities.

The 1992 proclamation was revised in 1996 (Proclamation No 37 of 1996), relaxing some investment areas for private investment. Activities such as banking and insurance businesses were exclusively reserved for domestic investors by the new policy. As a result private banks became operational since 1996/97. The code has also improved the participation of the private sector in large scale electricity, air and transport services by limiting the allowable capacity and permitting joint domestic and foreign investors to invest in engineering, pharmaceutical and fertilizer industries, which were previously reserved for the state.

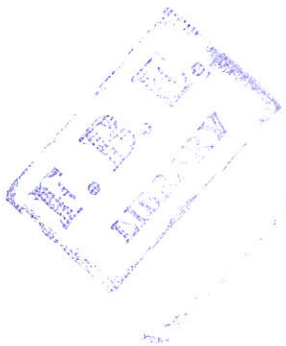
The role of the state during the post reform period is to provide an enabling

environment for the private sector through several incentives. Duty free import of some investment goods, tax exemptions and tax incentives on profits and exports are some of the incentives provided by the government to raise private investment in the economy. Moreover, export tax (except those on coffee) were eliminated to encourage private exporters, proclamation no 36 /1996 has also reduced the previous level of confiscatory rate of business taxation to 35% for private organizations so as to enable an increase in participation by the sector.

The 1996 investment proclamation was further revised in 1998, 2002 and 2003 to relax the investment areas and to provide more incentives to private investment. In the new investment proclamation, investors who engage in exporting 50% of their products or supply 75% of their product to exporters shall get an exception from an income tax for five years. An investor shall be allowed to import duty free capital goods and construction materials necessary for the establishment of a new enterprise or for the expansion or upgrading of an existing enterprise. Investment in banking, insurance, micro credit and saving services, forewarding and shipping agency services, broadcasting services and air transport services using aircrafts with a seating capacity of up to 20 passenger are exclusively reserved for Ethiopian nationals.

It appears from the above section that development policy designation has created an improved climate for the private investment. However, measures taken by the government do not seem to trigger the necessary investment as

expected. Private investment remained stagnant at nearly 10% of GDP over the period 1991-2006.



CHAPTER 3

LITERATURE REVIEW

3.1 Theoretical Literature

The long history of ideas on economic growth started from the classical economists like Adam Smith, Robert Malthus, Ricardo and Marx. For more than three decades the Neoclassical and the Endogenous Growth theories have attracted the attention of growth economists. The main objective of these growth theories is identifying a nation's sources of economic growth. The 20th century economist Keynes who transformed modern macroeconomics radically has also his own contribution in identifying sources of a nation's growth (James Cypher and Dietz 1998). From this time onwards, various studies were conducted to assess sources of economic growth and the role of various social, economic and political scenarios in the economic growth process. Though the history of economic growth can be traced back to the distant past, this study considers the recent models and studies on economic growth as a base for the analysis of growth condition in Ethiopia and its determinants.

The study of growth generally concerns the medium or long run. It is about the accumulation of physical capital, the progress of skills, ideas and innovation, the growth of population, how factors are used, combined and managed and so on (Stern 1991). Economic growth can be defined as the growth rate of per capita GDP over some period. The trend of growth of real GDP can be considered as sustainable economic growth, while the short-run

fluctuation of growth over the trend can be thought of as business cycles. Economic development includes economic growth, distribution of income, unemployment and poverty. Nowadays, development is being defined as transformation of societies (Stiglitz, 1994).

To achieve the above goals of economic growth, various factors determining economic growth are addressed in various studies. The models used in modern literature for analyzing the determinants of growth can be the Neoclassical or the New Endogenous theory of economic growth in a cross sectional, panel or time series data framework. Though there are various theories, as mentioned above, regarding economic growth, in this section we will address the most commonly applied models: the Neoclassical and Endogenous Growth Models.

The Neoclassical Growth Model

The Solow (1956) and Swan (1956) models of economic growth, which commonly represent the Neoclassical model are based on an aggregate production function (Cobb-Douglas) and a capital accumulation equation. These models do not account for technological progress and predict that the level of per capita income is determined by the population growth rate and the investment rate. Accordingly, economic growth can happen only temporarily and lasts only until capital per capita reached its steady state level. The second model introduced by Solow in 1957 incorporates an exogenous technology.

The important implications of the Neoclassical growth model are that level of per capita output is determined by the level of technology, investment rate and population growth rate. While sustained growth rate of per capita output overtime is determined by technological changes. Other temporary shocks such as policy changes can affect growth only temporarily just until a new steady state level is reached. Hence, according to Solow's model, per capita output differences across countries and overtime are explained by the population growth rate, the investment rate, and the level of technology of countries (Jones 1998, Romer 1996).

The other implication of the dynamic analysis of the Neoclassical model is that the initial capital stock is far below the steady state rate of accumulation (until a new steady state is restored) is fast and accordingly output grows fast but at a lower rate as it approaches steady state level where growth ceases. This implies that poor economies with a lower stock of capital and output tend to catch up with the initially rich ones. The prediction, hence, is that poor economies grow faster than rich ones (Barro, 1997).

In this model, in the absence of technological progress, steady state per capita output does not grow and it depends on exogenous factors (i.e. technological progress and population growth). In this framework, in the short run, an increase in the savings rate raises per capita economic growth. However, due to diminishing returns to capital, per capita output in the long run grows at the rate of exogenously given technological progress. Although

economic policies can affect the level of output (growth rate) when the economy is in transition from one steady state to another, they do not affect steady state economic growth.

One might object to the Neoclassical model on the grounds that it does not, in the end, shed light on economic growth. In the steady state of the Neoclassical model, all growth is due to advances in technology, but technological progress is taken as exogenous. It might thus seem that the model unravels the mystery of economic growth simply by assuming that there is economic growth (Mankiw 1995). In other words, the neoclassical growth model is criticized on the grounds that it leaves technological growth as an exogenous factor and without technological growth, the model asserts that economic growth will, ultimately, cease.

Endogenous Growth Model

The failure of the Neoclassical Growth Model to be consistent with empirical evidence in predicting that the output level of countries with similar technologies should converge to a given level in steady state and the inability of the model to show the mechanisms through which government policies can potentially influence the growth process, led to the development of Endogenous Growth theory that avoids the assumption of exogenous advance in technology. This new growth model addresses the limitations of the neoclassical model by proposing a variety of channels through which steady-state growth arises endogenously.

Two broad approaches have been followed in the New Growth literature to relax the assumption of diminishing returns to capital imposed in the basic Neoclassical model. The first consists of viewing all production inputs as some form of reproducible capital including physical capital and human capital (Lucas 1988) or the state of knowledge (Romer 1986). The second approach to generate growth endogenously consists of introducing spillover effects or externalities in the growth process. Introducing spillover effects leads to a relaxation of the assumption of diminishing returns to capital.

Romer (1986) models technology growth (he termed it knowledge growth) as the outcome of competitive firms that invest in knowledge generation. The central idea that for allowed this was that while individual firms face diminishing returns to invest in knowledge, at the social level returns to knowledge can be increasing i.e. knowledge is a function of the entire capital stock of the economy. The fact that knowledge can have positive externalities is at the center of the growth process. Romer (1986) develops these ideas into a competitive equilibrium model which yields long-run positive growth. The model also suggests that the competitive growth rate is below the socially optimal level due to the presence of knowledge externalities; large countries may grow faster and shocks to a country's growth may have permanent effects.

One particular source of externalities that has been emphasized in the growth literature is the accumulation of human capital and its effect on the productivity of the economy. Lucas (1988) provides one of the best known

attempts to incorporate the spillover impacts of human capital accumulation, in a model built upon the idea that individual workers are more productive, regardless of their skill level, if other workers have more human capital. The important implication of the external effect captured in the model presented by Lucas's (1988) is that under a purely competitive equilibrium its presence leads to an under investment in human capital because private agents do not take into account the external benefits of human capital accumulation. The equilibrium growth rate is thus lower than the optimal growth rate due to the existence of externalities. Because the equilibrium growth rate depends on the rate of investment in human capital, the externality implies that growth would be higher with more investment in human capital. This leads to the conclusion that government policies (subsidies) are necessary to increase the equilibrium growth rate up to the level of the optimal growth rate. A government subsidy to human capital formation or schooling could potentially result in a substantial increase in the rate of economic growth (Agenor and Montiel 1996).

Various variables that are considered as determinants of a country's economic growth along with private and public investment are addressed in different studies. The main determinants that are emphasized by researchers are human capital, research and development, innovation and other macroeconomic and institutional factors with respect to the focus of the study concerned.

