

**ADDIS ABABA UNIVERSITY  
SCHOOL OF GRADUATE STUDIES  
FACULTY OF BUSINESS & ECONOMICS**

**AN EMPIRICAL INVESTIGATION OF  
THE AID - GROWTH RELATIONSHIP IN ETHIOPIA**

**BY  
WONDWOSEN TEFERA**

**A THESIS SUBMITTED TO THE SCHOOL OF  
GRADUATE STUDIES OF  
THE ADDIS ABABA UNIVERSITY**

**IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
OF THE DEGREE OF MASTER OF SCIENCE  
IN ECONOMIC POLICY ANALYSIS**

**JULY 2003  
ADDIS ABABA**

## ***ACKNOWLEDGEMENT***

I would like to express my sincere gratitude to my advisor Dr. Gebrehiwot

Ageba for his constructive advice and guidance while I was writing this thesis. I am grateful to his invaluable comments and suggestions from which I have benefited a lot.

My thanks also goes to the African Economic Research Consortium (AERC) for sponsoring my stay in Nairobi and for the financial support.

Last but not least, I am indebted to my family particularly to my sister Emnet Tefera for the assistance and encouragement that enabled me complete this study.

## TABLE OF CONTENTS

Acknowledgement .....	i
List of Tables .....	v
List of Figures .....	vi
Abstract.....	viii
CHAPTER ONE – INTRODUCTION .....	ii
1.1 Background .....	1
1.2 Problem Statement.....	1
1.3 Objective of the Study .....	2
1.4 Data and Methodology.....	4
1.5 Organization of the Paper.....	5
CHAPTER TWO - ECONOMIC POLICY AND PERFORMANCE OF ETHIOPIA....	5
2.1 Economic Policy of Ethiopia - An Over View.....	6
2.2 Economic Performance of Ethiopia.....	6
2.2.1 Trends in Real Output .....	10
2.2.2 Performance of Investment and Domestic Saving .....	10
2.2.3 Performance of the External Trade .....	13
2.2.4 Trends in Government Revenue, Expenditure and Deficit Financing .....	14
2.2.5 Performance of Aid .....	16
CHAPTER THREE - REVIEW OF THE LITERATURE.....	19
3.1 Theoretical Literature .....	22
3.1.1. Early Studies .....	22
3.1.2. Modern Theories on Aid Effectiveness.....	22
I) Aid, Saving and Investment .....	25
II) Aid Policy and Growth: .....	27
3.2 Review of the Empirical Literature .....	32
3.3 Studies on Ethiopia.....	34
CHAPTER FOUR - MODEL SPECIFICATION AND METHODOLOGY .....	43
4.1 Model Specification .....	49
4.2 Data Source .....	49
4.3 Methodology of the Study.....	56
4.3.1 Stationarity and Unit Roots .....	56
4.3.2 Cointegration Analysis.....	56
4.3.3 Vector Error Correction Model (VECM).....	60

CHAPTER FIVE - ESTIMATION RESULT .....	67
5.1 Unit Root Test.....	67
5.2 Test for Cointegration and Long run Relationship.....	68
5.3 Error Correction Model Result .....	76
5.4 Test for Causality .....	79
CHAPTER SIX - CONCLUSION AND POLICY IMPLICATION .....	82
6.1 Conclusion .....	82
6.2 Policy Implication .....	83
BIBLIOGRAPHY .....	86
APPENDICES .....	
Appendix I Plot of the Level of Investment not Financed by Foreign Aid.....	92
Appendix II Residual Generated Regressor .....	93
Appendix III Policy Index .....	94
Appendix IV Plot of Variables .....	95
Appendix V Test Result for Weak Exogeneity and Beta Significance.....	97
Appendix VI Plot of Recursive Estimation .....	98
Appendix VII Result of Cointegration Test .....	99

## LIST OF TABLES

Table 2.1: GNP Per Capita and Percentage Growth of Real GDP .....	11
Table 2.2: Growth rate of Real GDP and the contribution of the sectors. ....	12
Table 2.3: Percentage Share of Domestic Saving and Investment to GDP.....	13
Table 2.4 Revenue, Expenditure and Deficit .....	17
Table 2.5 Per capita Aid .....	20
Table: 5.1 ADF Unit Roots Test .....	68
Table5.2 Test for the Number of Cointegrating Vector (Investment Equation).....	69
Table 5.3 Standardized Beta ( $\beta$ ) Coefficient and Standardized Alpha ( $\alpha$ ) Coefficient..	69
Table 5.4 Test for the Number of Cointegrating Vector (Growth Equation) .....	72
Table 5.5 Standardized Beta ( $\beta$ ) Coefficient and Test for $\alpha$ coefficients .....	72
Table 5.6 Result for the Dynamic Equation (Investment Equation).....	76
Table 5.7 Result for the Dynamic Equation (Growth Equation) .....	78
Table 5.8 Causality Test (F-statistics).....	81

## LIST OF FIGURES

Figure 2.1	Share of gross domestic saving and gross capital formation to GDP.....	14
Figure 2.2	Trade Balance.....	16
Figure 2.3	Deficit including and excluding grant .....	19
Figure 3.1	Kinked budget constraint .....	28

## ACRONYMS

SSA	Sub Sahara Africa
FFDP	First Five Year Development Plan
SFDP	Second Five Year Development Plan
TYPF	Ten Years Perspective Plan
ODA	Official Development Assistance
GNP	Gross National Product
GDP	Gross Domestic Product
GDS	Gross Domestic Saving
GCF	Gross Capital Formation
DF	Dickey Fuller
ADF	Augmented Dickey Fuller
EG	Engle - Granger
OLS	Ordinary Least Square
ARCH	Auto Regressive Conditional Heteroscedasticity
VAR	Vector Auto Regressive
VECM	Vector Error Correction Model

## **ABSTRACT**

The objective of this study is to assess the relationship between aid, policies and economic growth in Ethiopia for the period 1962/63 to 2001/02. The analysis is conducted using the Johansen Maximum Likelihood Procedure.

The main findings of the empirical investigation are: Foreign aid has a significant positive contribution to investment, whereas uncertainty of aid flow (as a result of aid volatility) significantly and negatively affects the capital formation activity. The effect of foreign aid on economic growth appeared negative but insignificant. Aid interacted policy term, on the other hand, produced significantly positive result. The result further points out that good economic policies increase the level of foreign aid that can be productively consumed. The Error Correction Model (ECM) conclude that foreign aid is insignificant in the short run. Furthermore, the causality test shows that the causality runs from policies to foreign aid while the converse does not hold.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background

Judged by several conventional standards, Ethiopia is one of the poorest countries in the world. The record of Ethiopia is even far lower than the average Sub Saharan Africa (SSA) countries who are also termed as poor by the world standard. For instance, between the period 1975-2000, GNP per capita of Ethiopia is four times lower than the average SSA countries (World Bank, 2002). Similarly, the performance of Ethiopia in improving domestic saving and investment is behind the average SSA. Evaluation of the case across regimes in general point that in the Derge period the performance was the lowest where real per capita GDP on average appeared negative.

In all regimes much of the income is generated from the agricultural sector followed by the service and the industry sectors respectively. However, the service sector contributes much of the growth in real GDP. The low growth contribution of agriculture (compared to its income share) is partly a result of its structure where it heavily depends on rain and hence vulnerable to rainfall fluctuation. Nonetheless, agriculture is the only source of income to the majority of Ethiopians and, therefore, the performance of the macroeconomy is dependent on the well being of the sector. That is, improvement (or deterioration) in the macroeconomy is highly influenced by the success (or failure) of agriculture.

As briefly discussed in section two, the performance of domestic saving and investment was relatively good in the imperial time where it worsened in the Derge era and revived in the post Derge period. The gap between the two variables, however, widened from time to time.

Similarly, the external trade performance of Ethiopia remained weak. The export sector, dominated by few agricultural commodities, suffered from weather fluctuation and price instabilities in the international market. On the other hand, the dependency on imported goods continued to be substantial. Thus the external trade sector recorded an increase in the trade imbalance. Moreover, the capacity of domestic revenue in financing total expenditure is also far lower, particularly in the Derge regime. This created a gap between the two variables.

The macroeconomic performance can further be explained by the economic policies implemented by the respective regimes. In the imperial era, economic policies were designed to create a more liberalized market. To this effect, the participation of the private sector was encouraged. This pro-market attitude was halted in the Derge period where a command economy was introduced which highly discriminates against private sector activity in the economy. The policy of Derge highlighted the state's monopoly over the market. The first job of post-Derge period was reforming the economy by abolishing the excessive government control that was in place. The process of liberalization was supported by structural adjustment programs. Priority is given to the improvement of the participation of the private sector in the economy.

In any case, the presence of gap (between import and export, investment and saving, and expenditure and revenue) requires some form of external finance. In this regard, the poor experience of Ethiopia in attracting foreign investment made foreign assistance to be the major source for financing the gaps. Moreover, the prevailing magnitude of the resource gap reflects the extent of our dependency on aid

## **1.2 Problem Statement**

Growth theories suggest that economic growth emanates from expansion in investment

(capital formation activity) whose various financing components are domestic saving and foreign sources (notably aid and foreign capital inflows). The brief discussion made in the previous section point that the performance of Ethiopia in improving the level of investment through domestic sources and private capital inflow is far from adequate. This made the importance of foreign aid indisputable to the well being of the economy. Similar scenario also holds for most of Africa countries. But, a number of empirical studies argue that the role of aid in promoting the development potential of Africa remained unsuccessful. For instance, between 1970 to 1997, the real per capital GDP of Sub Sahara Africa has been 0.6%, despite huge flow of aid to the region (Gomane, Girma and Morrissey, 2001). Such results, however, can not imply that aid does not work at all. Hansen and Tarp (2000) underlined that there is no theoretical and empirical support to conclude against the possibility of aid in supporting growth.

While most micro based assessments of aid effectiveness (i.e., case studies of projects) highly favor the role of aid, the issue remained unresolved for macro evaluations. Such contradicting outcomes generate a micro-macro paradox (Durberry, Gemmell and Greenaway, 1998). One of the criticisms in macro studies, however, is the failure to adequately specify the model and the associated weakness in the econometric techniques applied. Considering such limitations, White (1992) (cited in Hansen and Tarp, 2000) noted that "we know surprisingly little about aid's macroeconomic impact"

The traditional analysis on aid effectiveness focuses on the growth impact of aid through its influence on investment. This relationship was primarily initiated by Harrod-Domar theory. The model assumes the presence of positive relationship between aid and investment, and between investment and growth. As Dollar and Easterly (1999) argued, this type of

considerations do not necessarily hold. This is because the growth impact of aid is very much complex that requires assessing its effect in a wider macroeconomic setting. For instance, inflow of aid may free up domestic resources intended for investment to be allocated into less productive ventures. Moreover, inflow of foreign aid beyond the absorptive capacity of the economy has the potential to induce undesirable influence through increasing inflation rate (Nyoni, 1997)

Studies beginning from mid nineties attempted to explore the role of economic policies and the stability of the political system of the recipient country in promoting aid financed growth. In this regard, several studies acknowledge the role of policy to economic growth. However, the issue of whether the effectiveness of aid is conditional on the policy environment or not is on debate.

The empirical findings regarding the role of aid on Ethiopia point out that the studies are limited by model specification in the sense that they fail to incorporate many of the recent advances made in the aid growth relationship. The inclusion of such advances provides the basis to develop more refined model in assessing aid. Therefore, motivated by recent developments in the aid effectiveness literature, this paper seeks to identify the growth impact of aid.

### **1.3 Objective of the Study**

The general objective of the study is to identify the macroeconomic impact of foreign aid in Ethiopia. More specifically the paper will have the objective of investigating factors that influence the effectiveness of aid. In doing so, the basic research questions that the study would like to address are:

- Is there a systematic role that aid can play in affecting investment and economic growth?
- Is the effectiveness of foreign aid conditional on good policies?
- Is there causal relationship between foreign aid and the policy environment?
- Is uncertainty of aid flow a crucial factor in the aid-growth relationship?
- Does political stability play an important role in affecting investment and growth?

#### **1.4 Data and Methodology**

The study will be based on macro data covering the period 1962/63 to 2000/2001. The period is chosen based on data availability. In the paper two equations (namely investment and growth equations) are specified and estimated. Moreover, causality test is performed to identify the causal relationship between aid and policy variables. The Johansen Maximum Likelihood Procedure will be used in estimating the variables.

#### **1.5 Organization of the Paper**

The paper is structured as follows. The following section (section two) summarizes in brief the economic policy and performance of Ethiopia in the respective regimes. Review of the literature concerning aid effectiveness is presented in section three. Section four discusses the model and methodology whereas section five presents estimation results. Finally section six concludes and provides policy recommendations.

## CHAPTER TWO

### ECONOMIC POLICY AND PERFORMANCE IN ETHIOPIA

#### 2.1 Economic Policy - An Over View

Economic policies are designed and implemented to achieve certain goals. Sound economic policies are believed to constitute an important role in influencing the growth of a country. In view of this, the following sub section briefly looks at the various economic policies adopted by the respective regimes of Ethiopia

##### A) Economic Policy during the Imperial Regime (1955/56-1973/74)

In the early 50's of the imperial era, the level of infrastructural development was at its lowest level. Moreover, participation of the private sector was negligible. In 1956, development planning was introduced for the first time that covers five years beginning from 1957 to 1962. To fulfill such an overall economic plan, the government introduced and revised several economic policies. Following the commencement of development planning, the bulk of public investment was planned to target on the productive sector. In this regard, agriculture was given the highest priority due to its significant share in employment, total output and export revenue (Second Five Year Development Plan-SFDP, 1962)

In this period, a series of proclamations were effected to attract the participation of local and foreign investors. This includes the 1961 income tax proclamation and investment decree of 1963 which was later revised in 1966. The decree constituted among others, tariff protection to infant industries, exempting import duties for selected capital goods and withdrawing export duties on manufacturing goods.

The trade policy basically aimed at export diversification and import substitution (of consumer goods in particular). Moreover, the government promoted a subsidy policy on selected intermediate inputs such as fertilizer and fuel (Shiferaw, 1995).

In the imperial regime, the monetary sector had supported the investment process through mobilizing funds. However, though the participation of local and foreign private banks and insurance companies were encouraged, both deposit and lending rates were administratively fixed by the then State Bank of Ethiopia. In this period, there had been attempt to expand the capital market that would improve the mobilization of resources to investment. To this effect, the Share Dealing Group (SDG) had been established to buy and sell shares of various companies. (Shiferaw, 1995)

In summary, the economic policies were targeted mainly in improving the level of income and savings so as to increase the investment outlay.

#### B) Economic Policy under the Derge Regime ( 1974/75 - 1990/91)

The Military government (Derge) followed socialist policy throughout its ruling period, despite some reforms in late 1980s. The economy was highly centralized and policies were devised in favor of the public sector. Thus, the government took various measures that highly discriminate against the private participation in the economy. The first step taken by the Derge in this regard was the nationalization of private properties. This includes rural lands, extra houses and a number of large and medium enterprises (Berhanu, 2001).

The private sector was allowed to take part only in small scale activities in areas of industry, trade and road transport. Gebrehiwot (1997) noted that the participation of the private sector was further restricted through a number of prohibitive measures taken by the regime. This

include, among others, imposing investment ceiling, prohibiting equities (raising capital) to form company or partnership (other than general partnership) and levying progressive income tax and profit tax. In 1984, a Ten Years Perspective Plan (TYPP) having a short and long term program was put in place covering the period of 1984/85 to 1993/94. The plan gave priority to agriculture because of its huge contribution in the economy. More emphasis, however, was given to state farms and state sponsored cooperatives despite their small contribution to the total production. Although the plan acknowledged the role of saving in enhancing the economy, the major task of doing so was given to the public sector. (MEDaC, 1999).

The government had extended its discriminatory measures to the monetary sector as well that intensified the market distortion. First and foremost the financial sector was monopolized by the government where no entry was allowed to private firms. Furthermore, the policy favored the public sector in every respect. For example, the lending interest rate to the private sector borrowers was 9% and 8% for industrial and agricultural firms respectively. But for the public enterprises, it was 8% and 6% respectively.

Derge took a series of policy reforms at the end of 1980's. Among others, this includes raising the ceiling on the level of investment, and exempting import duties on vital capital goods. In addition, in 1990 the government introduced major economic policy change which permitted the participation of the private sector on a number of areas. But all the amendment were not implemented due to the intensified war and the government lost its power a year after its reform (Gebrehiwot, 1997). In general the military government's economic policies were ill devised with full of distortion.

### C) Economic Policy During Post-Derge Period (Mid-1991-todate)

The economic policy adopted by the then Transitional Government of Ethiopia (TGE) and later the EPDRF government made a radical change from what Derge had followed. The early periods of post-Derge era is characterized by adjustments and stabilization scheme as a way out to market oriented economic system. In this connection, a three year structural adjustment program, supported by World Bank and IMF was first adopted in 1992 (Gebrehiwot, 1997). Later in 1996 the government implemented Entrenched Structural Adjustment Facility (ESAF) of the IMF (Berhanu, 2001).

The first measure taken in the reform process was liberalizing the economy. This includes abolishing the unfair act against the private sector and eliminating government monopoly and control over prices. In addition to this, a budget subsidy to the public sector was halted and consequently, a number of public enterprises were transferred to the private sector through privatization (MEDaC, 1999). As part of encouraging investment outlays, both local and foreign investors were provided with incentives in the form of tax holiday, tax reduction and the like.

To enhance the revenue collection efficiency, a number of policy measures have been effected in the period under review. One of this is broadening the tax base where the government took amendments to the already existing tax system and also introduced new taxes such as capital gain tax, rental income tax and recently value added tax. Furthermore, to make the tax administration easy, the income tax brackets were reduced from 9 (of Derge) to 5 (MEDaC, 1999).

In a similar fashion, the government undertook trade liberalization in the external trade. This includes a gradual reduction of the effective rate of protection (i.e., tariff cuts), suspension of

taxes and duties from a number of export goods, allowing foreign exchange deposit account in local commercial banks (MEDaC, 1999). Moreover, the exchange rate was devalued by more than 100% to encourage export and reduce foreign exchange misalignment.

The financial sector has also underwent liberalization process. The major breakthrough in this connection is removal of state monopoly in the sector and allowing Ethiopian investors to participate in the banking and insurance service. In a related development, the exchange rate was allowed to be determined through the foreign exchange auction market beginning from 1993 which was latter replaced by an inter bank foreign exchange market. The other financial reform worth mentioning is the establishment of micro financing institutions that provide credit to peasants, petty traders and small scale undertakings.

In summary, the post Derge period is marked by transformations into pro market economic system by giving due attention to the private sector's contribution in economic growth.

## **2.2 Economic Performance of Ethiopia<sup>1</sup>**

Although Ethiopia is endowed with ample resources base that can induce a change, the country is still characterized by worsened living condition, recurrent famine and unstable political environment. This section analyzes the record of Ethiopia by employing various standard measurements.

### **2.2.1 Trend in real output**

The economic performance of Ethiopia depicts low level of output growth. This is further exacerbated when it is compared to Sub-Sahara Africa countries. As can be seen from the table below, except for the growth of real GDP between 1990-2000, Ethiopia's performance

---

<sup>1</sup> The numerical statements discussed in this section are own calculation unless and otherwise stated.

drastically falls short of the average African countries. For instance, from 1975 to 2000, average GNP per capita of SSA is almost four times higher than that of Ethiopia.

**Table 2.1: GNP Per Capita and Percentage Growth of Real GDP<sup>2</sup>**

Development Indicator	Period	S.S.A	S.S.A(1)	<b>ETHIOPIA</b>	<b>ALL AFRICA</b>
Growth rate of Real GDP (% Average)	75-84	2.2	2.5	<b>n.a.</b>	3.3
	85-89	2.3	3	<b>2.9</b>	2.5
	90-2000	2.3	2.8	<b>4.2</b>	2.6
GNP Per Capita (average)	75-84	544	371	<b>135</b>	640
	85-89	513	393	<b>162</b>	676
	90-2000	524	338	<b>114</b>	683

S.S.A = Sub Sahara Africa

S.S.A(1) = Sub Sahara Africa excluding South Africa and Nigeria

n.a. = data not available

Source: Africa Development Indicators, (The World Bank, 2002)

A comprehensive review of the state of affairs point that between 1962/63 to 2001/02, the average growth rate of real GDP in Ethiopia was on average 3.1%. To this result, 32% is contributed by the agriculture sector while 13% is from industry, and 55% from the service sector. Yet, the share of agriculture, industry and service in GDP on average is 57.5%, 10.6% and 31.9% respectively. This shows that the service sector contributed more than half of the growth of real GDP, despite its share in GDP is significantly lower than that of agriculture. A further breakdown of the performance into the three regimes provides a clear picture about the trend see table 2.2 below. During 1962/63 to 1973/74 of the imperial period, growth rate of real GDP on average was 3.7% (see table 2.2). This is actually lower than the planned growth rate of 4.3% and 6% for

the periods 1963 to 1967 and 1968/69 to 1972/73 respectively (see First Five Year Development Plan, 1956; Second Five Year Development Plan, 1962). In this period the

<sup>2</sup> The period of categorization in the table is taken as it is stated in the African Development Indicator (2002). This made the period 1990-2000 to fall under different policy regimes.

service sector contributed about 46% of the growth in real GDP exceeding the agricultural sector.

**Table 2.2: Growth Rate of Real GDP and the Contribution of the Sectors.**

Period	% Growth Rate		% Share to GDP			Contribution to Growth of Real GDP		
	Real GDP	Real Per Capita GDP	Agric.	Industry	Service	Agric.	Industry	Service
<b>Imperial</b> <i>(1962/63 - 1973/74)</i>	3.7	1.3	67.5	9.4	23.1	38	16	46
<b>Derge</b> <i>(1974/75 - 1990/91)</i>	1.9	-0.7	55.6	11.4	33	36.5	10.5	53
<b>Post Derge</b> <i>(1991/92 - 2001/02)</i>	4.5	1.6	48.7	10.6	40.7	22.7	13.6	63.7

The period of Derge (1974/75-1990/91) is a case in point of chronic economic failure. For instance, real GDP growth rate declined to 1.9%. This is about 100% lower than the imperial period stated earlier. The rate was also lower than the population growth rate in the same period. Hence, per capita GDP growth rate dropped below zero to -0.7 indicating a deterioration of the standard of living. Similar to the Imperial period, the Derge era showed that about 50% of the growth contribution is generated from the service sector although service holds a share of one-third from the total output. In this period, the growth performance realized was by far lower from the planned targets. For example, between 1984/85 to 1993/94, it was planned to achieve a 6.5% growth rate of real GDP (TYPP, 1984). But, the actual figure during 1984/85 - 1990/91 was 2.1%. Furthermore, in contrast to the actual result stated earlier (in table 2.2), Derge had planned to reduce the share of agriculture in GDP to 39% and raise that of industry to 24%.

In the post Derge period, the economy revived and gained momentum to revert the poor performance of the previous regime. During 1991/92 - 2001/02, growth rate of real GDP

underscored on average 4.5%, which is higher than the two regimes discussed earlier. Moreover, per capita real GDP increased and reached 1.6%, on average. In the period under review, the share of agriculture in GDP showed a decline while it improved for the service sector.

## 2.2.2 Performance of Investment and Domestic Saving

The trend of domestic savings has not been satisfactory. As shown in Table 2.3 the performance of SSA is on average three times higher than that of Ethiopia.

**Table 2.3: Percentage Share of Domestic Saving and Investment to GDP**

Development Indicator	Period	S.S.A	S.S.A(1)	<b>ETHIOPIA</b>	ALL AFRICA
Gross Domestic Investment Average % Share to GDP	75-84	20.8	19	<b>13.7</b>	23.5
	85-89	15.3	15.8	<b>14.7</b>	19.8
	90-2000	16.7	18	<b>14.4</b>	19.4
Gross Domestic Saving Average % share to GDP	75-84	20.2	15.2	<b>6.4</b>	24.7
	85-89	19.1	16.5	<b>7.2</b>	20.3
	90-2000	16.1	12.2	<b>5</b>	17.8

S.S.A = Sub Sahara Africa

S.S.A(1) = Sub Sahara Africa excluding South Africa and Nigeria

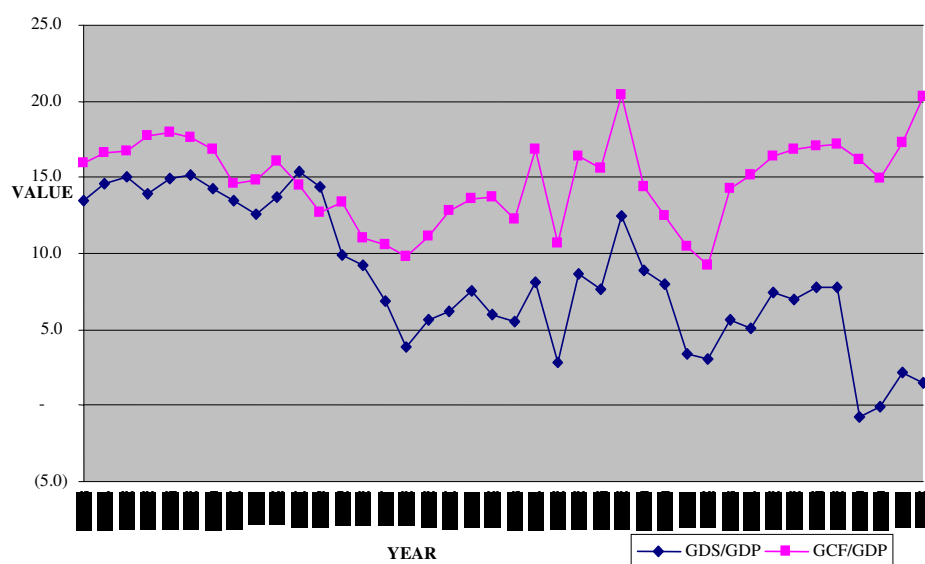
Source: Africa Development Indicators, (The World Bank, 2002)

This underlines the low level of saving prevailed in the country that remained far behind the investment process being undertaken.

The trend of gross domestic saving (as a share of GDP) of Ethiopia confirms that the achievement during 1962/63 - 1973/74 (in the imperial period) was remarkable with average share of 14.2%. This very good record has never been attained. Rather, it has deteriorated to 7.1% in the Derge period (74/75 - 90/91) and further down to 4.2% during the post-Derge time of 1991/92 - 2001/2002.

The performance of gross capital formation shows that between 1962/63 and 1973/74 its share in GDP had been 16%, which declined to 13.3% and went up again to 15.9% during the Derge and post Derge periods respectively. The share declined in the period of Derge, presumably due to its poorly structured and ill managed economic environment. The trend of saving and capital formation resulted in an expanded resource gap as shown in the figure below.

**Figure 2.1 share of Gross Domestic Saving and Gross Capital Formation to GDP**



The gap (measured as a ratio of GDP) was low in the imperial time with an average of 1.8%. Nevertheless, it widened drastically to 6.2% in the Derge period which further increased to 11.7% between 1991/92 to 2001/02. This shows how important foreign financing becomes in bridging the resource gap.

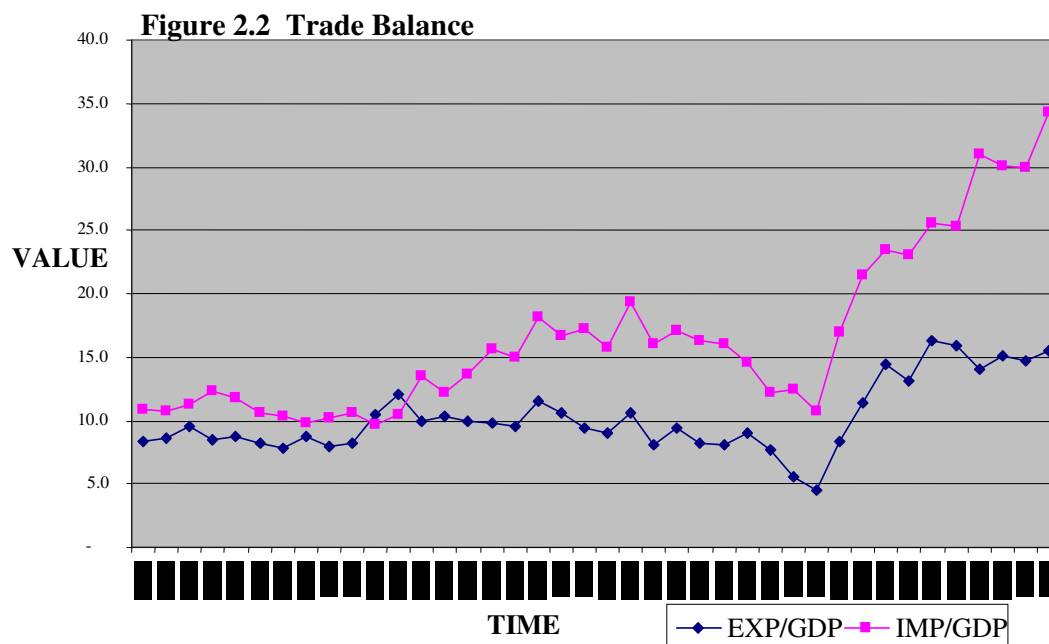
### 2.2.3) Performance of the External Trade

The external trade sector mainly involves import and export activities. The role of import in

the Ethiopian economy is enormous. That is, it supplies capital goods that cannot be produced locally at a competitive price and also, it augments local production through delivering the required raw materials and intermediate goods. Moreover, it provides several consumer goods including food and other items. The record revealed that import holds 16.5% of GDP between 1962/63 to 2001/02. A detailed analysis, however, points that this ratio on average achieved the highest value in post Derge time with 24.7% between 1991/92 to 2001/02. This is presumably due to the lifting up of several import restriction and also relatively higher volume of aid. The ratio during 1962/63 to 73/74 and that of Derge period was relatively low with 10.7% and 15.4% respectively presumably due to import substitution and restriction policies affected by the respective regimes.

Export, on the other hand, is dominated by few agricultural commodities where coffee stands first with a share averaged at 52% between 1962/63 and 2001/02. A closer look of the case reveals that the share of export in GDP is 10.2% for the same period stated above. The export sector, being dominated by rain fed agricultural production, is victim of problems related to bad weather. In addition to this, more than 60% of our export goes to few but economically strong countries who are at all levels termed as price makers (own calculation). Hence, our export revenue is dependent and, therefore, vulnerable to fluctuation in the weather condition and price level in the international market.

Such problem associated with export limited the amount of import that can be financed from export revenue thereby widening the trade imbalance. In this regard between 1962/63 to 2001/02, export covered 65.3% of the import on the average. In the imperial time, the performance of export in financing import was the highest, covering 84%. This figure deteriorated to 60.4% in the Derge period and further dropped to 52.7% in post Derge time.



Therefore, as shown in the figure above the trade imbalance enlarged from 1.8% in the imperial period to 6.2% during 1974/75 to 1990/91; and further to 11.7% in post Derge time of 1991/92 to 2001/02. This highlights the important role of foreign financing in the external sector.

#### 2.2.4 Trends in Government revenue, Expenditure and deficit financing

Viable economic progress involves a reasonable expansion of various expenditures which in turn needs adequate and sustainable revenue base. The performance of Ethiopia in this regard showed a substantial gap between the two variables which highlighted the role of foreign finance in bridging the gap.

The following table presents the sources of revenue and expenditure in the three regimes.

**Table 2.4 Revenue, Expenditure and Deficit**

Period	Revenue (Including Grant)			Expenditure		Deficit/GDP	
	% Share of tax	% Share of Non-tax	% Share External Grant	Share of Recurrent expenditure	Share of Capital expenditure	Excluding Grant	Includin g Grant
Imperial (62/63 - 73/74)	72.5	11.9	15.6	80.4	19.6	2.3	1
Derge (74/75 - 90/91 )	66	21.7	12.3	73.4	26.6	8.5	5.7
Post Derge (91/92 - 01/02 )	60	24	16	67.7	32.3	7	6.1

Between 1962/63 to 73/74 of the imperial time, tax collection, grew by 11.4 % on average. Moreover, the share of economic and social expenditures (which includes spending on agriculture industry education public health and the like) in the recurrent account retained 32.4% which, for instance, exceeded the share of defense that was limited at 21.5 % on the average. This indicates that more emphasis had been given to development purposes. In the same period, the capacity of revenue including and excluding grant in financing total expenditure was the highest (compared to the other two periods) with 96.8 % and 80.5 % respectively.