In analyzing capital accumulation in a growth framework, the relative effect

of private and public investment is useful from the policy and theoretical perspective. From the policy angle, if private investment has a stronger impact than public investment, it will help to rationalize policies related to public investment and privatization. From a theoretical perspective, most studies analyze the relationship between investment and economic growth by taking the aggregate role of investment for determination of steady state growth path and convergence rate.

Studies related to capital formation and economic growth focus on separating gross capital formation into public and private components. These studies have shown the impact of private and public investment on the performance of a given country's economy, or a group of countries. Hence, differences in economic growth even in developing regions in terms of levels and rate of per capita income seem to be associated more with differences in private than public investment rate.

Public investment can have either a crowding in or a crowding out impact on private investment, which may lead to a growth enhancing or growth deepening path. This depends on the availability of funds to undertake investments and the area to which the fund is devoted. According to Khan and Reinhart (1990), public sector investment can cause crowding out if it utilizes scare physical and financial resources that would otherwise be available to the private sector, or if it produces marketable output that competes with private output. Furthermore, the financing of public sector investment, whether through taxes, issuance of debt, or inflation will lower

the resources available to the private sector and thus depress private investment activity. Such crowding out would work in favor of strategies aimed at cutting back public sector investment as they would create a commensurate increase in private investment. On the other hand, public investment that is related to the development of infrastructure and the provision of public goods can clearly be complementary to private investment. Public investment of this type can enhance the possibilities for private investment and raise the productivity of capital, increase the demand for private output and ancillary services, and augment overall resource availability by expanding aggregate output and savings.

In empirical studies government investment has been approximated by the government's contribution to capital accumulation. The complementarity and the substitutability between public and private investment depends on the government's fiscal policy and its involvement in the economy. A large budget deficit will crowed out the private sector as a result of lower access to bank credit, higher real interest rates and a more appreciated real exchange rate.

Many endogenous growth models have stressed the role of private firms in driving the growth process. This idea is linked to the often held view that too much interference from the government may be detrimental to efficient production and (high) rates of accumulation. This type of thinking has led economists to empirically analyze the relationship between size of the public sector (e.g. government expenditure to GDP) and economic growth (Rogers 2003).

In economic growth studies, human capital is one part of the analysis. Nelso and Phelps (1966) stated that human capital can be thought of as affecting economic growth in two ways. First, if human capital (H) is a factor of production, e.g. $Y = f(A, K, H, L)$ changes in H will be correlated with changes in Y (growth). For example, workers with higher levels of education or skills should, ceteris paribus, be more productive. Second, the level of human capital may affect the rate of accumulation of other factors. For example Romer (1990) assumes that the growth of knowledge or technology (A) depends on the level of H. This appeal to the idea that more educated and skilled people are more inventive and innovative. A higher level of human capital may also encourage capital accumulation, or may raise the rate of technological catch-up for the country.

Terms of trade are also one of the most important macroeconomic variables as an indicator of external shocks to the economy. Adverse movement in the terms of trade will increase the cost of import relative to income and will also reduce the purchasing power of exports. Unfavorable terms of trade, therefore, may worsen the ratio of current account deficit to GDP. An increase in the price of imported goods with large weight in the national import value will have a direct impact on consumers' prices. Depressed export price in the agricultural sub-sector, which is the main stay of the economy, will draw resources away from the sector, reducing export earnings and discouraging investment in the sector (Oshikoyo 1994).

3.2 Empirical Literature

Most growth studies begin their framework of analysis with the most influential works of Solow (1956 and 1957) in economic growth theory, which ignored the role of any capital formation to economic growth and took technical productivity as the only source of economic growth. In this analysis technical progress was explained outside the model and considered as *manna* from heaven. Following this work there have been various studies by different researchers that attempted to trace the possible sources of growth of a nation. In these studies, a variable that is taken as a determinant of growth in one study is considered as a controlling variable in another study.

Most of these growth analyses tried to show the relative contribution of various factors of production to the growth process. Cross country analysis and time series were used in all attempts to show possible sources of growth. Usually, growth related analyses are undertaken by using cross section and panel data evidence. Such data sets are criticized for taking samples of varies countries differing widely in social, political and institutional characteristics on a common surface.[6]

Since the reappearance of growth theory in economic literature following Solow's pioneering work, various, empirical and theoretical studies relating investment to economic growth have been conducted. These studies show the different role of aggregate investment in the long run growth and

[6] For detailed critics of panel and cross-country growth regression see Temple 1999.

convergence across countries (Morgan, 1969, Barro, 1991, Barro and Sala-i-Martin, 1992, Mankiw, Romer and Weill, 1992, De Long and Summer, 1991, Levine and Renelt, 1992, Collier and Gunning, 1997 and Barro and Lee, 1994) are some to mention. De Long and Summer (1991), Levine and Renelt (1992), Collier and Gunning (1997) and Barro and Lee (1994) find that investment to GDP ratio has a strong influence on income growth.

The causal relationship between growth and investment is still an ambiguous issue. Though most studies show the direction of causality from investment to growth, Blomstorm and Zejan (1996) using a Grange-Sims causality framework and data of 5 year periods show that growth causes capital formation more than the reverse. Podrecca and Carmeci (2001) using sophisticated econometrics, on Penn World data found no evidence that increasing investment leads to increased growth.

The good performance of economies, which were governed by the state led economies in post war Europe and other socialist countries motivated most LDCs in Africa and Latin America to implement similar types of policy to public sector investment in 1950s. These LDCs invested scarce capital of their economy in large and medium scale industries, farming, mining, trade etc. However, excessive involvement of the public sector in every sector of the economy caused great crisis to these economies. Consequently, there have been frequent calls towards private investment especially since late 1970s. Following the Structural Adjustment Program of the International Monetary Fund and the World Bank for newly liberalized market economies of LDCs

most of these countries adopted privatization and private sector led growth as an alternative development strategy to boost economic growth. In this regard, the role of the state is limited to the formulation of policies and infrastructure investments like road, communication and energy whose service are essential since they tend to generate positive externalities for the private sector.

It is now widely accepted that the expansion of private investment should be the main impetus for economic growth, allowing public investment resources gradually to focus on social areas including alleviation of poverty and the upgrading of social capital and services (Chibber and Dailami, 1990).

Empirical studies addressing the impact of private investment on economic growth in developing countries started to appear in economic literature following the 1980s and 1990s Structural Adjustment Program. The robustness of investment to GDP ratio in explaining economic growth and the possibility of investigating the strong link between economic growth and economic policy through investment variables led most studies to focus their analysis from economic policy towards explaining cross-country differences in investment level. Mankiw et al (1992) using the augmented Solow model, which includes accumulation of human as well as physical capital in the growth regression found that 80% of the cross country growth variation in the model is explained by these variables. That is international variation in per capita income can well be explained using just these three variables.

In addressing the role of private and public investment in the economic growth process for 24 Latin American and Asian countries using a cross section sample, Khan and Reinhart (1990) found that private investment and public investment have a different effect on the long run rates of economic growth. Furthermore, they identified that private investment plays a much larger and more important role in the growth process than does public investment. In contrast, public investment has no statistically significant effect on growth. However, the problem in this analysis was the quality of the methodology employed. The causal correlation between dependent variables and the independent variables was not addressed properly. The causality runs directly from private investment to economic growth. The correlation between private and public investment may cause public investment to contribute indirectly to GDP growth by providing the necessary infrastructure like roads, electricity, telecommunication and schools. Although Coutinho and Gallo (1991), Serven and Solimano (1989) came to a similar conclusion, they have used a relatively small sample size and limited time period. Ram (1996) extended Khan and Reinhart's (1990) work by estimating their growth models to cover a considerably larger cross sectional sample and by including data for the 1970's and 1980's. For the 1970's, like Khan and Reinhart (1990), private investment appears vastly more productive than public investment. For the 1980's, however, public investment seems more productive than private investment in most cases. In this study considering the overall (average) picture for the two decades, productivity of some component of investment seems fairly similar, but the public investment parameter is slightly larger.

Another similar study, which tried to show the role of the private investment in economic growth, is that of Ghura (1997) for Cameroon. He used more than three decades data to test the hypothesis and employed modern econometric tools of time series to avoid any spurious correlation. He found that private investment plays a crucial role in output expansion. The analysis established a significant robust causal linkage between private investment and economic growth, implying that increases in private investment ratio boost economic growth. An increase in the private investment ratio by one percentage point raises economic growth by about 1.4 percentage points; this impact is larger than that of an increase in government investment. Ghali (1998) also attempted to address this issue in the neoclassical growth framework. He employed a Co-integrated Vector Autoregressive model to account for potential endogeneity and nonstationarity problems. Results suggest that private investment contrary to public investment has stimulated economic growth in Tunisia over the period from 1963-93. Badawi (2003) by using the same methodology as Ghali (1998) for Sudan found a positive contribution of private and public investment to economic growth. The impact of private investment was found to be more pronounced than that of public sector investment.

Khan and Kumar (1997) using pooled time series cross section data, which has a relatively larger number of country coverage (95 developing countries including Ethiopia) and a long time period (1970-1990) came up with similar positive contribution of private investment to economic growth. Their

result reveals that there is a substantial difference in impact of private and public investment on economic growth. Private investment had a much larger impact compared to public investment especially during the 1980s. This relationship holds even when other determinants of per capita growth are taken into account such as population and technical change, human capital enrollment ratio (secondary) and fiscal balance. Button and Sumlinshi (2000) confirmed Khan and Kumar's (1997) results and found an even larger coefficient for private investment and a smaller coefficient for public investment. Ramirez and Nazmi (2003) also suggested that both public and private investment positively contribute to economic growth for nine major Latin American countries. Ashipala and Haimbodi (2003) observed that private investment plays a crucial role in long-term stabilization policies in South African countries. Calamitsis, Basu and Ghura (1999) using data for 1981–1997 for Sub-Saharan Africa found that private investment is large and statistically significant compared to government investment in growth analysis. This result underscores the crucial role played by private investment in boosting growth. Although the magnitude of the impact of private investment declines once other factors influencing growth are taken into account, the coefficient remains statistically significant. The effect of government investment however is not robust. In most of the above studies except Ghura (1997), Ghali (1998) and Badawi (2003), the relationship between private investment and growth relationship is analyzed by using a cross section sample.

There are also studies conducted in Ethiopia, which show various

determinants of economic growth. Most of them, like others, focused on investigating the macro economic factors of growth. However, one study went beyond the traditional factors and included the annual rainfall supply in the regression and found a significant relationship between growth and annual rainfall. The study was first addressed by Seid (2000) and then by Seid and Berhanu (2003). Both of these studies by using cointegration analysis also found that the role of capital was statistically insignificant in Ethiopia's growth process of more than four decades. Another study by Esterly (2002), which used a growth accounting framework, supports the statistically insignificant contribution of capital to economic growth. However, Alemayehu and Befekadu (2002) in their analysis of factors characterizing the Ethiopian economy using a growth accounting framework found that capital has contributed positively to economic growth.

The contrast between the findings of Alemayehu and Befekadu (2002), and Esterly (2002) arose from the authors' assumption for the factor share of human and physical capital (0.65 and 0.35 respectively) based on cross country regression results as a benchmark instead of estimating them empirically (Seid and Berhnu, 2003)

Paterson (2003) used data from 1981 to 2000 to analyse the relationship between growth in real GDP and investment in a simple Harrod–Domar growth model and found a positive connection between investment and GDP growth rate in Ethiopia. The result also suggests that investment from exports and capital inflow is a viable way to promote growth. However, the

analysis and the conclusion are based on three explanatory variables (the ratio of investment to GDP, the ratio of export to GDP and the ratio of capital inflow to GDP) for a short period, which exposes the analysis to econometric problem like multicollinearity and endogeneity. Furthermore, the Harrod-Domar model is criticized for its assumption of a fixed coefficient production function, which does not allow for factor substitution and the saving ratio is assumed to be fixed.

Though there exist a vast economic literature, which demonstrates the relationship between private investment and economic growth for groups of developing countries, country specific studies lack in most of these countries including Ethiopia. It is obvious for countries like Ethiopia private investment is good for sustained economic growth. Given this fact, it is useful to investigate the contribution of private investment to economic growth using long time series data and suggest what has to be done for this sector to enhance the country's development endeavor.

CHAPTER 4

MODEL SPECIFICATION, METHODOLOGY AND DATA DESCRIPTION

4.1 The Model

To investigate the impact of private investment on economic growth, this paper utilizes a Solow- Swan type aggregate production function as applied in Ghura (1997) and Beddis (1999). The production function is modified to account for three types of capital- private and public physical capital stocks and the human capital stock. The production function is given by

$$Y_t = A_t(K_t^p)^{\alpha}(K_t^g)^{\beta}(Z_t)^{\gamma} \quad Z_t = L_t \quad \text{and} \quad HL_t \qquad (4.1)$$

Where Y is real output, A is technological progress, K^p and K^g denote the private and public physical capital stock respectively; Z is labor force (L) augmented by human capital development HL and t is the time index. The parameters α, β and γ denote, the elasticities of output with respect to private, government, labor force and human capital stocks respectively.

Expressing equation (4.1) in growth rate terms by multiplying both sides in log form (with lower case letters denoting growth rate) gives:

$$y = a + \alpha k^p + \beta k^g + \gamma z \qquad (4.2)$$

Equation (4.2) represents a long run growth relationship, which can be estimated provided that data are available for capital stock. However, such

data are typically unavailable for developing economies including Ethiopia, thus making it difficult to estimate a specification like (4.2). In the absence of data on capital stock, equation (4.2) can be transformed into an estimable form by making some simplifying assumptions regarding physical capital stock. Following Ghura (1997), data construction for the private and public investment can be undertaken by a simple transformation of the perpetual inventory accumulation equation.

$$\frac{\Delta K_t^p}{K_{t-1}^p} = \frac{I_t^p}{K_{t-1}^p} - \delta_p \qquad (4.3)$$

$$\frac{\Delta K_t^g}{K_{t-1}^g} = \frac{I_t^g}{K_{t-1}^g} - \delta_g \qquad (4.4)$$

Where I^p and I^g denote real private and public investment respectively δ_p and δ_g are the respective rates of depreciation of the private and government capital stocks. Assuming that both private and government capital stocks are a constant share of real GDP, that is[7]

$$.K^p = \mu^p Y \qquad (4.5)$$

$$K^g = \mu^g Y \qquad (4.6)$$

Where μ^p and μ^g are the respective fixed coefficients for private and government capital. Now one can rewrite equation (4.2) to obtain;

[7] In fact, this is not a real assumption as the country has undergone various economic policies with respect to investment, hence it is used here as a simplifying assumption

$$y = a' + \alpha' \left[\frac{I_t^p}{Y_{t-1}} \right] + \beta' \left[\frac{I_t^g}{Y_{t-1}} \right] + \gamma Z \qquad (4.7)$$

Where $a' = (a - \alpha\delta^p - \beta\delta^g)$, $\alpha' = \frac{\alpha}{\mu^p}$ and $\beta' = \frac{\beta}{\mu^g}$

Equation (4.7) can be estimated with available data for Ethiopia. This equation can be transformed into an empirically estimable specification as follows,

$$Y = a' + \alpha' PIY_t + \beta' GIY_t + \gamma HL_t + \psi L_t + \varepsilon_t \qquad (4.8)$$

Where Y is real output growth, PIY_t denotes real private investment as a share of lagged real GDP, GIY_t is the ratio of real government investment to lagged real GDP, HL_t is labor growth augmented by the human capital stock (HL), (L_t) labor force growth rate and finally ε_t is stochastic error term.

The main motivations underlying the specification of the model in equation (4.8) are first, following Barro's (1990) growth model, the possibility of the differential impact of private and public investment on economic growth is considered. Second, another strand of growth models stress that human capital accumulation by enhancing labor productivity can boost growth in the steady state (Lucas, 1988, Romer 1990, and Becker Murphy and Tamura, 1990).

One additional relevant variable which is common in explaining the growth process in most developing countries is added in equation (4.8) that is the

percentage change in export (X) as a share of real GDP. When we include this variable into the equation the final estimable model will be

$$Y = a' + \alpha PIY_t + \beta GIY_t + \gamma HL_t + \psi L_t + + \varpi X_t + \varepsilon_t \qquad (4.9)$$

Variables, which are included in the final model, are conducive to faster growth because they promote competition, encourage learning by doing, improve access to trade opportunities, raise the efficiency of resource allocation and enhance positive externalities resulting from access to improved technology (Lucas, 1988, and Romer, 1986 and 1990).

4.2 Estimation Procedure

Most empirical literature, which estimates the impact of private investment on economic growth generally employ the cross sectional data. This data assumes the existence of an identical aggregate production function for all countries, although differences may actually exist across countries. Therefore, the application of time series analysis helps to better understand the specific historical progress in perspective.

Estimation of parameters and hypothesis testing using time series data requires an investigation of the data generating process underlying variables at work. This investigation helps to avoid estimating a spurious correlation between variables in a regression, where what actually exist is a correlated time trend rather than a meaningful economic relationship (Granger and Newbold, 1986). A combination of variables that contain a time trend or are non-stationarity may lead to spurious correlation. To avoid the problem of

spurious correlation due to the presence of non-stationary variables in the regression model, the time series properties of the variables used in the model will be investigated.