In the Derge era (1974/75 -1990/91), growth of tax revenue was limited at 8.7 %. Hence compared to the imperial time, it showed a decline. This presumably has got to do with the inefficiency of state owned enterprises and more importantly the restriction imposed on the private sectors income creation activity that could have generated more tax. The expenditure side indicates that the pattern of overall expenditure was not pro-development. For example, the period marked a substantial increase in defense spending compared to the imperial and post Derge periods where it consumed 40% of the recurrent expenditure. As a result, the share of economic and social activities spending (out of the recurrent expenditure) declined to 25% on the average. Moreover, revenue including grant financed 77.3% of total expenditure,

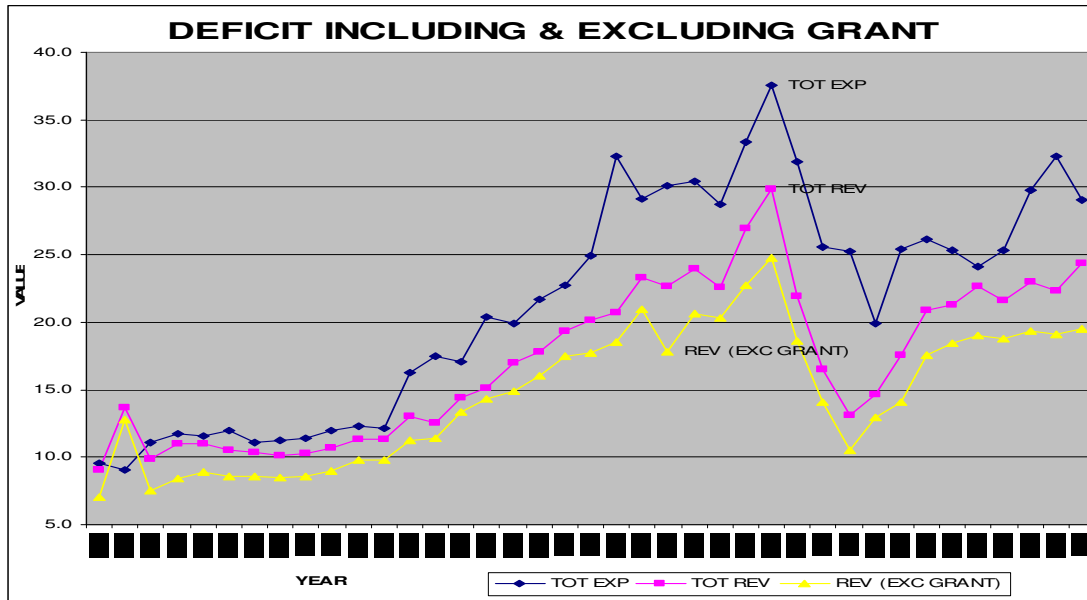
which dropped to 67.9% for revenue without grant. This is relatively lower than the preceding period.

The post Derge time, marked by the end of the civil war and massive economic reforms, brought a change in the spending pattern. For example, the share of capital expenditure increased to a level which is higher compared to the results obtained both in the imperial and Derge period. The dividend of peace was further felt through a massive decline in the share of defense (out of the recurrent expenditure) to reach about 24.6 %. The reduction of defense outlays (compared to the Derge regime) created room for more resources to be allocated into development activities. For example, out of recurrent expenditure, the share of economic and social services have exceeded the performance of Derge and reached 31.4 %. In this period, total revenue including grant covered 83.3% of total expenditure. The result for revenue excluding grant was 72.2 %. In relative terms this performance is better than that of Derge.

Whatever the case may be, the fact that total expenditure exceeded total revenue calls for deficit financing scheme. That is, the gap between revenue and expenditure indicates the importance of other forms of financing. As shown in table 2.3 below deficit excluding and including grant was relatively lower in the imperial period. Moreover, 70.2% of total deficit (including grant), was financed from external borrowing with the remaining 29.8% from domestic sources. In the Derge period the level of deficit has witnessed a drastic increase. Moreover, domestic source covered the bulk of the deficit (including grant) while 39.8% came from external borrowing.

Unlike the Derge's experience, the post Derge period showed a change in the composition of financing where 63.1% was derived from external borrowing and the remaining came from domestic sources.

**Figure 2.3 Deficit including and excluding grant**



In general, the increasing gap (in absolute terms) between the level of expenditure and revenue indicates our huge reliance to foreign finances. Moreover, this highlights the importance of sustainable flow and proper management of external finance to obtain the utmost benefit out of it.

### 2.2.5 Performance of Aid

Development aid is concerned with resource transfer to poor countries in the form of technical assistance, total grant and loans with concessional terms (Birhanu, 2001). There are a number of reasons to highlight the importance of development aid to Ethiopia. Among other uses, development assistance is instrumental in financing deficit, bridging the gap between import and export, and expanding the level of investment beyond domestic capacity.

The three regimes highlighted the importance of foreign aid to the fulfillment of their respective program. For instance, in the imperial period, in addition to its role in financing the

investment endeavors, development assistance was also needed to protect the economy from any inflationary tendencies that may took place in the planned fast growth (FFYP, 1956). The military government had also given aid at most importance in its development program. Berhanu (2001) pointed that in the Ten Years Perspective Plan, Derge had anticipated more than 50% of its planned investment to be financed by foreign aid, which of course did not occur.

The reform programs and stabilization measures launched in the Post Derge period are backed up by inflow of foreign fund. Moreover, the action plan designed by the current government for the period 2001 to 2010 expects 50% of investment outlay to be financed by foreign funds (MEDaC, 2001). Such huge reliance to development assistance is likely to remain unaltered in light of our limited access to foreign investment funds.<sup>3</sup>

From 1980 to 1997 total ODA to Ethiopia exceeded 17 billion USD (Berhanu, 2001). Though this figure seems huge in absolute terms, the per capita net ODA of Ethiopia is small when compared to other African countries. For example, as the table below shows the per capita aid of SSA is on average twice higher than that of Ethiopia.

**Table 2.5 Per capita Aid**

Period	SSA	SSA (1)	Ethiopia	All Africa
1975-1984	17	21	5	19
1985-1989	27	34	16	27
1990-2000	27	34	15	28

S.S.A = Sub Sahara Africa  
 S.S.A(1) = Sub Sahara Africa excluding South Africa and Nigeria  
 Source: Africa Development Indicators, (The World Bank, 2002)

<sup>3</sup> The share of foreign direct investment (FDI) to LDCs is about 1% of the total. The performance of Ethiopia in this regard is far lower than the average SSA (MEDaC, 2001).

The role of development aid in the economy of Ethiopia can be seen through its share in the GDP. On the average, foreign aid constituted 4.2% between 1962/63 and 2001/01. This share had been relatively lower in the imperial time with 2.6%. It, however, rose to 5% in the Derge period and slightly dropped to 4.8% between 1991/92 to 2000/01.

As the available data shows, development assistance covered about 40% of capital expenditure between 1962/63 to 2000/01. While each regime roughly maintained this share, two-third of the external finance was in the form of loans and credits while the remaining was in the form of grant. For the same period, the share of technical assistance from the recurrent expenditure possessed 8%. This share had been relatively higher in the imperial period having 11.4% between 1962/63 to 1973/74. It later declined to 7.2% in the Derge era and further to 5.4% in 1991/92 and to 2000/01 of post Derge period.

The source of development assistance points that, between 1970 and 1997, more than three-fifth of the loan is secured from International Development Association (of the World Bank) and African Development Fund (ADF). Moreover, for the same period stated above, EuropeaCommunity, United Nations, United States and Nordic Countries hold about three-fourth of the total grant.<sup>4</sup>

---

<sup>4</sup> Calculated based on data obtained from Berahnu ( 2001).

## CHAPTER THREE

### REVIEW OF THE LITERATURE

#### 3.1 Theoretical Literature

##### 3.1.1. Early Studies

Early theoretical formulations that relate aid with economic growth were based on the Harod-Domar model. This model uses saving as a ladder to growth (Hansen and Tarp, 2000). The model is based on the assumptions that potential output is proportional to the stock of capital and factor inputs are employed in fixed proportion with no possibility of substitution.<sup>5</sup> Therefore, in the Harod-Domar framework, change in potential output will be:

$$\Delta Y = \frac{1}{V} \Delta K \dots\dots\dots (3.1)$$

where Y = potential output, K= capital and V= constant capital output ratio.

According to the model, change in capital stock equals to gross investment. Hence, considering constant rate of capital depreciation ( $\delta$ ) the growth rate of potential output will be:

$$\frac{\Delta Y}{Y} = \frac{I}{VY} - \delta \dots\dots\dots (3.2)$$

---

<sup>5</sup> The model further assumes that

- the economy is closed
- there are only two factors of production – labor and capital
- labor is homogenous and grows at a constant natural rate
- there is no technical progress

The model shows that output and capital formation are linearly related. That is, when there is more capital stock (which is financed by saving including one of its foreign component - aid), the higher would be the growth of an economy.

From the outset, the Harod-Domar model was used to calculate the amount of finance required to bridge the gap between the available savings and the required amount that must be channeled to investment to bring about the targeted growth rate (Easterly, 1998). This implies, in the Harod-Domar model, constraints on savings is the binding limit to growth. That is, when domestic savings alone are inadequate to bring about the investment level necessary to attain the targeted growth rate then growth is said to be constrained by the savings gap (i.e., short fall of actual savings from the desired level). Therefore, the role of foreign finance in this regard is to augment domestic savings so as to achieve the targeted rate of growth.

Studies beginning from the 1960's extended this analysis to include the gap between import and export (referred to as trade gap) as the other source that limits growth. This approach is based on the assumption that all investment goods are not produced locally (i.e. some level of capital import is necessary in order to achieve the desired investment level). When foreign exchange earned through export are insufficient, actual import will be lower than the level required to achieve a targeted growth rate (Weiskopf, 1973). Thus, the role of foreign inflow here is to finance the import bill left uncovered through export earnings so as to achieve the targeted growth rate. This approach got emphasis since developing countries depend on imported capital goods and intermediate inputs.

The incorporation of this gap led to the Two-Gap model where both savings and foreign exchange act as the constraints that impede growth. In this model, both gaps represent separate or independent limit to growth where inflow of foreign fund is used

to fill the gaps (Chenery and Strout, 1966). Moreover, according to the model, it is one of the two constraints that would be binding at a given point in time. That is, it is the larger of the two gaps that constrains growth. Therefore, the impact of foreign transfer relies basically on identifying the binding constraint (Weisskopf 1973). The desired rate of growth cannot be attained if foreign finance is not sufficient to finance the larger gap. In addition, if the foreign exchange constraint is binding, the growth impact of aid will not be facilitated via its impact on the level of savings. Rather, aid affects growth through relieving the limits on import. This means, in contrast to the Harod-Domar model where the effect of aid on growth is through saving, growth can be directly influenced by foreign inflow if the trade gap is binding (Hansen and Tarp, 2000).

In the late 1980's, the role of fiscal limitation in affecting growth gained attention in the gap analysis. In this framework, the gap between government revenue and expenditure is considered as the other source of growth hindrance (Taylor, 1994). Actually, fiscal gap is one component of saving gap. However, in theory, the inclusion of this gap plays an important role at a time when a country suffers from external shock and/or when underutilization of capital persists. For instance, expenditure on education, infrastructure, health and so forth is required to expand economic capacity. But, government revenue must be sufficient to meet the expenditure. Otherwise, growth will be limited by fiscal gap (Hjertholm, Laursen and White, 2000). Therefore, fiscal limitation has the potential to be the binding constraint in affecting growth than the other two gaps.

However, evaluation of the Harod-Domar model and the extended versions point that the approaches suffer from basic limitations. First, the underlying assumption that growth is proportional to capital stock is unlikely to be true. That is, a linear

association of capital and output would imply that as long as the finance (including aid) required for capital formation is available, any growth target would be achieved. This assumption is incorrect that even Evsey Domar (co-founder of the Harod-Domar model) had admitted it to be unrealistic and dismissed the original model (Easterly, 1998). Thus, the level of capital formation alone does not guarantee growth as postulated by the Harod-Domar model. Several factors that affect productivity at the same time must be addressed. This includes identifying the relationships between aid, investment, policies and growth. Moreover, the growth impact of foreign aid is not one-for-one as postulated by the Harod Domar type of analysis (Hjertholm, Laursen and White, 2000). Rather, foreign aid may substitute domestic resources, affect the exchange rate and, therefore, may bring undesirable result. Hence, the simplistic view of early theories does not adequately address the macro economic impact of aid. In addition to this, gap analysis is developed based on the assumption that the structure of the economy does not change. The theory, therefore, is inapplicable in times of policy changes that reshape a country's economic structure (Sepehri and Lodhi, 1999).

### 3.1.2. Modern Theories of Aid Effectiveness

In contrast to early studies, several attempts have been made to assess the aid-growth relationship within the neoclassical and endogenous growth frameworks.

Unlike the Harod-Domar model, the neoclassical growth model allows for factor input substitution and diminishing marginal returns in the production process. The basic neo-classical growth model shows that for the growth of an economy capital accumulation is the central issue. The model further shows that aggregate saving (investment) determines the growth of capital stock, which, in turn plays a key role in

the growth of an economy. Technology is considered as exogenous, whose prime role is to augment labor. In this framework, the rate of investment and population growth determines the growth rate of per capita output (Johns, 1998). Nevertheless, growth continues only in the transition to a new steady state. In the long run, the rate of technological change which is exogenous by assumption, determines the growth rate of the economy (Schmidt-Hebbel, Serven and Solimano, 1996).

This implies that policy measures do not affect long run growth rate. Thus, the standard neoclassical growth model does not emphasize the contribution of policy for long run rate of growth (Durberry, Gemmell and Greenway, 1998)

The endogenous growth model basically differs from the neo-classical one because the former endogenizes improvements in technology. In the endogenous growth setup, the role of externality that arises from research and development is considered as growth stimulant factor, unlike the neo-classical model. Because of this, rate of growth continues even in the steady state (Johns, 1998). Therefore, new growth models acknowledge that policy measures could have significant impact on long run growth.

In both models, aid is treated as a component of total saving. However, the Solow model argue that aid is most productive when the country is poorest (Bulir and Lane, 2002). To capture the macroeconomic complication associated with foreign aid, modern theories have extended their analysis to examine the influence of aid on several other variables. This includes examining the impact of aid on saving and investment. Moreover, studies have assessed the relationship between aid and productivity, and the influence of aid instability on growth performance. Very recently the link and causality between aid, policy and growth has gained attention in the literature. The

following section summarizes the theoretical arguments in this regard.

#### I) Aid, Saving and Investment

From the recipients' point of view, the purpose of development aid is primarily to augment domestic savings to bring about an increased level of investment. However, in theory, the ultimate impact of foreign aid on savings and investment is a priori ambiguous.

Several theoretical explanations point out the potential of aid to substitute domestic savings effort and depress investment and economic growth. This occurs due to a number of interrelated factors as discussed below

A. Fungibility of aid: - It is true that foreign aid influences the policies of the recipient country in areas of public expenditure (Dervarajan, Rajikumar and Swaroop, 1999). At the same time aid relaxes the budget constraint of the government. The fungibility of aid, therefore, refers to the potential of foreign aid to divert resources into other expenditures. In this regard fungibility of aid is said to exist when an aid recipient country adjust its overall expenditure following the inflow of foreign aid or when government investment fails to increase by the amount of aid. Foreign aid could be fully fungible, partially fungible or non fungible at all (Dervarajan, Rajikumar and Swaroop, 1999). That is, if aid money purely supplements domestic resources, then aid is said to be fully fungible. On the other hand, if it is part of the (aid) money that is treated as a supplement to domestic resource then aid is said partially fungible. But if there is no diversion of resources, then foreign aid is fully non-fungible.

The two gap model discussed earlier does not consider the possibility of fungibility of aid.

Instead, it simply assumes consumption to remain unchanged following aid flow. The demonstration by Hjertholm, Laursen and White (2000) vividly elucidates the fungibility of aid money. The figure below shows intertemporal consumption decision before and after aid flow. In the diagram, the horizontal axis measures current consumption ( $c_t$ ) while the vertical axis measures next period consumption ( $c_{t+1}$ ).

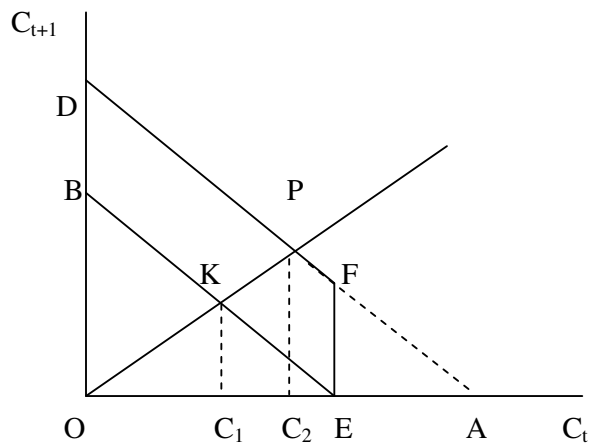


Figure 3.1 Kinked Budget Constraint

Income not consumed in current period will be saved and invested and be consumed next period where its value is  $(1+r)$  times the saving amount in period 't'.