4.2.1 Unit Root Test

If the data generating series follow the first order autoregressive process, the simplest form of the Dickey-Fuller (DF) test amounts to testing;

$$y_t = \mu + \rho y_{t-1} + u_t \qquad (4.10a)$$

or

$$\Delta y_t = \mu + \gamma y_{t-1} + u_t \qquad \text{Where} \quad \gamma = \rho - 1 \qquad u_t \sim \text{IID}(0, \sigma^2) \quad (4.10b)$$

Then the set of hypotheses to be tested is

$H_0 : \rho = 1$ (i.e. y_t series is non stationary)

$H_1 : \rho < 1$ (i.e. y_t series is integrated of order zero or stationary)

Since there is a deterministic component (intercept, trend, dummies) in the data generating process, we must allow a time trend to enter in the regression model to be expressed as

$$\Delta y_t = \mu + \gamma t + \gamma y_{t-1} + u_t \qquad u_t \sim \text{IID}(0, \sigma^2) \qquad . \qquad (4.11)$$

In this specification, the hypothesis is similar to the one applied to equation (4.10).

The DF test assumes the data generating process to be autoregressive (AR) of order one (AR (1)), and residuals as 'white noise'. However, if the data generating process is AR(ρ), where $\rho > 1$, the error term will be autocorrelated

due to misspecification of the dynamic structure of the concerned variable. In this case the DF test is no longer valid, and lagged differences of the dependent variable should be added or augmented to the test model in order to mitigate the autocorrelation problem, in the disturbance term. This is incorporated in the Augmented Dickey-Fuller test (ADF).

The ADF test can be captured by the following specification of an equation

$$\Delta y_t = \mu + \gamma t + \beta y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta y_{t-i} + u_t \qquad (4.12)$$

Where y_t is the variable of interest, t is a time trend, k is lag length, which is determined by a general to specific method whereby a generous lag structure will be allowed and the insignificant lags will be eliminated sequentially based on Akaike Information Criterion (AIC) and u_t is a random variable assumed to be 'white noise'.

The set of hypothesis to be tested is

$H_o: \beta = 0$ (i.e. y_t series is integrated of order one or unit root)

$H_a: \beta < 0$ (i.e. y_t series is integrated of order zero or non-unit root)

Where, H_o and H_a are the null and alternative hypothesis respectively.

With regard to non-stationarity, one remedy for the short run dynamic is to estimate by differencing variables if those differences are stationary. However, this method will lead to a considerable loss of long run properties of the data. Alternatively, economic variables may be combined together in

levels provided that they are co-integrated.[8]

Non-stationary economic series are said to be co-integrated if they can be transformed into a single series that exhibits stationarity (Engle and Granger 1987). There are two important ways to test for the existence of co-integration, namely, the Engle and Granger methodology and the Johansen (1988) Maximum Likelihood Estimation procedure. In the Engle and Granger methodology, variables to be included in the co-integration analysis have to be integrated of the same order, that is, order I(1). Then the long run equilibrium relationship is estimated between the variables and the residual is obtained. If this residual from the long run equilibrium is found to be stationary, the two variables are co-integrated of order (1, 1), that is, they do have long run relationship. If the variables are co-integrated, the next step is to estimate the Error Correction Model (ECM). However this procedure has its own defects, first, it assumes one variable as endogenous and uses others as regressors with a problem of imposing restriction. Moreover, using three or more variables, there may be more than one co-integrating vector. The method has no systematic procedure for separate estimation of the multiple co-integrations.

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[8] Formally, time series x_t and y_t are said to be co-integrated of order d, b, that is x_t and y_t .~ CI (d, b), where $d \geq b \geq 0$, if both series are I(d) and there exists a linier combination of the series such that $\beta_1 x_t + \beta_2 y_t$ is I(d-b) (Engle and Grander, 1987, p 253). The vector $[\beta_1 + \beta_2]$ is called a co-integrated vector. For the case of n series where n>2, a nx1 vector β exists such that $x_t * \beta \sim (d-b)$ where x_t denotes an nx1 vector of series $x_{1t}, x_{2t}, ..., x_{nt}$. The most interesting case is where the combination of the series is stationary, i.e. where d=b.

Fortunately, the Johansen (1988) maximum likelihood estimators can be used to replace the use of two step estimator and can test for the presence of multiple co-integrating vectors. This study uses the Johansen maximum likelihood for the analysis.

4.2.2 Co-Integration Analysis Using the Johansen Approach

In the Johansen procedure of co-integration analysis, there is no a priory separation of variables into endogenous and exogenous variables. Given the variable in equation (4.9) and specifying them as vector Z, the model can be re-specified as a vector of autoregressive (VAR) involving up to k lags.

$$Z_t = A_0 D_t + A_1 Z_{t-1} + A_t Z_{t-2} + \ldots + A_k Z_{t-k} + \varepsilon_t \qquad (4.13)$$

$$\varepsilon_t \sim IN(0, \Sigma)$$

Where Z_t is an nx1 vector containing all n variables in the system, D is a vector containing deterministic terms (intercept, trend, dummies, etc.) and ε is an n dimensional vector of multivariate random error with mean zero and covariance matrix Σ.

The VAR system in equation (4.13) can also be represented in the form

$$\Delta Z_t = A_0 D_t + \pi Z_{t-k} + \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \ldots + \Gamma_{t-k} \Delta Z_{t-k+1} + \nu_t \qquad (4.14)$$

This is simply an error correction representation, which discribes the interaction between the short run and long term impacts in a given

relationship. The estimates $\hat{\Gamma}_i$ represent short run adjustments while $\hat{\pi}$ contains long run information, D_t represents a vector of dummies, and intercepts. Equation (4.14) shows how levels of the endogenous variable in the Z enter short term dynamics. The main concern of cointegration is to determine the rank of the long run matrix, that is the determination of the maximum number of linearly independent columns in the matrix π. In determining the rank r of a matrix π of order, nxn the maximum possible rank is n and the minimum rank is zero. If there is full rank i.e. $r = n$, where n is the number of variables entering the co-integration space, this implies that all endogenous variable in z are I(0). If there is reduced rank, the statistical hypothesis under co-integration is $H(\rho)$; rank $(\pi) \leq r$, where r is the rank of the long run matrix. In this case, matrix π can be decomposed into a product of two non-null matrices such that $\pi = \alpha\beta'$. Matrix β is (nxr) vector of long run parameters and the (nxr)α matrix represents speed of adjustment to disequilibrium. Therefore πz_{t-k} in equation (4.14) is equivalent to $\alpha\beta' Z_{t-k}$ and $\beta' Z_{t-k}$ represents up to (n-1) linear combinations that ensure the convergence of the vector Z_t to their long run steady-state solution (Harris 1995).

When there is a reduced rank, that is, if there are $r \leq (n-r)$ co-integrating vectors in β, $\pi Z_{t-k} (= \alpha\beta' Z_{t-k})$ should be stationary (I(0)) so that ε_t becomes white noise. Once the number of linear combinations in the long run matrix π is known through rank determination, the next step is to conduct exogeneity and causality analysis to provide an economically meaningful

linear relation.

Hence, this study employs a method of cointegration analysis combined with the VAR technique (which is called cointegrated VAR) in order to estimate relevant coefficients and parameters that describes short and long run relationship of growth and private investment.

4.3 The data

This study conducts the empirical analysis by employing data sets for the period 1971-2006 for all variables. The data set is restricted to this period due to the availability of consistent information especially about the private sector. The data sources of the study are the national income accounts as prepared by the Ministry of Finance and Economic Development, Statistical Bulletins of Ministry of Education, the data base of the National Bank of Ethiopia, statistical abstracts of the Central Statistics Agency, the data base of the Ethiopian Investment Agency and the data base of the World Bank (WB) .

Data for real private and real public investment is obtained from the National Bank of Ethiopia at 2000 constant price. Human Capital Stock (HL) is measured by average years of schooling of the labor force based on Barro and Lee's (2000) method and data from Ministry of Education and Central Statistics Agency. Labor Force (L) is approximated by economically active population which is at the age of between 15 and 65. Data on export (X) which is measured by export is available from the National Bank of Ethiopia.

CHAPTER 5
EMPIRICAL ANALYSIS

The level of total investment in general and private investment in particular for the last 36 years showed a fluctuating trend in Ethiopia. The share of private investment in GDP was 9.1% on average for the period 1971-2006. When we see the record in the three regimes separately, it has registered on average 14.24%, 6.81%, 10.25% share of the GDP during the imperial, the military, and the current period respectively. The public investment share of GDP was also at a low level. Its record reveals that during the three regimes the share was not more than 10 %. The growth rate of the economy was also at such a low pace that it was not in a position to feed the rapidly growing population. This is clearly illustrated by the country's high dependency on foreign assistance and by the registered low growth rate as summarized in Table 5.1.