Suppose that, without foreign aid, the budget constraint was "BE". Point "K" will be the preferred consumption bundle point and the level of domestic saving would be "EC<sub>1</sub>". If aid is given for investment purpose, we will have a kinked budget constraint "DFE".

This is because foreign aid is earmarked to investment with no possibility of being part of current consumption<sup>6</sup>. In such a situation fungibility of aid money occurs as long as the

<sup>6</sup> If foreign aid is treated as part of income where it can be shared between consumption and savings then the budget constraint would shift outward to DA.

consumption bundle lies on "DF". For example, if the consumption bundle lies at point P (following inflow of aid) then domestic savings would decrease to  $EC_2$ . Thus aid is fungible. In any case, fungibility of aid affects growth negatively if the diverted fund ends up in financing less productive activities such as government consumption or dwindles the government's tax collection effort (Devarajan, Rajikumar and Swaroop, 1999).

In a Keynesian framework, however, an increase in government consumption increases private savings and investment since such expenditure adds to the level of income (Hadjimichael, and Ghura, 1995). This points that domestic saving (and investment) will not decline by the amount of government consumption since the effort of the private sector offsets part of the decline. Hence, the private sector's activity in this regard reduces the negative growth impact associated with an increase in consumption.

To avoid consumption of aid money, tying in flow of aid to projects was proposed (Levy, 1987). This was emphasized because the donated money will finance the project instead of being consumed. However, the advantage of project targeting is undermined by fungibility of aid. Because, an attempt of tying foreign aid on targeted sectors becomes useless as long as the inflow of funds tends to free up resources. Considering such cases, Devarajan and Swaroop (1998) recommended tying of foreign aid to the overall public expenditure program of the recipient country rather than concentrating on specific sector.

**B. Aid and Uncertainty:** - Macroeconomic uncertainty has an adverse effect on investment. This is due to the irreversibility nature of investment once undertaken without incurring considerable cost (Serven, 1996). Thus, the existence of uncertainty has the potential to affect aggregate investment.

Since foreign aid is one source of investment finance, uncertainty of its inflow has the

potential to influence the level of investment in the economy. That is, unlike the deliberate switch of resources into non-productive expenditures mentioned previously (i.e. section A), this refers to the rational response of governments to postpone aid supplemented investment activities when instability of anticipated aid takes place (Lensink and Morissey, 2000). The argument here is that governments can anticipate the amount of future development aid based on past experience. In view of this, the likelihood that anticipated aid would be used for investment depends on the stability of its inflow. Otherwise, it will result in unanticipated decline of government revenue. Uncertainty of aid inflow, therefore, exerts pressure on economic growth by its direct impact on government investment. When government investment is curtailed following instability of aid inflow, it is likely to influence the private investment participation. Hence, the theory points that the problem associated with uncertainty also affects growth indirectly through its impact on private investment.

C. Aid and the Dutch disease effect: - The name "Dutch Disease" is derived from what Netherlands experienced in 1970s following the discovery of a natural gas reserve. That is, with the boom in the traded good sector, the Dutch economy suffered from an increase in inflation and unemployment and a decline in the competitiveness of the export sector that led the economy to have lower growth rate (Hjertholm, Laursen and White, 2000).

Dutch Disease occurs when there exists a booming and lagging sectors in the traded goods sector (Nyoni, 1997). The consequence of the boom is a higher return in the labor employed therein so that it attracts labor away from the other sub sector. The decline in the labor supply of the lagging sector (following the out flow of workers) will result in higher labor cost that depresses its activity. The higher income obtained as a result of the boom, increases spending

on non-traded goods so that price of non traded goods rises and creates inflation condition. The increase in price induces the exchange rate (i.e., local currency in terms of foreign currency) to appreciate and, therefore, constrains the competitiveness of the export sector that in turn leads to the Dutch disease problem.

Edwards and Van Wijnbergen (1989) (as cited by Nyoni, 1997) stressed that the economic impact of increased income owing to inflow of foreign aid is similar to the effect of an increase in the income as a result of natural resource discovery. That is, inflow of foreign aid leads to an exogenous increase in the income of the recipient country. Moreover, price of non traded good may increase since much of foreign aid is usually allocated to it. This in turn may result in higher inflation condition and lead the exchange rate to appreciate (Mwega, 1997; Hadjimichael and Ghura 1995). That is, the increase in the rate of inflation leads to a decline in the competitiveness of the traded goods sector through the appreciation of the exchange rate. This underlines the potential of foreign aid to cause the Dutch disease effect.

The ultimate impact of the Dutch disease effect is a decline in the competitiveness and hence profitability of the traded sector. This reduces the investment and, therefore, the growth endeavor of the sector.

However, the theory explains that unlike the Dutch Disease Effect, foreign aid may result in improving the competitiveness of the external sector. This occurs if aid helps to raise the productivity of the traded sector through improving the level of education, lowering the cost of transportation and so forth (Hjertholm, Laursen and White, 2000). Moreover, since foreign aid relaxes problems associated with supply of commodities, it plays a deflationary role in the economy. In view of this, Dutch Disease will not occur if the deflationary impact exceeds the inflationary effect associated with foreign aid.

In general, Dutch Disease is likely to occur when the amount of aid money injected in to the economy is more than its absorptive capacity (Hjertholm, Laursen and White 2000).

## II) Aid Policy and Growth

Policies do play a role in promoting growth. This is because good economic policies facilitate efficient allocation of the meager resources of poor countries into investment (capital formation) instead of being consumed. Fisher (1993) pointed that the negative growth rate of most African and Latin American countries in the 1980's is partly attributed to distortive economic policies. He, therefore, argued that, for conducive growth, appropriate macroeconomic policies are critical.

The theoretical explanations regarding the impact of policy on aid effectiveness have taken different forms. For instance, the Harod-Domar framework assumes constant marginal productivity of capital. Therefore, it explicitly ignores the role of policy in promoting productivity (Dalgaard and Hansen, 2000). Hence, in the model, the role of good policy is solely to facilitate the aid-investment link.

In contrast to this, the theoretical framework of Burnside and Dollar (1997, 2000) emphasizes that growth inducing policies at the same time influence the productivity of aid. Using Cobb-Douglas production function, they state their argument as follows.

$$Y = BK^{\theta} \dots\dots\dots (3.3)$$

Where Y= per capita output, B=the level of technology, K= capital per worker, and  $\theta$  measures productivity of capital.

Assuming that aid affects output through capital accumulation, the impact of aid on growth would be,

$$\frac{dY}{dA} = \frac{dY}{dK} \frac{\partial K}{\partial A} \dots\dots\dots (3.4)$$

where A stands for aid.

Using equation (3.4), we obtain the following

$$\frac{dY}{dA} = \theta \frac{Y}{K} \frac{\partial K}{\partial A} \dots\dots\dots (3.5)$$

The result shows that  $\theta \frac{Y}{K}$  measures the marginal productivity of capital. Here, it is assumed that favorable economic policy positively affects the marginal productivity of capital. Since foreign aid is one source of capital formation, the same relationship is made with regard to the impact of policy on the productivity of aid. Moreover,  $\frac{\partial K}{\partial A}$  examines the marginal propensity to invest aid.

In this approach, the impact of good policies is not limited to paving the way for the transfer of aid into investment. Rather, it is extended to improving the productivity of investment through which effectiveness of aid is demonstrated. Hence, in this framework, the growth impact of aid is conditional on the policy environment.

In theory, the relationship between aid and policy is ambiguous. On the one hand, aid may improve policy environment by ensuring macroeconomic stability. In this regard, foreign aid facilitates adjustment programs and helps for smooth transition to good policy regime. In contrast to this, aid inflow may lead to deterioration of policy condition. For instance, if aid is allocated to cover import bills, aid recipient countries may tend to remain closed instead of liberalizing their export (Burnside and Dollar, 1997, 2000)

Moreover, there is a theoretical explanation that emphasizes non-linear relationship

between aid and growth. This highlights the possibility that an increase in aid may result in a decreasing return. In the Harod-Domar model, aid is assumed to have a fixed proportional impact on growth. In recent studies reviewed by Hansen & Tarp (2000), factors like absorptive capacity constraints of the recipient country and problems associated with Dutch disease are mentioned as possible causes for the occurrence of diminishing marginal returns to aid. In this connection, policy environment is considered as a determining factor in affecting the marginal contribution of aid to growth (Collier & Dollar, 1999). That is, for a given level of aid, its marginal contribution increases as the policy condition becomes more and more favorable.

In general, recent theoretical formulations stipulate that good economic policy environment is crucial for the efficient allocation of aid money to investment. Furthermore, it positively affects the marginal productivity of capital and minimizes the diminishing behavior of foreign aid.

### **3.2 Review of the Empirical Literature**

For the last 40 years a number of studies examined the aid-growth relationship empirically. Since the type of data used, the model specifications and the method of analysis poles apart in most studies, the literature has witnessed mixed conclusions. Due to the influence of the theory, most works in the 1960s and 1970s were dominated by Harod-Domar type of analysis. Recent empirical works, however, deviated a lot by incorporating additional variables that are believed to facilitate the aid growth relationship.

In the two-gap model, the study is basically to identify which of the two constraints is binding to potential growth so that the role of foreign transfer would be determined.

In this framework, Weisskopf (1973) performed OLS regression to classify countries based on their binding constraints. The test was conducted on 44 underdeveloped countries for the period 1953-1966. Using the regression result, he concluded that saving is the binding problem for growth of most underdeveloped countries. However, his other finding contradicts with the basic framework of the two-gap model. The theory discussed in the previously section argues that it is one of the two constraints that becomes binding at a given time period. Contrary to this, in Weisskopf's result six countries appeared to be unclassified as saving constrained or trade constrained economies. This shows that the empirical result is not consistent with the theoretical formulation. Similar inconsistency with the underlying theory was obtained in other works (see Nalo 1993).

Several empirical works were done to date in the two-gap and three-gap framework<sup>7</sup>. But, in all of the analysis, foreign transfer is used in its aggregated form. Because of this, the contribution of foreign aid was not distinctly put and therefore, it is impossible to evaluate the aid-growth relationship using gap model.

Papanek (1973) disaggregated foreign transfer into its different categories, and used the components of investment (i.e., domestic saving, foreign aid and foreign private investment) as explanatory variables to growth. Using data obtained from 85 developing countries for the period 1950s and 60s, the findings revealed that, for Asia and Mediterranean countries, foreign aid appeared as the dominant variable contributing to growth more than domestic savings. For Africa and Latin American countries, the relationship between aid and growth appeared to be insignificant. With

---

<sup>7</sup> For instance see Chenery and Stout (1966), Weisskopf (1973), Nalo (1993), Walt and wet (1993), Sepehri and Lodhi, (1999).

this he came to conclude that foreign aid didn't help the growth performance of these countries. However, review of Papanek's work shows that the model is a simple Harod-Domar type of formulation where investment (proxied by its different components) is the only explanatory variable. In contrast to this, modern conventional growth literature incorporates additional variables that are equally important in explaining growth. Hence Papanek's method is less appropriate as it failed to include the role of other variables such as policy in affecting economic growth.

Mosley, et.al (1987) used an expanded version of Papanek's (1973) model by including export and labour force as additional variables explaining growth. He employed OLS regression on a panel data of 80 countries for the period 1960-1983. The general finding shows that aid has insignificant negative role on growth. A separate analysis conducted on three sub-groups revealed that, for Africa, aid appeared to have negative and insignificant contribution while for Latin America the result was insignificantly positive. For Asia, on the other hand, aid produced positive and significant impact on growth. They also found that, on average, the share of aid allocated for development purpose is higher in high growing countries. With this, they postulated that high growth is attributed not only to the degree of aid flow, but also to the share of aid allocated to development activities (investment). Nevertheless, such conclusion has less acceptance on one basic ground. As Dowling and Heimenz (1983) pointed out, poor countries (like those in Africa) receive huge amount of aid in proportion to their income. Therefore, empirical analysis has high probability to produce misleading result in cross-country test since poor economic performance usually causes the inflow of more aid money.

Levy (1987) criticized early works which used total aid in their analysis. He specified a consumption equation where development assistance and relief aid appear in the equation separately. Using a panel data obtained from 39 countries for the period 1970-1980, the OLS regression result shows that the propensity to consume out of development aid is 0.4<sup>8</sup>. Based on this result, he argued that aid is effective since most of the development aid has been saved and invested. With this he concluded that in assessing the growth impact of aid, the question that has to be addressed is how efficient aid funded investments are in enhancing economic growth. In general, the argument of Levy (1987) is acceptable. However, the effect of foreign aid should also be measured in terms of other outlays crowded in as a result of foreign aid. That is, aid may be efficiently allocated, and yet growth may be unsatisfactory if the fund tends to free up resources to be used elsewhere such as building the military base. Therefore, efficiency of aid should be viewed not only in the sense of how it is allocated but also its impact on diverting resources.

Lensink and Morrissey (2000) tested the impact of uncertainty of aid flow on growth using instability of aid money to proxy the uncertainty of aid inflow<sup>9</sup>. The investigation is done on a panel data derived from 75 developing nations and on a sub group of 36 African countries for the period 1970-1995. In the base model, they specified growth equation as a function of aid, investment, human capital and initial per capita level. The OLS regression result for both groups show that aid has negative and insignificant contribution to growth. But, when the uncertainty variable is included in the model, the coefficient of aid turned out to be

---

<sup>8</sup> Levy (1987) further found that the propensity to consume out of emergency aid equals almost one.

<sup>9</sup> To construct the uncertainty proxy, Lensink and Morrissey (2000) first estimated the forecasting equation using autoregressive process. Then they derived the uncertainty proxy for each country by calculating the standard deviation of the residuals from the forecasting equation.

significantly positive while uncertainty has significant negative coefficient. They also specified an investment equation to assess the role of uncertainty of aid flow in affecting the level of investment. The result shows that both the coefficient and significance of aid improves when uncertainty of aid is controlled for in the model. With this, they came to conclude that uncertainty of aid flow undermines the growth impact of aid.

Among other factors, the growth impact of aid rests on the productivity of investment funded by aid money. In this regard, studies have examined how critical aid is in introducing efficiency in the economy. To analyze such case, empirical works widely used incremental output capital ratio (IOCR). Here, aid is said to bring productivity improvement if the change in output to the change in aid ratio is positive. Otherwise, the opposite will hold. In view of this, Mosley et.al (1987), out of OLS regression on a panel data of 80 countries found positive result. Rana & Dowling (1988) on the other hand, used pooled data of 9 Asian developing countries and obtained negative result.

However, the use of IOCR to estimate efficiency is highly criticized in the sense that it gives a crude picture of productivity. It is argued that IOCR measures the change in output for a unit change in investment without controlling for other factors that affect growth (Adam and O'Connell, 1997). The critics suggest the importance of analyzing additional variables such as policy environment in affecting efficient allocation of resources. In this connection, a number of empirical works have investigated the role of policies in affecting economic growth. Generally, several studies (e.g. Dowling and Hiemenz, 1983; Villanueva, 1993; Hadjimichael and Ghura, 1995; Easterly, 1998 ) come to conclude that growth is positively affected when:

- ◆ the rate of inflation is lower,
- ◆ there is low level of deficit in the budget account of the government,
- ◆ the economy is more open,
- ◆ the tax screw is not tight.

In the literature, favorable policy environment is assumed to help the efficient allocation of aid by minimizing the leakage of aid into non-productive expenditures. Areskourg (1973) examined the role of alternative policy conditions in influencing the growth impact of aid. He did OLS regression using a pooled data obtained from 20 developing countries for the period 1948-1968. His finding revealed that countries that used expenditure-increasing policies (of both fiscal and monetary) end up increasing consumption of aid money. On the other hand, countries that adopt trade control or flexible exchange regime allocate aid for investment purposes by controlling the demand for consumption goods. Therefore, he conclude that foreign aid is more effective when expenditure-switching policies are favored than expenditure increasing instrument.

Dowling and Heimenz (1983) used a panel data of 31 high growing Asian countries to assess the growth impact of foreign aid and various policy instruments during 1970s. The result obtained from OLS regression points that foreign aid, degree of openness, and financial liberalization significantly contributed to growth. The public sector and tax revenue variables appeared to be statistically insignificant. With this result they come to conclude that liberal trade regime and sound financial policies have helped the growth impact of aid.

Burnside and Dollar (1997, 2000) tested the impact of policy on the aid- growth

relationship using a new technique. The analysis is conducted based on data obtained from 56 countries for the period 1970-1993. The model is specified using aid, policy and other variables designed to capture the impact of institutional and social qualities on per capita growth. Both the OLS and 2SLS regression results show that aid is insignificant in promoting growth. But, when aid interacted with policy index<sup>10</sup> is used as explanatory variable, the result became positive and significant. Hence, they conclude that aid significantly promotes growth if the policy mix is favorable (or conducive). In view of the result, they recommend disbursement of aid to be conditional on good policy environment.

The findings of Burnside and Dollar (1997, 2000) have been questioned by a number of recent studies. According to the investigation of Hansen and Tarp (2001), aid tends to increase the rate of growth even without the inclusion of interacted term. Dalgaard and Hansen (2000), on the other hand, pointed that the result of Burnside and Dollar is very fragile. They argue that inclusion of five additional countries to the data set destroys the conclusion of Burnside and Dollar. Similar critics were forwarded by Lensink and Morrissey (2001), Hansen and Tarp (2000).

Burnside and Dollar (1997) extended their study to examine the possibility of endogeneity between policy and foreign aid. They specified an aid equation with initial GDP per capita, population, policy and dummies for institutional quality as explanatory variables. The policy equation, on the other hand, is composed of aid, initial GDP per capita and dummies intended to capture the institutional quality and political condition of the recipient country. Using data obtained from 191 countries

---

<sup>10</sup> According to Burnside and Dollar (1997, 2000) factors that improve the growth impact of aid must be interacted with aid and included in the regression analysis.

for the period 1970-1993, the 2SLS regression result revealed that policy has a positive and significant impact on aid while the contribution of aid on policy is insignificant. This made them to conclude that good policies are rewarded by donor countries, but there is no systematic effect of aid on policy. Nevertheless, evaluation of the analysis points that there is a reason to be skeptical about such conclusion. This is because the estimation is done using data obtained from almost all countries that received aid. But, the importance of aid is not expected to be similar across all countries. Those who need foreign aid badly are likely to suffer from unhealthy policy condition (such as high inflation rate, and huge level of deficit among others). On the other hand, countries that need aid the least may be under good policy environment. Hence, to establish conclusive relationship between aid and policy, the analysis must be based on either specific country or on sub-group of countries that are in similar status.

In a related case, it is argued that in disbursing aid money, donor countries give more weight to their strategic objectives than the policy environment of the recipient country (Hansen and Tarp, 2000, 2001). On the other hand, Gomanee, Girma and Morrissey (2001) argued that aid may not influence all policies and, therefore, it is difficult to assess the impact of aid on policy at least in a cross country framework.

A number of recent studies show interest in assessing the existence of capacity constraint on the amount of aid that can be productively absorbed. To capture such phenomena, aid squared term is included in the regression equation. In such approach, Dalgaard and Hansen (2000), Hansen and Tarp (2000) and Hansen and Tarp (2001) found the relationship between aid and growth to be non-linear. Therefore, they

conclude that there exist decreasing returns to aid.

Nyoni (1997) examined the effect of foreign aid on the real exchange rate of Tanzania. In the analysis, real exchange rate is modeled as a function of aid, openness, government expenditure and devaluation. The estimation is based on OLS regression using time series data covering the period 1967-1993. Both the long run and short run regression results show that foreign aid causes depreciation of the real exchange rate and, therefore, it did not cause the Dutch disease effect.

Lloyd, Morriessey and Osei (2001) assessed the impact of policy reform in the aid-growth relationship of Ghana. The analysis is based on data from 1970-1997. In the model they represented output growth by the growth in private consumption pointing out the existence of theoretical and empirical support for doing so<sup>11</sup>. The equation is specified as a function of export, foreign aid and time trend to capture the labor force and autonomous improvements in technology. The OLS regression result shows that in the long run export and foreign aid contribute to the growth of private consumption. In the short run model (ECM), policy is incorporated using a dummy that captures the implementation of the structural adjustment program in 1983 and the subsequent years. The policy variable is then interacted with export and aid variables to evaluate the role of structural adjustment. The result shows that both policy interacted export and aid produced significant positive contribution to growth of private consumption. Aid (not interacted with policy variable produced negative but insignificant contribution. Based on this result, they emphasized the role of policy reform in enhancing the impact of aid on growth (in private consumption).

---

<sup>11</sup> The authors re-estimated the long run and ECM formulations using real GDP as the dependent variable. The result obtained is not very different from the one that used private consumption. However, the diagnostic test detected problems associated with model specification.

The analysis shows the role of policy in facilitating the aid growth relationship. However, the specification problem obtained while using real GDP as explanatory variable reveals the existence of important variables that are not incorporated in the model. This includes domestic savings and import. Moreover, the estimation may suffer from shortcomings associated with small degrees of freedom since the analysis employed only 28 years data.

What we can infer from the foregoing review is that the conclusions made on the aid-growth link are weak mainly due problems related to model specification. This holds true for most of the reviewed cross country and time series studies. Moreover, the analyses done based on cross-country studies have the tendency to provide less reliable result due to the apparent limitation of panel data studies. Dowling and Hiemenz (1983) argue that there is a lag between aid flow and its growth impact. The lag also differs from country to country based on the nature of the project. Therefore, it is impossible to incorporate them in a panel data analysis. Besides, aid recipient countries are not the same in terms of dependency on aid money, their socio-economic and policy environment. This in turn influences their absorptive capacity of aid money. Hence, aggregating these countries to analyze the growth impact of aid is likely to produce biased results.

### **3.3 Studies on Ethiopia**

For aid dependent countries like Ethiopia, assessing factors influencing aid effectiveness is very important. In the past, several studies have attempted to assess the growth impact of aid.

Dawit and Yemiserach (2001) examined the aid growth relationship for the period 1970-1999 using an error correction model. They formulated three equations-output,

investment and import equations. Based on the ECM result of the output equation, they conclude that aid contributes negatively to economic growth whereas investment has a positive and significant influence on growth. The investment equation, on the other hand, found a positive and significant role of aid. With this result they argued that aid has helped growth through its contribution to capital formation. Similarly, they argue that aid has a positive significant impact on imports and therefore, it has helped growth through the acquisition of important inputs.

Review of the analysis and the results they arrived at calls for a number of criticisms. First, the specification of the output equation is likely to be biased. That is, output is specified as a function of savings, aid, investment and other variables. Gomane, Girma and Morrissey (2001) argued that when aid and investment are used together as explanatory variables to growth, the coefficient and significance of aid in the regression would be underestimated and provide incorrect result. This is due to a problem of double counting since investment captures part of the growth impact of aid. Second, as discussed in the theoretical analysis earlier, the fact that aid has helped in capital formation does not necessarily mean that it spurs growth since aid may lead to unproductive (inefficient) investment. This could hold for the aid-import relationship as well where aid may import inappropriate technologies that have insignificant contribution to growth. Thus, in light of this, the conclusion by Dawit and Yemiserach (2001) seems inappropriate.

Sewasew (2002) examined the relationship between import and GDP growth in Ethiopia for the period 1960/61-1999/2000. Using the Johansen (1988) procedure, he found that in the short run foreign exchange receipts has significant positive impact on

imports. Since one source of foreign exchange receipt is aid, it can be argued that aid has positive impact on import. However, Sewasew's (2002) finding also revealed that imported capital goods have insignificant negative impact on the growth of real GDP. This suggests that a favorable impact of aid on import does not guarantee the aid-growth link to be positive.

Haile and Alemayehu (2000) examined the relationship between savings, foreign aid and economic growth using 30 years data (from 1967-1997). They specified saving and growth equation in the form of an error correction model. The conclusion they made, using the Johansen Procedure, is that foreign aid has insignificant negative impact on growth.

Nonetheless, the growth equation is specified in a fashion similar to Dawit and Yemiserach (2001) - previously discussed paper. That is, both aid and investment are used as explanatory variables. In such formulation aid may appear insignificant because a portion of its contribution to growth is taken over by the investment variable. Hence, the result understates the growth impact of foreign aid.

Tolessa (2001) examined the role of aid in the Ethiopian economy for the period 1964/65 - 1999/2000. He specified saving, investment, and growth equations. In the analysis, he desegregated foreign aid into grants and loan assuming that the two components have different impact. The estimation uses Johansen maximum likelihood procedure. From the investment equation he found that foreign loan has positive and significant long run impact on investment while foreign grant doesn't. The finding also revealed that domestic savings and foreign loan has positive and significant influence on long run growth. In contrast to this, the impact of foreign grant appeared

to be significantly negative. Furthermore, the ECM shows that both foreign inflows are insignificant in affecting growth. With this, he recommended that the government should encourage domestic saving than foreign aid. He further incorporated a policy index into the growth equation derived from a combination of a fiscal deficit, openness to trade and exchange rate premium. Based on a significant result obtained he argued that good policy improves effectiveness of aid.

However, Tolessa (2001) used the policy index in the growth equation without interacting it with foreign aid. In such formulation, the coefficient of policy index shows its impact on growth as any other variable stated in the model does. Therefore, his result does not show the role of policy in affecting aid effectiveness. In addition, the use of exchange rate premium (ERP) as one component in deriving policy index is very likely to produce misleading result. This is because ERP measures the rate of deviation of the official exchange rate (OER) from the parallel exchange rate (i.e., PER). Thus, the ERP measured in one period may substantially differ from another period while the gap between OER and PER is equivalent in both times. Therefore, using ERP to compare the macro economic situation may give misleading information. Rather, the deviation of OER from PER should have been used while formulating the policy index.

Jiffar (2002) examined the impact of foreign aid on various public spending for a period covering 1966/67 to 1998/99. The analysis is based on the aid fungibility model. He constructed seven equations to explain sectoral spending. Four equations are categorized under development spending while the remaining three are non-development spending. The development sector is composed of agriculture, education, construction, and transport and communication. On the other hand, non-development

are spending to defense general service and debt servicing.

Each sectoral spending is specified as a function of aid attributed to its own sector, aid given to other sector's and GDP. His finding revealed that in the long run aid given to each development sectors has positive impact on the spending of the respective sectors. Particularly the result is significant for construction. With regard to non developmental activity, foreign aid appeared to have positive impact on debt servicing expenditure while it is negative for expenditures on defense and general service.

The short run (ECM) result point that foreign aid allocated to transport and communication and construction sectors brought significant negative influence to the spending of the respective sectors. The same holds for the impact of aid given to other sectors. The rest, however, have positive sign. On the other hand foreign aid is found to have positive role on all non-development sector's spending. With this he concluded that there exists fungibility problem.

The analysis is based on a simple model where aid and GDP only are assumed to influence the level of spending. Moreover, the analysis fails to address the possibility of complementarity between sectors' spending activity. That is, an increase in one sector's spending (following aid given to that particular sector) may increase the spending of another sector due to the complementarity nature of the two sectors. Hence, ignoring such case may tend to make aid appear fungible when actually it is not. Besides, fungibility of aid poses a problem on the economy if and only if the diverted fund finances unproductive expenditures (Hjertholm, Laursen and White, 2000).

In summary, most of the studies reviewed suffer from problems associated with model

specification. Besides, important variables such as the policy aspect were given less emphasis while assessing the growth impact of aid. Hence, the studies were not strong enough to adequately identify the aid-growth link.

## CHAPTER FOUR

### MODEL SPECIFICATION AND METHODOLOGY

#### 4.1 Model Specification

Two equations are identified to assess factors affecting aid effectiveness. More specifically, the equations are designed among others, to examine the role of policy in affecting the growth impact of aid, and the influence that instability of aid flow poses on the, investment and growth.

##### A) Investment Equation

The theoretical and empirical review performed by Hansen and Tarp (2000) is used in designing the investment equation. Moreover, attempt is made to incorporate other factors that are believed to affect investment. Hansen and Tarp (2000) pointed out that most empirical studies on investment are built up on a behavioral equation that links total investment to the overall saving. That is, investment is assumed to depend on domestic savings and inflow of foreign resources. Nonetheless, studies show that the relationship between saving and investment is ambiguous from a theory point of view. For instance, Schimdt-Hebbel, Serven and Solimano (1996) argued that investment responds to risk and profitability and not to savings. Contrary to this, strong correlation is evidenced through a number of empirical works. In this regard mostly cited case is the growth miracle of East Asian countries which is attributed to (among others) their saving performance. Such contrasting cases made the investment-saving relationship uncertain. The literature on aid, however, emphasizes the existence of positive correlation between foreign aid and capital formation activity. For instance, Harod-Domar and Gap theories consider foreign inflow as

an important growth inducing element through bridging the gap between the available resources and the required investment. Gomane, Girma and Morissay (2001) in this connection underlined that investment is one of the transmission mechanisms that facilitates the growth impact of aid (i.e. foreign aid positively affects investment).

Recent theories extended the above stated behavioral equation to include other factors such as uncertainty of aid inflow. This variable measures the impact of aid volatility on growth. Lensink and Morissay (2000) pointed out that instability of aid flow from the expected level limits revenue and, therefore, the fiscal behavior of the government. Moreover, it creates uncertain environment and, therefore, affects investment and growth. This implies that, if the deviation of actual aid inflow from the expected amount increases, then it points high uncertainty of aid inflow that in turn depresses investment performance. That is, a short fall of foreign aid from the budgeted amount tends to depress government revenue which in turn constrains the capital formation activity.

In addition to income uncertainty, the literature argues that political and social instability tends to deter investment by affecting the incentive framework. Such instability affects investment negatively by raising the value of waiting, threatening property right and making prediction of investment returns difficult (Serven, 1996). One of the factors that induce political and social instability is war. Therefore, this paper checks the potential (if any) of such instabilities in depressing investment.

Since development assistance has a loan component, current inflow of aid necessitates its future payments in the form of debt service. If recipient's repayment capacity fails to increase, debt servicing is likely to crowd out investment activity by consuming the available foreign exchange. Therefore, it is equally important to assess the issue of whether debt

servicing weakens investment or not.

Hence, with the expected signs indicated below the equation, the investment function is given by:

$$I = f \{ S, A, U, DF, DX \} \dots\dots\dots (4.1)$$

(?) (+) (-) (-) (?)

where I = the ratio of gross fixed investment to GDP, S = the ratio of gross domestic saving to GDP, A = the ratio of Official Development Assistance(ODA) to GDP, U = the ratio of the deviation of actual aid flow from the budgeted level<sup>12</sup> (to GDP), DF= the share of defense expenditure in GDP (a proxy of war)<sup>13</sup>, DX= the share of debt service to export.

Accordingly, the model to be estimated is specified as follows:

$$\ln I = \beta_0 + \beta_1 \ln S + \beta_2 \ln A + \beta_3 \ln U + \beta_4 \ln DF + \beta_5 \ln DX + U_i \dots\dots\dots (4.2)$$

where  $\beta_0$  is the constant term,  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$  and  $\beta_5$  are elasticity coefficients and  $U_i$  is white noise error term.

B) Growth Equation

Studies in 1970 had been based on Harod-Domar type of analysis that assumed investment as the sole determinant to growth.<sup>14</sup> Studies in the 1980s, however, made some changes. The work of Mosley et.al (1987) and Rana and Dowling (1988), for instance, extended prior works to include other variables such as the labor force and policy variables. The growth model of this paper, therefore, is based on such extended works. However, to incorporate recent thinking of aid effectiveness and also in line with the objective of the study, attempt is made to further improve the model.

---

<sup>12</sup> The budgeted level refers to the amount of aid the government declares at the beginning of each budget year

To properly identify the aid-growth relationship, due attention should be given to model specification<sup>15</sup>. In this regard, omitting investment variable from the growth equation is likely to produce biased result. However, as Gomanee, Sourafel and Morrissey (2001) argued, including both aid and investment in the growth equation is at the same time incorrect. This is because it results in double counting since part of aid finances investment.

Therefore, to address this problem, this paper uses only the part of investment that is not explained by aid as an investment variable. Actually, there are two ways that help derive non aid financed investment. The first one is called Residual Generated Regressor. It requires conducting investment regression by which aid (i.e. Official Development Assistance) appears as the only explanatory variable. Then, using the residual from the regression, the investment level that is not a result of foreign aid can be constructed. The other alternative involves first netting out the amount of loan and grant allocated to total capital expenditure to get government investment not financed by foreign aid. Then adding this to total private investment will give total investment which is not a result of foreign aid.<sup>16</sup> A cross plot of the two alternatives as shown in appendix I confirm that the residual generated regressor constitute a higher value. This confirms the existence of government investment outlays out of recurrent expenditure that the second method overlooked. Hence, this paper employs the residual generated regressor since it gives more accurate figure.