Table 5.1 Average GDP shares of private (PI) and public investment (GI) and Economic growth rate 1971-2006

Year	1971-1974	1975-1991	1992-2006	1971-2006
PI	14.24	6.81	10.25	9.07
GI	2.86	8.39	8.99	8.02
Growth rate	3.2	2.0	8.16	

Source: National Bank of Ethiopia, Ministry of Finance and Economic Development and own computation

5.1 Estimation Results

This section of the study addresses the relationship between private investment and economic growth by employing the methodology described in the previous chapter. Before directly estimating equation (4.9) of Chapter 4, the order of integration of each variable has to be tested i.e. there is a need to test the unit root by using ADF (DF) procedures. This testing procedure reveals the number of times a variable needs to be differenced to attain stationarity. ADF (DF) test results for the variable considered are based on equation (4.10) – (4.12). When the ADF (DF) statistic is larger than the critical value, the null of unit root is rejected. In every case, the number of lags included in the regression was chosen using the Akaike Information Criterion (AIC). The Equations are applied to variables Y, PIY, GIY, HL, L, and X as defined in methodology section in logarithmic form. The results indicate that all variables are non-stationary by not rejecting the null for variables in level and rejecting the null for change in variables at. 1% level of significance. Therefore all variables are integrated of order one (I (1)) see Table (A) in the appendix.

Non-stationary of variables, as noted in Chapter 4 supports employing the technique of VAR system of equations. Technically, the endogenous variable under the VAR system is explained by the lagged values of the variable and lagged values of all other variables in the system.

5.1.1 Co-Integrated VAR System and Stationary Long-Run Relationships.

In estimating the model represented by equation (4.9) in Chapter 4 using Johansen maximum likelihood procedure, data for 1971-2006 are used and the results are presented in Table 5.2. In the model, the matrix D (the deterministic matrix) holds an unrestricted constant i.e. it does not enter the co-integrating space of long run relations. [9] The order of the VAR or the lag length is set to two, hence VAR(2). The determination of lag length in the VAR system is a crucial issue since the co-integration rank and resulting outputs are sensitive to the dynamic structure of the system. To set the lag length, this study followed general to specific approach in which a VAR system is run with a reasonably high lag length of four to reach a suitable lag length of two.

By employing PcGive, (which is based on Johansen (1988)) the study determined co-integration rank r, and estimated co-integrating vectors β and adjustment coefficients α s. Results are reported in Table 5.2. Co-integration test statistics for the six variables indicate that one co-integrating vector exists. As indicated in Table 5.2(a) the null hypothesis that there is no co-integrating vector in the system ($r \leq 0$) is rejected but the null that there exists at most one co-integrating vector ($r \leq 1$) is not. This is indicated by that for $H_o: r \leq 0$ the trace statistic reports a magnitude of 127.76 which is

[9] This paper complies with a suggestion by Doornik and Hendry (2001), to use un- restricted constant when data exhibit non-stationary behavior, allowing for a non-zero drift in any unit root process.

insignificant at 1% while for H_o:$r \leq 1$ the trace statistic reports a significant magnitude which is less than the critical value (see panel (a) of Table 5.2). The null of at most one co-integrating vector ($r \leq 1$) is accepted. Unrestricted standardized estimates for the co-integrating vector βs and respective adjustment coefficients α s are reported in panels (b) and (c) of Table 5.2 along side respective standard errors.

The co-integrated long run relationship with adjustment coefficients or loading parameters corresponds to the term (ΠZ_{t-1}) or ($\alpha\beta' Z_{t-1}$) in equation (4.14) of Chapter 4. This term encompasses the error correction term ($\beta' Z_{t-1}$) that enters the short term Vector Error Correction Model (VECM).

Table 5.2 Co-integration Rank, Unrestricted cointegrated Vector and Loading Coefficients.

(a) I (1) co-integration analysis and testing for co-integration rank r

Rank r≤	Trace statistic	$l_{trace}(95\%)$	Eigen values	P- Values
0	127.76	109.8	0.9038	0.009***
1	86.785	94.2	0.7111	0.087
2	56.728	62.5	0.5978	0.172
3	28.839	36.4	0.5705	0.577
4	10.473	25.7	0.4268	0.897
5	3.668	12.3	0.1863	0.785

b) Unrestricted standardized Eigen vector b':

	Y	PIY	GIY	HL	L	X
β'	1.000	-0.4807	-0.3581	-0.209	-0.213	-0.105
	(rest.)	(0.2173)**	0.0995) ***	(0.1090) *	(0.29)	(0.0510) **

(C) Unrestricted standardized adjustment coefficients α:

	α:
Y	-0.4721 (0.1038) ***
PIY	-0.6236 (0.3034) **
GIY	0.1082 (0.1591)
HL	-0.6390 (0.6268)
L	-0.013 (0.0129)
X	0.4385 (1.0255)

(*), (**), (***) show the null hypothesis is rejected at 10%, 5% and 1% significance level respectively. The figures in parenthesis are standard errors

As shown in Table 5.2 (b) both private and public sector investment have a positive significant long run impact on real output. The coefficient for PIY and GIY can also be interpreted as long-run elasticities of real output with respect to both types of investment. Private investment shows a larger elasticity of 0.4807 compared to the reported coefficient for public

investment, which is 0.3581. The loading coefficient α_1 (-0.4721) shows adjustment towards the long run steady state path.

5.1.2 Long Run Weak Exogeneity and Granger Causality

Information about the variables' long run weak exogeneity with respect to co-integrating vector can be inferred from the adjustment or loading coefficients α. As can be seen in Table 5.2 αs on GIY, HL, L, and X appear to be insignificant, indicating a long run weak exogeneity with respect to the co-integrating vector. In contrast, Y and PIY appear with significant loading coefficients. This inference is supported by formal tests for long run weak exogeneity and results are reported in Table 5.3 below. Respective α coefficients on variables are linearly restricted to equal zero, preserving the co-integration rank of one. The restricted coefficients are then tested (separately) for weak exogeneity. The linear hypotheses of zero αs on GIY, HL, L and X are accepted since associated likelihood ratios chi^2 report respective values of 0.1439, 0.9145, 1.113 and 0.159, which are highly insignificant (*p*-probability in parentheses). Similar chi^2 tests for weak exogeneity of Y and PIY report magnitudes of 11.505 and 0.2031, which are highly significant enabling us to easily reject the null hypothesis of weak exogeneity.

Table 5.3 Test for long run weak exogeneity

(H_o: Variable is exogenous to the cointegrating vector)

	chi^2 (prob.)	Decision over H_o	Inference
Y	11.505 (0.0001)	reject	not exogenous
PIY	0.2031 (0.0425	reject	not exogenous
GIY	0.1439 (0.958)	accept	exogenous
HL	0.914 (0.339)	accept	exogenous
L	1.113 (0.292)	accept	exogenous
X	0.159 (0.689)	accept	exogenous

The rejection of the null hypothesis that real output is weakly exogenous indicates that a significant long run stationary feedback to real output exist and the endogeneity of other variables implies absence of feedback effect from the real out put to them . This result seems similar to those found in Badawi (2003) but in contrast to Naqvi (2003) for the case of Sudan and Pakistan respectively.

When we consider Table 5.3, the long run weak exogeneity of GIY, HL, L and X are utilized to re-estimate the system, preserving the co-integration rank of one and imposing four long run zero restrictions on respective adjustment coefficients of GIY, HL, L and X (no restrictions are imposed on βs apart from identification restriction). The final result of restricted standardized α s and βs are reported in Table 5.4. Results for restricted βs and α s for both private and public investment have brought a minor change in the respective elasticities of now 0.4937 and 0.3756. These results tend to be qualitatively similar to those reported in Badawi (2003), Naqvi (2003),Beddis (1999) and Ghura (1997) for Sudan, Pakistan, Gambia and Cameroon, respectively, but in contrast with Ghali (1998) who reported a negative contribution of public

investment to real output in Tunisia. Badawi reports 0.89 and 0.20 magnitude for output elasticities with respect to private and public investment. Both private and public investments affect real output positively in Sudan. The same positive contribution of private and public investment is revealed for Ethiopia from the respective β coefficients in Table 5.4.