---

<sup>13</sup> Defense expenditure is chosen (rather than dummy variable) since the former captures the severity of war as well

<sup>14</sup> For example see the work of Papanek (1973)

<sup>15</sup> Durbary, Gemmell and Greenaway (1998) argue that most aid- growth analysis suffer from poor model specification.

<sup>16</sup> Actually there are indications which suggest the presence of investment spending out of recurrent outlays. For instance, about 70% of total spending on education and health is derived from the recurrent expenditure. However, due to lack of data regarding the share of aid from such spending, this paper considers total capital expenditure only as government investment. Therefore, the calculated government investment using the second alternative is likely to be understated.

Accordingly, the level of investment not financed by aid ( $I_0$ ) is constructed from the following equation (see appendix II).

$$I_0 = INV - 0.09773 (AID) \dots\dots\dots (4.3)$$

In addition to the aid variable, the growth equation further includes aid interacted with policy index variable. This helps to examine whether the aid-growth relationship is conditional on good policy environment or not. Notwithstanding a number of studies agreed on the contribution of good policy in enhancing growth, consensus is not reached as to whether the growth impact of aid is conditional on the quality of the policy environment or not. The policy index is formed using the technique performed by Burnside and Dollar (1997, 2000). They developed the policy index out of a regression result obtained from a growth equation. The growth model is comprised of budget surplus, openness to trade, inflation rate (that capture fiscal, trade and monetary policies respectively) and other variables that help capture institutional and social distortions. Then the policy index is derived using the coefficients obtained from the regression result.<sup>17</sup>

In the Ethiopian context, it is inappropriate to use inflation rate as an indicator of monetary policy since prices have been controlled for a long period of time through regulation. Instead financial liberalization is used to proxy the monetary aspect of the policy index. A policy index formed in this manner shows that a good policy environment is a condition where the level of deficit is low, the trade sector is more open and greater financial liberalism.

---

<sup>17</sup> Burnside and Dollar (1997, 2000) pointed out that the three economic policy variables act as a proxy to a range of policies. Collier and Dollar (1999), on the other hand, used the World Bank's Country Policy and Institutional Assessment (CPIA) to proxy the policy environment. The measure is composed of 20 components. It includes (in addition to macroeconomic policies), property right, safety nets, quality of the public sector and others. However, due to lack of such data, this paper makes use of the policy index formed mainly by grouping economic policies that capture the fiscal, monetary and trade situations.

According to studies, a reduction in fiscal deficit is widely viewed as pro-growth move. Fisher (1993) (cited by Durbarry, Gemmell and Greenaway 1998) point out that fiscal deficit acts as an indicator of a government that is loosing control. Moreover, they underlined the importance of reduced fiscal deficit in facilitating stabilization programs. In addition, Villanaueva (1993), Ghura and Hadjimichael (1995) argue that an increase in government deficit has the potential to repress the economy. This is because government deficit implies government dissaving that put pressure on the overall domestic saving. Moreover, higher level of deficit usually resulted in large government borrowing which may crowded out the private sectors' capital accumulation. The evidence from empirical research also conveys the same message (See Kormendi and Maguire, 1985; Easterly, 1998).

The degree of openness of the economy is also viewed as a pro-growth policy. This is because a more open economy improves efficiency in production as a result of access to latest technology and inputs for production (Dowling and Heimenz, 1987). Besides, advantages from international trade is realized when the economy is more open.

The financial sector of the economy plays a key role in economic development. Over regulation of the sector (through limiting the private sectors access to credit, interest rate control and the like) hamper the potential of the sector (Durbay, Germeel and Greenway, 1998). In this regard, the extensive review by J. Fry (1995) underline the importance of financial liberalization in stimulating investment and growth. He argued that measured by variety of variables, less financial repression is correlated with higher economic growth (see Dollar and Easterly, 1999 for similar approach). Thus, financial liberalization is advocated as a growth enhancing monetary policy. There is, however, a contrasting literature that favors financial repression for growth. Gelb (1989) (cited by Durbarry, Gemmell and Greenaway 1998) argue that financial repression suppresses financial costs and, therefore, it is necessary

to encourage high priority investments that have externality and longer gestation period. Similarly, Stiglitz and Uy (1996) underlined the importance of moderate financial repression to increase aggregate saving in the economy. In support of their argument, they pointed that financial repression practice (measured by interest rate controls) in fast growing East Asia country was moderate when compared with a number of developing countries.

This paper considers financial liberalization (measured by credit access to the private sector) to capture the role of monetary policy in the economy. That is, more access or lower restriction of credit to the private sector is expected to improve investment efficiency and promote growth.

Therefore, the policy index is derived from the following regression result (see appendix III).

$$P_t = 0.446 (OPENNESS)_t + 0.107 (LIBERALIZATION)_t - 0.167 (BUDGET DEFICIT)_t \dots\dots (4.4)$$

In addition, aid squared variable is incorporated in the model to assess whether aid inflow has been beyond the absorptive capacity of the country or not. To make the model complete, human capital and labour force variables are included in the growth model specification. Therefore, with the expected signs indicated below each variable, the growth equation is given by

$$Y = f \{ I_o, A, PA, A^2, H, L \} \dots\dots\dots(4.5)$$

(+ ) (?) (?) (?) (+) (+)

where Y = real GDP, I<sub>o</sub> = the ratio of investment (that is not explained by foreign aid) to GDP, A = the ratio of official development assistance (ODA) to GDP, PA = policy index (P) interacted with the ratio of ODA to GDP (A), A<sup>2</sup> = the square of ODA to GDP, H = human capital proxied by the total number of students enrolled in the country and L = labor force. Hence the estimable log-linear model will be:

$$\ln Y = \alpha_0 + \alpha_1 \ln I_0 + \alpha_2 \ln A + \alpha_3 PA + \alpha_4 A^2 + \alpha_5 \ln H + \alpha_6 \ln L + U_i \dots \dots (4.6)$$

Where  $\alpha_0$  is the constant term;  $\alpha_1$ ,  $\alpha_2$ ,  $\alpha_5$  and  $\alpha_6$  are elasticity coefficients;  $\alpha_3$  and  $\alpha_4$  are slope coefficients, and  $U_i$  is a white noise error term.

## 4.2 Data Source

The time series data that will be used for estimation is collected from MoFED and National Bank of Ethiopia annual reports (various years). The data covers 39 years from 1962/63 to 2000/01. The period is selected based on availability of data for all the variables contained in equation (4.1) and (4.5).

## 4.3 Methodology of the Study

### 4.3.1 Stationarity and Unit Roots

For (many of) time series data stationarity is unlikely to exist. Therefore, testing the variables for stationarity is an important issue in econometric analysis. A process is said to be stationary (weakly or covariance stationary)<sup>18</sup> if the mean variance and auto-covariance (i.e., the first two moments of distribution) are time invariant. That is, there exists stationary process if it generates constant mean and variance and if the covariance depends only on the time lag used in the calculation (Enders, 1996). A non-stationary series, on the other hand, do not have long run mean where the variable returns and also the variance extends to infinity as time goes.

If the variables in the model are non-stationary, it results in spurious regression. That is, the fact that the variables share common trends will tend to produce significant relationship

---

<sup>18</sup> The process becomes weakly (asymptotically) stationary and not strictly stationary because the moments usually depends on the initial conditions of the process (Hendry, 1997).

between the variables. Nonetheless, the relationship exhibit contemporaneous correlation as a result of common trend rather than true causal relationship (Harris, 1995). Hence, with non-stationary variables, conducting OLS (and using the "t" and "F" tests) generate misleading result.

Studies have developed different mechanisms that enable non stationary variables attain stationarity. It has been argued that if a variable has deterministic trend,<sup>19</sup> including trend variable in the regression removes the trend component and makes it stationary. Such process is called trend stationary since the deviation from the trend is stationary. However, most time series data have a characteristic of stochastic trend (that is, the trend is variable which, therefore, can not be predicted with certainty). In such cases, in order to avoid the problem associated with spurious regression, pre-testing the variables for the existence of unit roots (i.e. non-stationary) becomes compulsory. In general if a variable has stochastic trend, it needs to be differenced in order to obtain stationarity. Such process is called difference stationary process (Gujarati, 1995). The number of unit roots a given variable posses determines how many times that variable should be differenced in order to attain stationarity. In this regard, the Dickey Fuller (DF) test enables us to assess the existence of stationarity. The simplest DF test starts with the following first order autoregressive model.

$$Y_t = \Phi Y_{t-1} + U_t \quad \dots\dots\dots (4.7)$$

Subtracting  $Y_{t-1}$  from both sides gives

$$\Delta Y_t = \gamma Y_{t-1} + U_t \quad \dots\dots\dots (4.8)$$

Where  $\gamma = (\Phi-1)$ ,  $U_t \sim \text{IID}(0, \sigma^2)$

The test for stationarity is conducted on the parameter  $\gamma$ . If  $\gamma = 0$  or  $(\Phi = 1)$  it implies that the

---

<sup>19</sup> A trend is said to be deterministic if it can be perfectly predictable rather than being variable (i.e. stochastic)

variable Y is not stationary. The hypothesis is formulated as follows.

$$H_0: \gamma = 0 \text{ or } (\Phi=1)$$

$$H_1: \gamma < 0 \text{ or } (\Phi < 1)$$

Using equation (4.8) is appropriate only when the series  $Y_t$  has a zero mean and no trend term (Harris, 1995). If a variable has zero mean, it implies that  $Y_t=0$  when  $t = 0$  (i.e., there is no constant term). But, it is impossible to know whether the true value of  $Y_0$  is zero or not. For this reason including a constant (drift) to the regression is suggested. That is,

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + U_t \quad \dots\dots\dots (4.9)$$

where  $\alpha$  is a constant term.

However, if a series contains a deterministic trend, testing for stationarity using equation (4.9) is invalid. Because if  $\gamma = 0$ , we accept the null hypothesis that the series contains a stochastic trend when there exists deterministic trend. Therefore, it is important to incorporate time trend in the regression as follows.

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \beta T + U_t \quad \dots\dots\dots (4.10)$$

where T is the trend element.

For equations (4.9) and (4.10) as well the parameter  $\gamma$  is used while testing for stationarity where the decision is made using a  $\tau$ -statistics.<sup>20</sup> If the calculated value of  $\tau$  is less than the critical value (reported by Dickey and Fuller) the null hypothesis is accepted and not if otherwise.

---

<sup>20</sup> Note that there are three  $\tau$ -statistics-. They are  $\tau$ ,  $\tau_U$ , and  $\tau_T$ . The first one is used to the regression that is void of constant and trend. The second incorporates only constant while the third includes both constant and trend element (See Enders, 1996).

Rejecting the null hypothesis implies that there exists stationarity. If a variable that is not stationary in levels appears to be stationary after  $n^{\text{th}}$  difference then the variable is said to be integrated of order  $n$   $I(n)$ . However, the DF test has a series limitation in that it suffers from residual autocorrelation. Therefore, it is inappropriate to use DF distribution with the presence of autocorrelated errors because the error terms will not be white noise.<sup>21</sup> Autocorrelation of the error terms is the result of failure to adequately specify the dynamic structure of  $Y_t$  (Harris, 1995). To amend this weakness, the DF model is augmented with additional lagged first differences of the dependent variable. This is called Augmented Dicky Fuller (ADF). This regression model avoids autocorrelation among the residuals. Thus, incorporating lagged first differences of the dependent term in equations (4.8), (4.9) and (4.10) gives the corresponding ADF models as follows.

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^k \theta_i \Delta Y_{t-1} + \mu_t \dots\dots\dots (4.11)$$

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{i=1}^k \theta_i \Delta Y_{t-1} + \mu_t \dots\dots\dots (4.12)$$

$$\Delta Y_t = \alpha + \beta T + \gamma Y_{t-1} + \sum_{i=1}^k \theta_i \Delta Y_{t-1} + \mu_t \dots\dots\dots (4.13)$$

where  $\alpha$  is a constant (drift),  $T$  is a trend,  $k$  is the lag length and  $\mu \sim \text{IID}(0, \sigma^2)$

Taking the variables in first difference form presents only the dynamic interaction among the variables with no information about the long run relationship. However, if the variables that are non-stationary separately have the same stochastic trend then it points that the variables have a stationary linear combination. This in turn implies that the variables are cointegrated, therefore, there exists long run equilibrium among the variables (Enders, 1996).

---

<sup>21</sup> A variable is white noise if the mean is zero, variance is constant and autocovariance of the process is zero.

### 4.3.2 Cointegration Analysis

Cointegration among the variables reflects the presence of long run relationship in the system. We need to test for cointegration because differencing the variables to attain stationarity generates a model that does not show the long run behaviour of the variables. Hence, testing for cointegration is the same as testing for long-run relationship. In general, if variables that are integrated of order 'd' produce a linear combination which is integrated of order less than 'd' (say 'b') then the variables are cointegrated and hence have long run relationship (Gujarati, 1995).

There are two approaches used in testing for cointegration. They are: (i) the Engle-Granger (two step algorithm) and: (ii) the Johansen Approach.

#### a) Engle-Granger (two step algorithm)

The Engle-Granger (E-G) method requires that for co-integration to exist, all the variables must be integrated of the same order. Hence, once the variables are found to have the same order of integration, the next step is testing for cointegration. This needs to generate the residual from the estimated static equation and test its stationarity. By doing so we are testing whether the deviation (captured by the error term) from the long run are stationary or not. If the residuals are found to be stationary it implies that the variables are cointegrated. This in turn ensures that the deviation from the long run equilibrium relationship dies out with time (Enders, 1996). Hence, the presence of cointegration makes it possible to model the variables (that are in first difference) through the error correction model. In the model a one time lagged value of the residual hold the error correction term where its coefficient captures the speed of adjustment to the long run equilibrium. However, the use of Engle-Granger method is criticized for its weakness on the following cases. (a) Cointegration test may depend on the

variable put in the left side of the cointegration. That is, the test is not invariant to the variable used for normalization (Enders, 1996). (b) The method does not allow the variables in the right hand side to be potentially endogenous (Harris, 1995). (c) When there are three or more variables, more than one co-integration vector may be found and the E-G method does not have a procedure for estimating the cointegration vectors separately.

Therefore, this paper chooses to use the Johansen maximum Likelihood Procedure (1988) since it addresses the above stated weakness of the E-G method.

b) Johansen (1988) Maximum Likelihood

The Johansen (1988) procedure allows to test for the presence of more than one cointegration vector. Moreover, it permits to estimate the model without priorly restricting the variables as endogenous and exogenous.

The starting point in this procedure is formulation of VAR model in the following form<sup>22</sup>.

Considering K-lags of  $Z_t$ ,

$$Z_t = A_1 Z_{t-1} + \dots + A_k Z_{t-k} + \mu + \phi D_t + \xi_t \dots\dots\dots(4.14)$$

where  $Z_t$  is a (nx1) vector of stochastic I(1) variables,  $A_i$  ( $i=1,\dots,k$ ) is  $n \times n$  matrix of parameters,  $\mu$  is a vector of deterministic component (i.e., a constant and trend),  $D$  is a vector of dummies and  $\xi_t \sim IN(O,\Sigma)$  is a vector of error term and  $t = 1, \dots, T$  ( $T$  is the number of observation).

The above model can be reparameterized to give a vector error correction model (VECM). That is, adding and subtracting  $(A_{k-1}, \dots, A_2 - A_1 - I) Z_{t-k}$  from equation 4.10 ( $I$  being the identity matrix) results the following specification.

---

<sup>22</sup> The discussion is taken from Juselius (1994) and Enders, (1996).

$$\Delta z_t = \Gamma_1 \Delta z_{t-1} + \dots + \Gamma_{k-1} \Delta z_{t-k+1} + \pi z_{t-k} + \mu + \varphi D_t + \xi_t \quad \dots\dots\dots(4.15)$$

Simplifying equation (4.15) gives

$$\Delta Z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + \pi Z_{t-k} + \mu + \varphi D + \xi_t \quad \dots\dots\dots (4.16)$$

where  $i = 1, \dots, k-1$ ,  $\Gamma_i = - \left[ I - \sum_{j=1}^i A_j \right]$   $\Gamma_i$  is allowed to vary without restriction

$$\pi = - \left[ I - \sum_{j=1}^k A_j \right]$$

The long run relationship among the variables is captured by the term  $\pi z_{t-k}$ . In the Johansen (1988) procedure, determining the rank of  $\pi$  (i.e., the maximum number of linearly independent stationary columns in  $\pi$ ) provides the number of cointegrating vector between the elements in  $z$ . In this connection, there are three cases worth mentioning. (i) If the rank of  $\pi$  is zero it points that the matrix is null which means that the variables are not cointegrated. In such case the above model (equation 4.15) is used in first difference, void of long run information. (ii) If the rank of  $\pi$  equals the number of variables in the system (say  $n$ ) then  $\pi$  has full rank which implies that the vector process is stationary. Therefore, the VAR can be tested in levels. (iii) If  $\pi$  has a reduced rank [i.e.,  $1 < r(\pi) < n$ ] it suggests that there exists  $r \leq (n-1)$  cointegrating vector where  $r$  is the number of cointegration in the system.. Therefore, the matrix  $\pi$  equals to  $-\alpha\beta'$  where  $\alpha$  and  $\beta$  are  $n \times r$  matrices,  $\beta$  represents the cointegration parameters with  $\alpha$  showing their corresponding feedback or adjustment mechanism to equilibrium (i.e., it shows the speed with which disequilibrium from the long run path is adjusted). In identifying the number of cointegrating vectors, the Johansen procedure provides  $n$  eigenvalues denoted by  $\lambda$  (also called characteristics roots) whose magnitude

measures the extent of correlation of the cointegration relations with the stationary elements in the model.

In general, to identify the number of cointegrating vectors in the system, the Lambda max ( $\lambda_{\max}$ ) and Lambda trace ( $\lambda_{\text{trace}}$ ) statistics are used. They are obtained from the following formulas.

$$\lambda_{\max} = -T \log (1 - \lambda_{r+1}) , r = 0, 1, 2, \dots, n-1 \quad \dots\dots\dots(4.17)$$

$$\lambda_{\text{trace}} = -T \sum_{i=r+1}^n \log (1 - \lambda_i) \quad \dots\dots\dots(4.18)$$

where T is the sample size and  $\lambda_i$  is estimated eigenvalues.

$\lambda_{\max}$  statistic tests the null hypothesis that there are 'r' cointegrating vectors against the alternative of 'r+1'. The trace statistics, on the other hand, tests the hypothesis of less than or equal to 'r' cointegrating vectors against the alternative of 'r+ 1'. The distribution of both test statistics follow Chi-square distributions (Enders,1995). Reimers (1992) (cited by Harris, 1995) points that the Johansen approach tends to over reject the null hypothesis when the sample size is small. While testing for cointegration, therefore, he suggests adjustment to be made for the degrees of freedom. This is done by substituting 'T-nk' in place of T in equations (4.17) and (4.18), where n is the number of variables and k is the lag length set in the test for cointegration.

The other important thing in the cointegration analysis is the issue of identifying endogenous and exogenous variables in the system. This is required because the Johansen procedure do not restrict the variables behaviour a priori. If a variable is weakly exogenous, it implies that its error correction term (i.e., the corresponding  $\alpha$ -coefficient) does not enter in the error correction model. This implies that the dynamic equation for that variable contains no

information concerning the long run relationship in the system. Hence, variables that are weakly exogenous should appear in the right hand side of the VECM. This restricts the exogenous variables to be contemporaneous with the dependent variable (Harris, 1995). The first step in the test is formulation of the null hypothesis which states that the variable is weakly exogenous against the general alternate. That is,

$$H_0: \alpha_{ij} = 0 \quad \text{for } j = 1, \dots, r \text{ (r being the number of cointegrating vectors)}$$

$$H_1: \alpha_{ij} \neq 0$$

The test (for weak exogeneity) is conducted using the following formula.

$$-2 \log(Q) = T \sum_{i=1}^r \log \left\{ \frac{(1 - \hat{\lambda}_i)}{1 - \hat{\lambda}_i^*} \right\} \dots\dots\dots (4.19)$$

where  $Q = \frac{\text{(restricted maximized likelihood)}}{\text{(unrestricted maximized likelihood)}}$

T = the number of observations, r = the number of rank, and  $\lambda_i$  and  $\lambda_i^*$  represents eigenvalues for unrestricted and restricted models respectively.

If the result obtained from the above formula is less than the Chi-squared distribution, then we can not reject the null hypothesis. This implies that the variable is weakly exogenous.

#### 4.3.3 Vector Error Correction Model (VECM)

Economic variables have short run behaviour that can be captured through dynamic modeling. If there is long run relationship among the variables, an error correction model can be formulated that portray both the dynamic and long run interaction between the variables. In the previous discussion, we show that if two variables that are non-stationary in levels have a stationary linear combination then the two variables are cointegrated. Cointegration means the presence of error correcting representation. That is, any deviation from the equilibrium

point will revert back to its long run path. Therefore, an ECM depicts both the short run and long run behaviour of a system. Engle and Granger (1987) (cited in Alogoskoufis and Smith, 1995) defined ECM as "a particular representation of a vector autoregression appropriate for cointegrated results." This means if there exists long run relationship (i.e., cointegration among the variables) we can rewrite equation (4.16) to come up with the following VECM specification.

$$\Delta Z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta Z_{t-i} + \alpha \left( \hat{\beta}_1' Z_{t-1} + \hat{\beta}_2' Z_{t-1} + \dots + \hat{\beta}^i Z_{t-1} \right) + \mu + \varphi D + \varepsilon_t \dots\dots\dots (4.20)$$

where the figure in the parenthesis represents the error correcting terms.

If there is only one cointegrating vector and if the endogenous and exogenous variables are identified in the long run analysis, we can develop the VECM by conditioning on the exogenous variables. In this case, only the error correcting terms of the endogenous variables

appear in the error correction model. Thus, assuming that  $Y_t$  is endogenously determined in the model and  $X_{jt}$  represents weakly exogenous variables, we can model for  $Y_t$ . This is performed using the lagged first difference of  $Y_t$ , the current and lagged first differences of the explanatory variables as well as the error correcting term (designed to capture adjustment speed to the long run equilibrium). That is,

$$\Delta Y_t = \alpha + \sum_{i=1}^k \beta_i \Delta Y_{t-i} + \sum_{i=0}^k \theta \Delta X_{jt-i} + \gamma ECT_{t-1} \dots\dots\dots(4.21)$$

where  $\Delta X_{jt-i}$  is a vector of the first differences of the explanatory variables,  $ECT_{t-1}$  represents the error correcting term.

To achieve parsimony in the model, insignificant regressors from the general model are removed. In the process the adequacy of the model must be checked to support the reduction

approach. This process is called "General to Specific Modeling".

The next section provides results of the estimation using the above discussed procedure. The estimation is performed using PCFIML and PCGIVE software.

## CHAPTER FIVE

### EMPIRICAL RESULTS AND INTERPRETATION

#### 5.1 Unit Root Test

To check for the existence of stationarity, both graphical presentation and ADF unit root test is conducted on the variables listed on equations (4.1) and (4.5). A plot of the variables (in levels) as listed in appendices IV shows that all the variables are not stationary. On the other hand, the variables in first difference suggest the presence of stationarity. To empirically test for stationarity and determine the order of integration, ADF unit root test is conducted. The result shows that in all the three cases (i.e., columns) the variables are non stationary when they are tested in levels. This is shown by the computed results which are less than the critical values in absolute term both at 5% and 1%. The variables in first difference are, however, stationary. This implies that, all the variables are integrated of order one [i.e.,  $I(1)$ ]. That is, the variables attained stationarity after first difference.

**Table: 5.1 ADF Unit Roots Test**

Variables in levels		Without Constant and Trend $H_0: \gamma = 0$	With Constant $H_0: \gamma = 0$	With Constant and Trend $H_0: \gamma = 0$
$\ln R$		1.6814	0.12534	-2.1122
$\ln I$		0.29838	-2.1939	-2.8353
$\ln S$		-0.31807	1.9346	-2.4534
$\ln A$		-0.73177	-2.4665	-2.6764
$\ln U$		-0.57036	-2.3236	-3.2452
$\ln DX$		-1.2212	-1.5881	-1.9435
P		2.8087	0.68293	-3.0466
PA		-1.2938	-2.2199	-2.8888
$\ln DF$		-0.62211	-1.4364	-1.4115
$\ln I_0$		-0.28878	-0.24998	-2.6923
$A^2$		-1.8290	-2.4965	-2.8712
$\ln LF$		-0.9682	-1.3220	-1.4914
$\ln H$		-0.83866	-2.4998	-2.7925
Variables in first difference				
$\delta \ln R$		-4.3403	-5.6849	-5.6326
$\delta \ln I$		-3.9664	-3.9073	-3.9135
$\delta \ln S$		-5.6015	-5.7575	-5.7174
$\delta \ln A$		-6.0230	-6.8440	-6.7391
$\delta \ln U$		-5.3343	-5.4106	-5.4027
$\delta \ln DX$		-5.6489	-5.6661	-5.5854
$\delta P$		-2.0357	-4.1430	-4.4426
$\delta PA$		-4.8070	-4.8011	-4.8740
$\delta \ln DF$		-4.1052	-4.0155	-3.9623
$\delta \ln I_0$		-4.1567	-4.0949	-4.1054
$\delta A^2$		-6.9139	-6.8440	-6.7391
$\delta \ln LF$		-1.96179	-3.7088	-4.2622
$\delta \ln H$		-6.7169	-6.6777	-7.2093
<b>Critical Value at</b>	<b>5%</b>	<b>-1.95</b>	<b>-2.945</b>	<b>-3.539</b>
	<b>1%</b>	<b>-2.628</b>	<b>-3.623</b>	<b>-4.232</b>

$\delta$  denotes first difference

The result suggests to use the variables in first difference. However, to incorporate the long run relationship among the variables, cointegration test is required.

## 5.2 Test for Cointegration and Long run Relationship

### a) Investment Equation

As shown in section 5.1 all the variables in the investment equation are integrated of the same order [i.e.,  $I(1)$ ]. Therefore, we can proceed to cointegration test to estimate the long run

relationship among the variables. Table 5.2 shows that both statistics (i.e.,  $\lambda_{\max}$  and the  $\lambda_{\text{trace}}$  eigenvalue) point the presence of a single cointegrating vector at 1% level of significance.

**Table 5.2 Test for the Number of Cointegrating Vectors**

$H_0: \text{rank}=r$	eigenvalue	$-T \log(1-\lambda_{r+1})$	$\lambda_{\max} 95\%$	$-T \Sigma \log(1-\lambda_c)$	$\lambda_{\text{trace}} 95\%$
$r \leq 0$	0.73084	48.56**	39.4	114.6**	94.2
$r \leq 1$	0.565452	30.84	33.5	66	68.5
$r \leq 2$	0.41477	19.82	27.1	35.16	47.2
$r \leq 3$	0.300126	13.2	21.0	15.34	29.7
$r \leq 4$	0.052277	1.987	14.1	2.132	15.4
$r \leq 5$	0.00392986	0.1457	3.8	0.1457	3.8

The existence of one cointegrating vector suggests that the first row of  $\beta$  and first column of  $\alpha$  matrices are important for further analysis. The table below reports the  $\beta$  and  $\alpha$  matrices.

**Table 5.3-A Standardized Beta ( $\beta$ ) Coefficient**

<b>LI</b>	<b>LS</b>	<b>LA</b>	<b>LDX</b>	<b>LU</b>	<b>LDF</b>
1.0000	-0.23045	-0.75435	-0.12462	0.38888	0.22047
-1.6515	1.0000	-1.0233	-0.23059	0.27003	0.17095
0.14135	-0.015660	1.0000	-0.90650	0.014837	0.39958
4.7527	-0.12320	0.16260	1.0000	-2.4118	1.5944
837.09	249.79	24.691	11.880	1.0000	205.63
1.7721	0.30281	0.12204	0.29698	-0.34959	1.0000

**Table 5.3-B Standardized Alpha ( $\alpha$ ) Coefficient**

<b>LI</b>	-0.55407	0.22564	0.045705	-0.011633	-0.00004	-0.0048579
<b>LS</b>	1.3539	-1.1430	-0.24442	-0.028568	-0.00050	-0.016738
<b>LA</b>	0.35707	0.68401	-0.16682	0.035476	-0.0002	-0.0088952
<b>LDX</b>	0.39443	-0.0014711	0.46444	-0.0052396	-0.0001	0.0021148
<b>LU</b>	-1.5450	0.20570	-0.14349	0.10687	-0.00003	-0.013956
<b>LDF</b>	0.11722	-0.094596	-0.022636	-0.0089087	3.00005	-0.029726

To identify the variables that are endogenously determined and conditional on other variables in the VAR, the test for weak exogeneity is conducted. This requires imposing zero restriction on the first column of  $\alpha$  coefficients. The results, using the likelihood ratio test as shown in the appendix V (B) confirm that only the dependant variable rejects the null at 1% while all the explanatory variables did not reject.

Therefore, other than investment all the explanatory variables are not endogenous to the

system. The speed of adjustment to long run disequilibrium in the investment function is given by  $\alpha_{11}$ . Hence, the long run investment equation with the corresponding signs and significance is presented as follows.

$$\begin{array}{cccccc}
 LI_t = & 0.23LS_t & + & 0.75LA_t & - & 0.39LU_t & - & 0.22LDF_t & + & 0.12 LDX \\
 & (2.37) & & (10.35) & & (17.37) & & (8.94) & & (2.67) \\
 & [0.13] & & [0.001]** & & [0.000]** & & [0.003]** & & (0.102)
 \end{array}$$

\*\*denotes rejection at 1% level of significance

$$\begin{array}{l}
 \text{Vector AR 1-2 } F(72, 38) = \quad 1.552 [0.0702] \\
 \text{Vector normality } \chi^2(12) = \quad 22.828 [0.0292] *
 \end{array}$$

The test summary reveals that the investment equation is void of vector serial correlation. That is the null of no serial correlation is not rejected at 5% significance level. But, vector normality problem is detected at 5%. This points that the null hypothesis of normality is rejected at 5% level of significance. However, Gonzalo (1994) (cited in Nachegea 2001) stress that the Johansen procedure is robust even with non normal vectors. Therefore, the investment equation is reasonably acceptable.

The test for the significance of the coefficients of the explanatory variables was performed by imposing zero restriction on each variable. This test identifies which explanatory variables are statistically different from zero and hence uniquely constitute the cointegrating vector (see appendix V(B)).

As the figures in the parentheses of the investment equation confirm, the null hypothesis of no significance is rejected for the foreign aid uncertainty and political instability variables. This suggests that the above mentioned variables are statistically significant in influencing investment.

The result in general point out that saving has insignificant but positive coefficient. This implies that for the period under consideration, the role of saving was negligible in improving investment. This tends to side with the theoretical argument that investment responds to risk

and profitability rather than to the saving rate. Foreign aid, on the other hand has positive and statistically significant contribution to investment. It implies that foreign aid played important role in financing capital imports, and supported domestic capital formation activity. Therefore, we can argue that for the period under consideration aid worked in improving the level of investment. This result is consistent with Tolessa (2001).

Uncertainty of aid flow brought negative and significant impact on investment. This is in line with the findings of Gomanee, Girma and Morissey (2001) for Sub Sahara Africa. It points that in the long run volatility of aid (that results in aid uncertainty) tends to depress investment.

The result further shows that political instability has negative and significant role to growth of investment. This underlines that war dwindles investment through creating uncertain environment, and by destroying existing property and infrastructure as well as by consuming the available resource that could otherwise be invested. The debt service variable produces statistically insignificant positive effect. It suggests that for the period under consideration the influence of debt service in crowding out investment was weak at best. Similar insignificant result is obtained by Jonse (2002) and Dawit and Yemisrach (2001). The plausible reasons for such insignificant result of debt service on investment include the practice of postponing debt payments (particularly in the Derg period), and successive debt relief provided under the current regime (Dawit and Yemisrach, 2001).

#### b) Growth Equation

Table 5.1 showed that all the variables contained in the growth equation are I(1). This permits to conduct the test for cointegration among the variables. The  $\lambda_{\max}$  and  $\lambda_{\text{trace}}$  statistics adjusted for degrees of freedom confirms that the null hypothesis of at most one cointegrating vector is not rejected at 5% significance level. This points the presence of one

cointegrating vector. The test is reported in the following table.

**Table 5.4 Test for the Number of Cointegrating Vector**

Ho:rank=r	eigenvalue	$\lambda_{\max}$	95%	$\lambda_{\text{trace}}$	95%
$r \leq 0$	0.866685	46.35*	45.3	136.7**	124.2
$r \leq 1$	0.709957	37.01	39.4	90.31	94.2
$r \leq 2$	0.625581	22.59	33.5	53.3	68.5
$r \leq 3$	0.458114	14.09	27.1	30.7	47.2
$r \leq 4$	0.428771	12.88	21.0	16.61	29.7
$r \leq 5$	0.147767	3.678	14.1	3.731	15.4
$r \leq 6$	0.00233137	0.05368	3.8	0.05368	3.8

Thus, the first row of  $\beta$  and the first column of  $\alpha$  matrices will be used for further tests about the model.