Table 5.4 Restricted Long-Run Elasticities and Loading Coefficients:

$(\alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0)$

a) Restricted standardized eigenvectors β':

	Y	PIY	GIY	HL	L	X
β'	1.00	-0.4937	-0.3756	-0.1280	-0.0291	-0.6471
	rest.	(0.2301)**	(0.1320)***	(0.0641)*	(0.9667)	(0.2904)**

(b) Restricted standardized adjustment coefficients a:

	α_1:
Y	-0.4701 (0.0687) ***
PIY	-0.6113 (0.2740) **
GIY	0.00(rest.)
HL	0.00(rest.)
L	0.00(rest.)
X	0.00(rest.)

(*), (**), (***) denote significance at 10%, 5% and 1% level, respectively. The figures in parenthesis are standard errors

In addition to long-run weak exogeneity, we test for causality between private investment and economic growth using Granger tests, a widely used technique. This method helps to test whether economic growth has an impact on private investment in the country and vice versa. Formally, it is possible to test for non causality from PIY to Y by testing for the hypothesis that all parameters on lagged values of PIY in an autoregressive equation of

Y are equal to zero. Such a restriction could be tested for straightforwardly by using an F-test or the Lagrange multiplier (LM) test. Acceptance of the joint hypothesis that all parameters on lagged values of PIY are not different from zero would imply that PIY does not Granger cause Y.

For causality tests VAR representation in levels may raise some doubts concerning its results because it contains non-stationary I(1) variables. Hence we employ VAR representation in differenced variables with only the intercept in the deterministic part.[10] Granger test results based on the stationary VAR model are reported in Table 5.5. Results indicate that there is no feedback effect of economic growth on private investment. The null hypothesis that PIY does not Granger cause Y is rejected at 1% significance level whereas the hypothesis from Y to PIY is not rejected justifying the fact that private investment can explain the growth process in Ethiopia.

Table 5.5 Granger tests for Causality

Null Hypothesis	F. Statistic	Probability
PIY does not granger cause Y	14.134	(0.0027) ***
Y does not granger cause PIY	6.4354	(0.1922)

*** shows rejection of the null hypothesis at 1% level of significant

[10] The same type of technique applied in Badawi (2003) and Ghali (1998).

5.1.3 Short Term Dynamic Analysis

Once the existence of a long term relationship and appropriate parameters are determined, to make the analysis complete under the Johansen framework, the coefficients of the short term dynamic have to be estimated. These coefficients are represented by $\hat{\Gamma}_i$ in equation (4.14) of Chapter 4. This short term dynamics include a lagged error correction term generated from the restricted long run stationary relationship described in Table 5.4 of the cointegrated vector β'. The error correction term takes the following form

ECT=Y-0.4937*PIY-0.3756*GIY-0.1280*HL-0.0291*L-0.6471*X (5.1)

This error correction term enters in the short term dynamic vector in its one period lag form. The reason behind including the lag as explanatory variable is that the disequilibrium at period t_{-1} determines the direction of the dependent variable at period t. the coefficient for the error correction term is expected to be equal to the adjustment coefficient reported in Table 5.4 of panel (b)(-0.47).

The short term dynamics or the I(0) VAR (1) system consists of six equations of changes in Y, PIY, GIY, HL, L and X. The system is estimated by Ordinary Least Squares technique and results obtained for change in Y and PIY are reported in Table 5.6 panel (a) and (b). Since all variables in the short term model are I(0), conventional test statistics such as chi square, t and F statistics are valid and can be used for inferences about the significance coefficients.

In estimating the error correction model, two cases are considered: one in which dummy (Dchange) for regime that promotes private investment is introduced and the other without the dummy. The various diagnostic tests of the models in Table 5.6 do not show statistical problems in either of the model. As shown in the Table, the Breusch-Pagan test of higher order serial correlation up to two lags, the autoregressive conditional heteroscadistic test for normality, hetroscedasticity test, and the RESET test of functional form confirm the absence of problems in the models.

In both models, private and public investments have a positive short term impact on growth at 5% and 10% significant level, respectively. In the models, export also makes a significant contribution to growth, while labor force and human capital are not statistically significant. The model including the dummy further indicates that the Imperial and the current regimes created a better environment for positive contribution of private investment to the economic growth process compared to the military regime.

Table 5.6 Vector of Error Correction Model

(a)

Explanatory Variables	Dependent Variable ΔY	
Constant	-2.178 (0.4134)***	-2.398(-0.3788)***
ΔY_{-1}	-0.061(0.3547)	-0.025(-0.2336)
ΔPIY_{-1}	0.0265 (0.0106)**	0.0402(0.0165)**
ΔGIY_{-1}	0.032 (0.0166)*	0.0321(0.0158)*
ΔHL_{-1}	0.080 (0.0624)	0.0186(0.0132)
ΔL_{-1}	0.5798 (0.3651)	0.710(0.4801)
ΔX_{-1}	0.032 (0.0158)**	0.0434(0.0199)**
ΔECT_{-1}	-0.4542 (0.2165)**	-0.4502(0.1943)**
Dchange	---	0.0274(0.0109)**
R^2	0.2839	0.3531
ARl-2	F (2.22) = 0.0808 (0.1487)	F (2.21)=2.108(0.1465)
ARCH 1	F (1.22)=0.12155(0.7301)	F (1.21) = 0.012(0.9154)
Normality	0.5318(0.1065)	2.43 (0.2969)
Chi^2 (2)		
Hetero test	F (14.9) = 1.5605 (0.2539)	F (15.7)= 1.1660(0.4402)
RESET	F (1.23) = 1.36841(0.5498)	F (1.22) = 1.495(0.5901)

(*), (**), (***) denote significance at 10%, 5% and 1% level, respectively. The figures in parenthesis are standard errors and probabilities in the coefficients and diagnostic tests respectively.

This is observed through the improvement of the coefficient from 0.03 to 0.04 and goodness of fit measure (R^2). As expected, the error correction term in both models is significant with expected sign and approximately equivalent magnitude (-0.45), which is comparable to the first restricted standardized loading coefficient (α) given in Table 5.4 of panel (b). In general, we can infer that private as well as public investment makes a positive contribution to growth in the long and in the short term.

5.6 Vector of Error Correction Model

(b)

Explanatory Variables	Dependent Variable ΔPIY
Constant	13.3258(5.100)**
ΔPIY_{-1}	-0.6109(0.3725)
ΔY_{-1}	0.7242(0.027)**
ΔGIY_{-1}	0.5765(0.2959)*
ΔHL_{-1}	0.2023(0.1366)
ΔL_{-1}	0.4972(0.7023)
ΔX_{-1}	0.2117(0.0854)**
ΔECT_{-1}	-0.6042(0.2331) **
R^2	0.6052
ARl-2	F (2.22) =1.4398(0.2585)
ARCH 1	F (1.22) = 0.1184(0.7341
Normality Chi^2 (2)	0.5605(0.7556)
Hetro test	F (14.9) = 0.4627 (0.905)
RESET	F (1.23) = 1.0109(0.917)

(*), (**), (***) denote the null hypothesis is rejected at 10%, 5% and 1% significance level respectively. The figures in parenthesis are standard errors and probabilities in the coefficients and diagnostic tests respectively.

The results concerning the short term dynamic of private investment as reported in panel (b) of Table 5.6 indicate that public investment has a significantly positive effect on private investment. This implies that private investment reacts positively to changes in public investment. Most similar studies conducted in other countries suggest the positive contribution of private investment to economic growth and show a positive or negative relationship between private and public investment. Ghali (1998) has found that in the long run, private investment has a positive effect on growth while public investment has a negative effect on it for Tunisia; additionally, he found that public investment has a significant crowding out effect on private investment. Badawi (2003) reports for Sudan that both private and public

sector investments have a positive long run impact on real output, however, public sector investment has a significantly negative effect on private investment. Naqvi (2003) also found the positive contribution of private and public investment to economic growth in Pakistan. These results show similarities and differences with the outcome we found for Ethiopia. In our case, both private and public investment positively contributes to economic growth and the relationship between the two investment types is complementary. Hence, investments made by the public sector in Ethiopia if they are of for example an infrastructural nature have a crowding in effect on private investment. Since infrastructure investment usually is associated with positive externalities, public investment engagement in that area enhances the productivity of private investment and economic growth.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

A strong private sector is an important engine for stimulating economic growth. The higher the share of private investment in the gross domestic product of a country, the higher the average growth rate of the economy. This is reflected by the creation of more employment opportunities, higher incomes, and increased foreign currency earnings, hence an improvement in the standard of living of people. Attainment of higher growth through private investment depends among other factors on the past policy of the country towards the sector.

In Ethiopia, private sector investment passed good and poorly designed policy regimes. During the Imperial regime, the investment policy followed by the government was favorable in terms of providing a better working environment. In addition, the relatively stable economic and political condition of the period helped to establish a secure working environment for the private sector. However, in the socialist regime, the state as a dominant actor in the economy was heavily involved in production of products ranging from household commodities to large machinery and construction materials. As a result, private investment was discouraged by imposing a ceiling on permissible fixed asset licensing and high rates of personal taxation in credit allocation. Public sector investment was favored in terms of incentive provision though its return was inefficient and ineffective. The current government since it took power in 1991 is providing various incentives and

tries to promote private sector investment. However, there is still a debate to further liberalize the market and to make it more conducive to the sector. The current government has enacted more than five investment laws over the past 16 years to create a better environment for private investment. However, the frequent changes in the law by itself appear to be an obstacle to the growth of stable private investment in the country. In general, when we compare the policies in the three regimes, the Imperial and the current governments provided a relatively better environment to the sector.

This study has measured the relationship between private investment, economic growth and public investment in Ethiopia using data from 1971 to 2006. Using multivariate cointegration technique we have developed a Vector Error Correction Model of growth useful for investigating the causal dynamics between private investment and economic growth. Estimation results revealed that both private investment and public investment have a positive effect on economic growth in the short as well as in the long run. An increase in private investment ratio to real GDP is estimated to raise growth *ceteris paribus* by about 0.49 percentage points in the long run. In addition to the two investment categories, the country's export was found to contribute positively to economic growth in the long as well as in the short term. The human capital component has shown to be an important determinant of the Ethiopian growth performance in the long run.

The pairwise Granger causality test between private investment and economic growth using a lag structure suggested that changes in private

investment precede changes in economic growth. The dynamic analysis of the short term vector of the Error Correction Model also confirms that private investment has contributed more to economic growth in the current and Imperial regimes than in the socialist regime. Furthermore, results substantiate the positive relationship between private investment and public investment.

Private investment and public investment are shown to have a quantitatively different long run as well as short run effect on the rate of economic growth. Private investment is found to be robust in explaining the growth process in Ethiopia. Therefore, private investment has to be encouraged for the economic development strategy of the country. The short term dynamic also demonstrates the complementarity between private and public investment underlining the importance of government investment in infrastructure like roads, electricity, telecommunications and schools that can have a strong positive influence on the productivity of private capital formation and economic growth.

Although the contribution of private investment to economic growth is higher than that of public investment, this contribution is relatively small when we compare it to other countries like Sudan, Gambia and Cameroon. Furthermore, the share of private investment in GDP during the study period (1971-2006) averaged less than 10 percent, which is lower than the average for other developing economies. The main reason for the small share of private investment in GDP and its low contribution to growth is the low level

of development of the sector and its rebirth after 17 years of distorted policy towards it. In order to generate sustainable real GDP growth rates for the next period, the private investment ratio will have to be raised.

To raise the share of private investment in real GDP and to improve the productivity of private investment so as to achieve more dynamic and sustainable growth, policy measures have to be taken to promote an enabling environment. Accordingly, a strong effort is required to establish a stable macroeconomic environment, including the provision of adequate legal and institutional arrangements that safeguard private property rights, enforcement of contracts and fostering of healthy competition, adequate access to credit and to imported inputs by private investors. Policies to promote private investment would generally have a significant benefit for long run growth and thus for the improvement in the standard of living of Ethiopians.

In support of these efforts, the Ethiopian government should formulate policies to encourage private sector development. These policies include the provision of the necessary infrastructure at a manageable economic cost as well as the creation of an overall conducive environment to sound investment and the promotion of human resources. Without these, the private sector is unlikely to make its full contribution to development.

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Appendix I

A) Unit root test using DF and ADF procedure

Variable	DF Test Statistics Without trend	DF Test Statistics With trend	ADF Test with Constant and trend	K	Inference
Y	-1.020	-1.319	-0.6706	2	unit root
ΔY	-5.403***	-5.681***	-5.744***	1	Stationary
PIY	-1.406	-1.281	-2.450	1	unit root
ΔPIY	-5.03***	-5.09***	-4.875***	3	Stationary
GIY	-2.133	-1.894	-2.212	0	Unit root
ΔGIY	-5.582***	-5.658***	-4.978***	0	Stationary
HL	-0.7555	-1.469	-0.486	1	Unit root
ΔHL	-4.788***	-4.713***	-4.657***	0	Stationary
X	-1.434	-1.920	-1.159	0	unit root
ΔX	-5.921***	-5.866***	-5.545***	0	Stationary
L	-0.282	1.187	-1.477	1	unit root
ΔL	-6.100***	-6.348***	-6.054***.	0	Stationary

Critical value used for ADF –statistics are 5% = -2.959 and 1% = -3.657 (values are produced by PcGive and found in Dickey and Fuller (1979). (*) and (**) rejects the hypothesis is of unit root at (5%) and (1%) significance level respectively K, the number of lags, which is chosen using the Akaike Information Criterion (AIC).

Appendix II

B) Graphical Representation of Variables

Figure B1: Real GDP

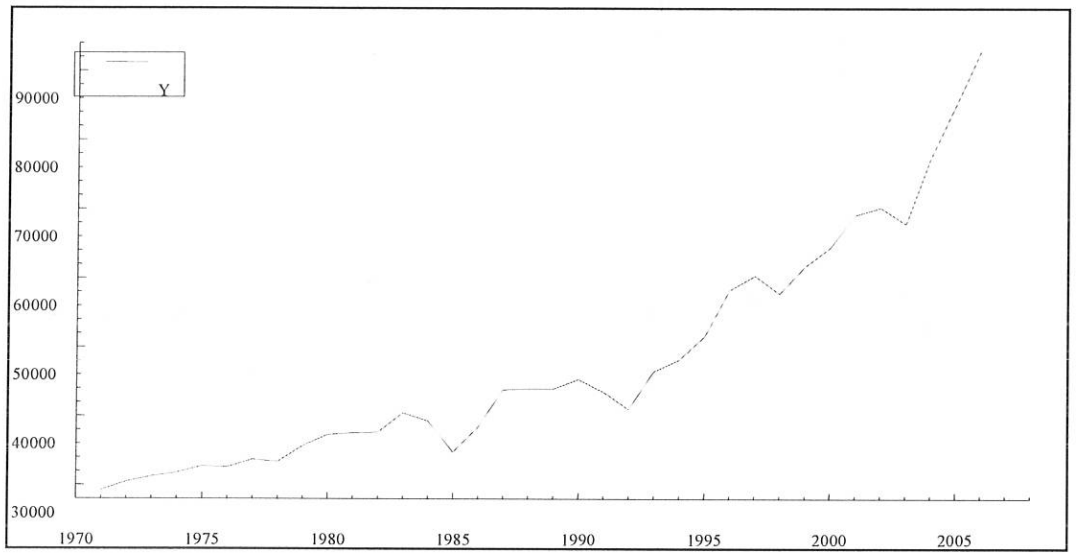


Figure B2: Real Private Investment

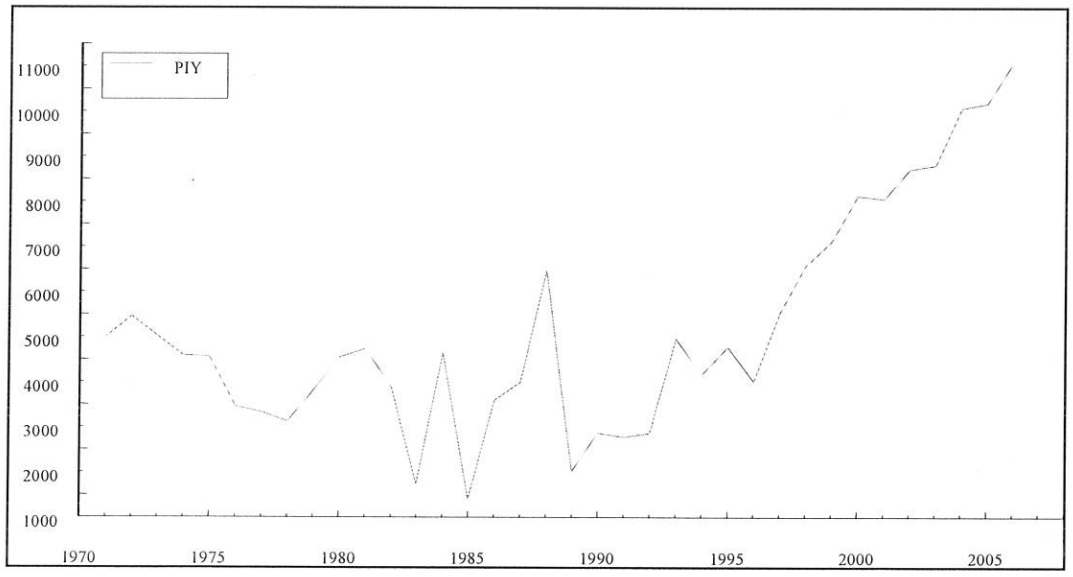


Figure B3: Real Public Investment

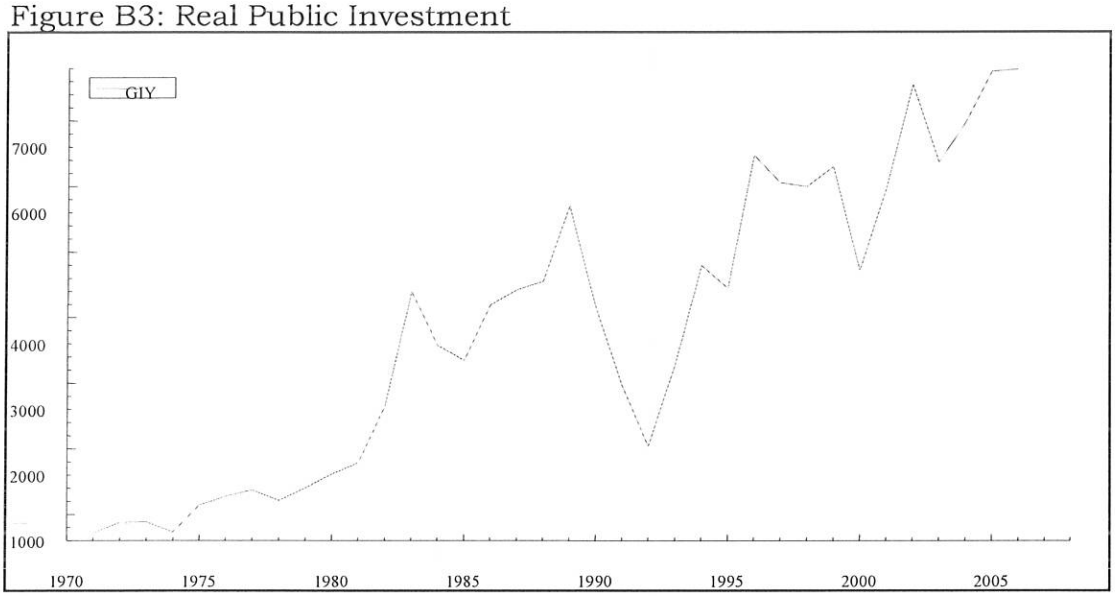


Figure B4: Human Capital

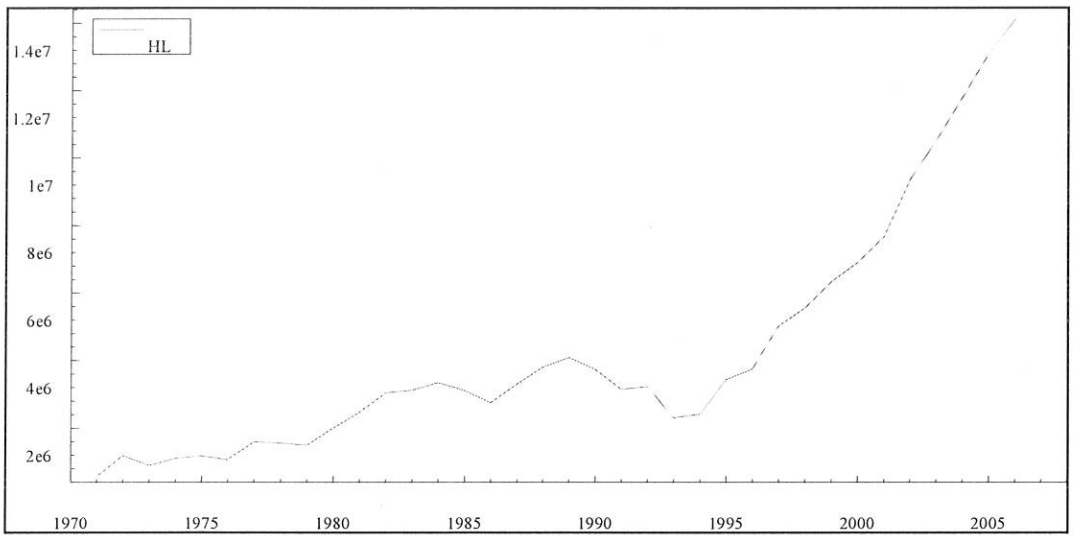


Figure B5: Real Export

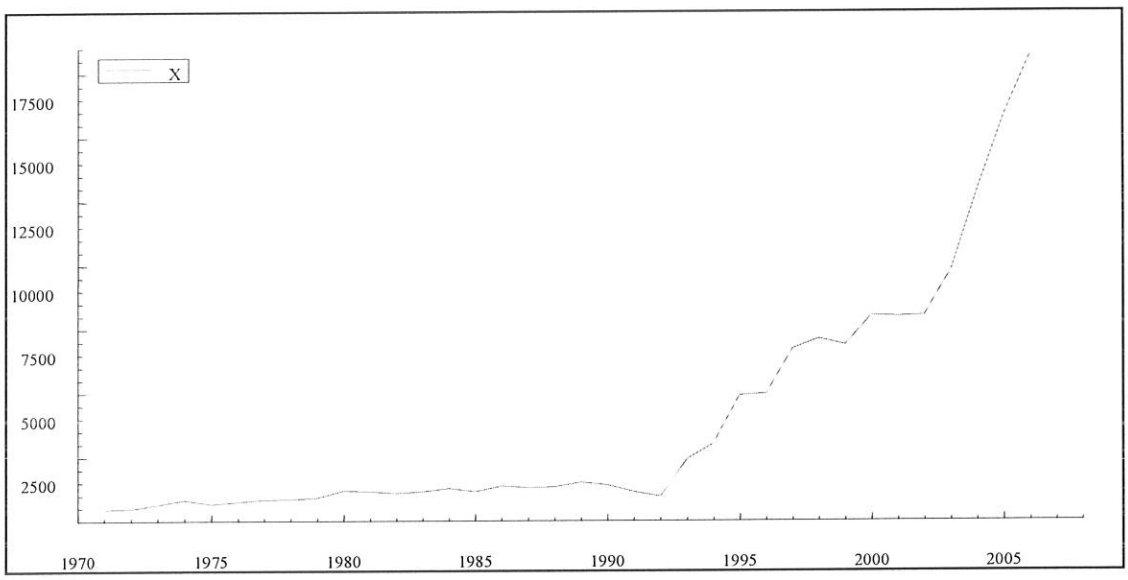
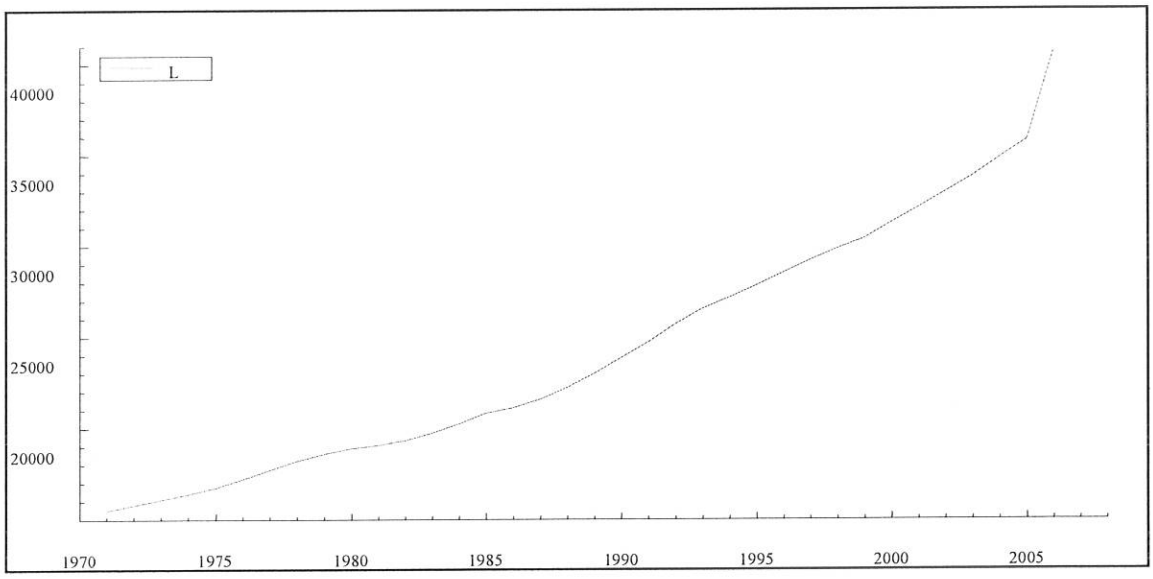


Figure B6: Labor Force



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.

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