**Table 5.5-A Standardized beta eigenvectors**

LR	LIO	A <sup>2</sup>	AP	LLF	LH	LA
1.0000	0.17108	0.0029066	-0.50819	-0.70297	-0.44652	0.034891
0.021656	1.0000	0.0042406	-0.030220	0.59396	0.77190	0.65222
24.859	-23.529	1.0000	-2.6202	10.081	-43.723	-24.829
4.2141	-0.69735	0.010996	1.0000	-5.7398	1.2242	-0.022814
-1.9788	0.16785	0.00095385	0.73002	1.0000	0.73056	-0.36452
1.9424	-1.6578	0.026393	0.34441	-2.0923	1.0000	-2.0845
-30.975	10.107	0.020655	-11.952	25.681	9.8884	1.0000

**Table 5.5-B Test for  $\alpha$  coefficients**

standardized \alpha coefficients							
LR	-0.48995	-0.041835	0.0016740	-0.044271	0.11659	0.012766	2.7387e-005
LIO	-1.5427	-0.54108	0.0015319	-0.15831	-0.39763	0.0055730	3.3142e-005
A <sup>2</sup>	-0.012354	35.757	-0.80303	-22.389	-52.364	0.52098	0.075898
AP	-0.66744	0.33152	0.0011815	-0.24771	-0.71065	0.028429	0.00048293
LLF	0.0092909	-0.0016562	0.00017156	0.0025341	0.0014937	-0.0022316	7.3793e-005
LH	1.6771	-0.16039	0.0056209	-0.13263	0.070885	-0.033999	-0.00047738
LA	0.088311	0.41847	-0.00087562	-0.43526	-0.51541	0.11403	0.0020025

To identify endogenous variables contained in the system weak exogeneity of the variables is tested by imposing zero restrictions on the first column of  $\alpha$  matrix. The Chi-square statistics and the associated probability value reported in appendix V(A) reveals that the null-hypothesis of weak exogeneity is rejected for growth of real GDP and human capital. The rest of the variables are found statistically to be weakly exogenous.

The presence of two non weakly exogenous variables makes it difficult to establish a single first different equation with real GDP as a dependant variable. A comparison of the adjustment variables (i.e.,  $\alpha$ -coefficient in Table 5.5 B) of the two variables, however, show that the feed back parameter of real GDP is -0.49 whereas it is positive and greater than one for the human capital. This suggests that real GDP is more endogenously determined than that of human capital. The failure to reject weak exogeneity implies that the adjustment parameter of that variable should enter in the dynamics model. In connection to this, Hendry (1994) underlines the importance of parameter constancy while formulating the feedback model. Moreover, Juselius (1994) argued that the constancy of the error correcting terms is mandatory to move on with simultaneous dynamic modeling. Similarly, Jonson and Subramanian (2000) argue that for a variable to be endogenously determined, its adjustment parameter in the dynamic model needs to be stable, i.e., the the adjustment variable should have the behavior of error correcting term.

Therefore, to identify the true endogenous variable(s), a dynamic model for first difference of both LR and LH is developed with their corresponding error correcting term. Then recursive estimation is conducted on the two models. A plot of a recursive estimate (with plus or minus twice the standard errors) of the error correcting term is listed in appendix VI [see Jonson and Subramanian (2000) for such kind of approach]

The result shows that the error correcting term of LH changes sign over time. This indicates that the variable is not actually error correcting (i.e., it lacks the characteristics of an error correcting term). It, therefore, should be treated as weakly exogenous.<sup>23</sup> This result allows to

---

<sup>23</sup> Jonson and Subramanian 2000 argue that small sample problem can induce failure to accept weak exogeneity. Similar problem is expected in this paper. When seven variables and their laggés are considered, 39 years data is indeed small.

move on with a single equation with real GDP as a dependant variable and  $\alpha_{11}$  representing the speed of adjustment to disequilibrium in the previous period.

The long run reduced form growth equation is given by:

$$\begin{array}{cccccc} \mathbf{LR} = & \mathbf{-0.17LI_0} & \mathbf{- 0.03LA} & \mathbf{+ 0.51PA} & \mathbf{- 0.003A^2} & \mathbf{+ 0.7LLF} & \mathbf{+ 0.44LH} \\ & \mathbf{(3.5741)} & \mathbf{(0.38161)} & \mathbf{(15.01)} & \mathbf{(8.883)} & \mathbf{(13.742)} & \mathbf{(11.443)} \\ & \mathbf{[0.0587]} & \mathbf{[0.5367]} & \mathbf{[0.0001]**} & \mathbf{[0.0029]**} & \mathbf{[0.0002]**} & \mathbf{[0.0007]**} \end{array}$$

Vector AR 1-2  $F(98, 15) = 1.59 [0.1554]$   
 Vector normality  $\chi^2(14) = 53.935 [0.0000] **$

The result of the diagnostic test confirms the adequacy of the model. That is, the null of no serial correlation is not rejected at any conventional significant level. The null hypothesis of normality, however, is rejected at 1% level of significance. Nonetheless, the Johansen result still holds. Furthermore, correlation test between the policy index and aid interacted policy variable is performed and the result found to be 0.46. This shows that there is no problem of strong correlation.

The regression result shows that non-aid financed investment has insignificant negative coefficient. It points that for the period under consideration the contribution of capital formation activity for the growth of real GDP is weak. This suggests the importance of efficiency in capital formation activity. Similarly aid (without policy interaction) resulted in insignificant negative value. This supports the argument that aid does not necessarily promote growth [see Burnside and Dollar (1997, 2000), Dollar and Easterly (1999) among others]. On the other hand aid interacted with policy variable produced positive and significant result. The result supports the argument of Burnside and Dollar (1997, 2000) that is, effectiveness of foreign aid is conditional on the quality of the policy environment. This is, however, contrary to the empirical findings of Hansen and Tarp (2001) and Dalgaard and

Hansen (2000). The result, in general highlights the role of policy in inducing growth through efficiency in resource allocation.

Moreover, aid squared term got significant and negative result. It suggests the presence of capacity constraint in absorbing foreign aid beyond some level. Similar result is obtained by Burnside and Dollar (1997, 2000) and Dalgaard and Hansen (2000). This result indicates the presence of optimal level of aid where it appears ineffective beyond that level. In this regard, the result obtained from the long run growth model underlines the importance of policy in affecting the point of saturation. Taking the significant variables and their corresponding signs, the role of policy in affecting the optimal point can be evaluated. The saturation point of aid ( $A^s$ ) is given by equating the partial derivative of real GDP with respect to aid to zero. That is;

$$\frac{\partial (LR)}{\partial A} = \theta P - 2\gamma A = 0 \dots\dots\dots(5.1)$$

Where  $\theta$  and  $\gamma$  are the coefficients of aid interacted policy term and aid squared variables (in the long run model).

Simplifying equation (5.1) gives:

$$A^s = \left( \frac{\theta}{2\gamma} \right) P$$

The result suggests that an improvement in the policy environment increases the capacity of absorbing foreign aid productively. Therefore, the quality of policy determines the level of aid that can be consumed without inducing undesirable impact in the economy. In a cross country analysis, Collier and Hoeffler (2002) found similar result.

In line with the standard growth theory, both labor force and human capital variables produced significant and positive influence on growth. The result implies that (LLF and LH) variables play major role in inducing growth.

### 5.3 Error Correction Model Result

#### a) Investment Equation

The existence of stationarity and cointegration permits to develop the following error correction model for investment.

$$\Delta LI = \sum_{i=1}^k \Delta LI + \sum_{i=0}^k \Delta LS + \sum_{i=0}^k \Delta LA + \sum_{i=0}^k \Delta LU + \sum_{i=0}^k \Delta LDF + \sum_{i=0}^k \Delta LD X + ECT_{t-1} \dots (5.2)$$

where k represents the lag length and  $ECT_{t-1}$  denotes the error correcting term.

Following the above specification, a dynamic equation for investment function is established.

Eliminating insignificant variables (from the above specification) through the general to specific modeling strategy, the following parsimonious result is reported.

**Table 5.6 Result for the Dynamic Equation**

Dependent variable DLI					
Variable	Coefficient	Std.Error	t-value	t-prob	PartR <sup>2</sup>
Constant	0.24524	0.069155	3.546	0.0013	0.3025
DLA	0.18808	0.074408	2.528	0.0172	0.1805
DLS	0.12681	0.038514	3.293	0.0026	0.2721
DLU	-0.099619	0.062427	-1.596	0.1214	0.0807
DLDF	-0.18047	0.090652	-1.991	0.0560	0.1202
ECI-1	-0.38442	0.094313	-3.694	0.0009	0.3200

R<sup>2</sup> = 0.551481 F(5,29) = 7.1314 [0.0002]  $\sigma$  = 0.13371 DW = 2.31  
 AR 1- 1 F( 1, 28) = 2.92 [0.0986]  
 ARCH 1 F( 1, 27) = 2.5004 [0.1255]  
 Normality Chi<sup>2</sup>(2) = 0.59616 [0.7422]  
 RESET F( 1, 28) = 1.8329 [0.1866]

The overall fit of the model is acceptable. The explanatory variables explain about 55 percent of the variation in the model. The F statistics rejects the null hypothesis that all the coefficients in the model are jointly insignificant. Moreover, the Durban Watson (DW) test result suggests that there is no autocorrelation problem. Moreover, the various diagnostic test performs well indicating no problem about the regression analysis. That is, the test does not reject the null of white noise error terms suggesting no problem of error autocorrelation. In addition, the test for autoregressive conditional heteroscedasticity (ARCH) points that no ARCH structure in the error term is detected. Failure to reject the null of no ARCH indicates the existence of constant variance. The Jacque Bera test for normality can not reject the null hypothesis of normality. It points out that the error term is normally distributed. Moreover, the Ramsey test for functional form mis-specification accepts the regression specification of the dynamic model.

The regression result reveals that, in the short-run, development assistance and domestic saving produce significant and positive impact. When we compare this with the one obtained from the long run analysis (i.e., section 5.2-A), we learn that the contribution of domestic saving to investment is only a short period phenomenon. Growth of defense expenditure (a proxy to war) resulted in significantly negative influence on investment. It points the impact of political instability in constraining investment. On the other hand, uncertainty of aid flow holds negative sign as expected though it is statistically insignificant.

The above preferred model also confirms that the error correcting term is significant at 1%. It points out that about 38% of the disequilibrium from the long run path will be corrected in one year. The speed of adjustment further indicates that it takes about two and half years for the deviation to be fully adjusted.

b) Growth Equation

The foregoing long run analysis confirms that real GDP is determined endogenously in the system. Therefore, we can develop its dynamic model conditional on other variables as shown below.

$$\Delta LR = \sum_{i=1}^k \Delta LR + \sum_{i=0}^k \Delta LI_0 + \sum_{i=0}^k \Delta LA + \sum_{i=0}^k \Delta AP + \sum_{i=0}^k \Delta A^2 + \sum_{i=0}^k \Delta LLF + \sum_{i=0}^k \Delta LH + ECV_{t-1} \dots (5.3)$$

where  $ECV_{t-1}$  is the error correcting term.

Using the general to specific model for the above equation, the following parsimonious specification is reported.

**Table 5.7 Result for the Dynamic Equation**

Dependent Variable DLR

Variable	Coefficient	Std. Error	t-value	t-prob	PartR <sup>2</sup>
Constant	2.3551	0.51852	4.542	0.0001	0.4075
DLR_1	0.24242	0.14466	1.676	0.1042	0.0856
DLIO	0.068709	0.034208	2.009	0.0537	0.1185
DLLF_1	2.7193	0.92573	2.937	0.0063	0.2234
DLH	0.18686	0.055180	3.386	0.0020	0.2765
ECG_1	-0.49010	0.11066	-4.429	0.0001	0.3954

R<sup>2</sup> = 0.522295 F(5,30) = 6.5601 [0.0003] σ = 0.0362026 DW = 2.10

**Diagnostic Test**

AR 1- 2	F( 2, 28) =	0.50698 [0.6077]
ARCH 1	F( 1, 28) =	0.36759 [0.5492]
Normality	Chi <sup>2</sup> (2)=	0.35636 [0.8368]
RESET	F( 1, 29) =	1.9932 [0.1686]

In general the independent variables explains 52 percent of the change in the model. Furthermore, The various diagnostic test of the model points no problem regarding the regression analysis. That is, all the tests failed to reject the null hypotheses at any conventional level of significance. This implies that all the coefficients contained in the model are jointly significant and also no autocorrelation problem is detected. The result

further shows no significant problem of error autocorrelation. Moreover, it is normally distributed and the variance is constant. In general, no problem is detected by the diagnostic statistics of the model which lends support to the reasonableness of the specification.

Both policy and aid interacted policy variables were found insignificant at all conventional levels and, therefore, are dropped from the parsimonious model. They appear insignificant presumably because foreign aid financed projects usually have long gestation period whose growth impact might not be seen in the short run even with good policy environment. The remaining explanatory variables perform well from the theory and statistical point of view. That is, both physical and human capitals as well as the labor force produced statistically significant positive result. The error correcting parameter is found to be statistically significant. It indicates that 49 percent of the disequilibrium in the previous period is corrected in one year. Thus, it takes roughly two years for the disequilibrium adjust to the long run path.

#### **5.4 Test for Causality**

The analysis in section 5.2 (B) underlines that the growth impact of aid is conditional on the policy environment of the recipient country. In addition to this, it is equally important to identify whether foreign aid causes the policy environment of the recipient country or the policy environment causes the level of foreign aid or there exists bi-directional causal (feedback) between the two variables.

This section tests the presence and direction of causal relationship between foreign aid and the policy environment. The analysis is different from the standard Granger-Causality test since it is based on Vector Error Correction Model (VECM). The procedure requires the variables

to be integrated of the same order. Moreover, the long run relationship between the variables needs to be checked. If the two variables are cointegrated, (i.e., have long run relationship) it points the existence of causality. Then, the test and direction of causality can be performed based on VECM.

Anorou and Ahmed (2001) point that this approach is more attractive than the standard Granger-Causality test for it allows the occurrence of temporary (short run) causality through the lagged coefficients of the differenced explanatory variables. Moreover, even if all the lagged differenced variables appear insignificant causality can be detected through the adjustment parameter.

The ADF test in table 5.1 confirmed that both policy (P) and aid (LA) are I(1) variables. This permits to conduct cointegration test using the Johansen approach. The test result reported in appendix VII (B) confirms the presence of one cointegrating vector which implies that there is at least one direction of causality between the two variables. To assess the causal relationship between foreign aid and policy, the following error correction model is used.

$$\Delta LA_t = \alpha z_{t-1} + \sum_{i=1}^a \beta_i \Delta LA_{t-i} + \sum_{j=0}^b \Phi_j \Delta P_{t-i} + \xi_t \dots\dots\dots (5.4)$$

$$\Delta P_t = \varphi x_{t-1} + \sum_{i=1}^c \theta_i \Delta P_{t-i} + \sum_{j=0}^d \lambda_j \Delta LA_{t-i} + \varepsilon_t \dots\dots\dots(5.5)$$

Where  $Z_{t-1}$  and  $X_{t-1}$  is one time lagged value of the error correcting term,  $(\beta_i, \lambda_j)$  and  $(\theta_i, \Phi_j)$  are the coefficients of differenced lagged terms of aid and policy respectively.  $\xi$  and  $\varepsilon$  are white noise terms.

The optimal lag length for a, b, c, and d in equation (5.4) and (5.5) is set at 2 using the Akaike Information Criterion<sup>24</sup>.

The test procedure requires formulation of the null and the alternate hypothesis. The null hypothesis states no causality between the variables in each equation (i.e., 5.4 and 5.5) where rejecting the null denotes the presence of causality. That is, for equation (5.4) either the adjustment parameter ( $\alpha$ ) or the  $\Phi_j$  is significant. Similarly for equation (5.5) rejecting the null implies either  $\varphi$  or the  $\lambda_j$  is statistically significant. The test is conducted by imposing zero restriction on the adjustment variable and jointly on the lagged coefficients of the differenced explanatory variables. The result is reported in the following table.

**Table 5.8 Causality Test (F-statistics)**

<i>Equation</i> \ <i>Variable</i>	<i>Adjustment parameter</i>	<i>LA</i>	<i>P</i>
<i>Aid</i>	3.45*	0.12	0.71
<i>Policy</i>	0.42	1.47	3.23*

\* Represents F-statistics significance at 10%  
The test is performed using E-Views

The result shows that in the aid equation the adjustment parameter (i.e.,  $Z_{t-1}$ ) causes aid at 10% significance level. On the other hand the policy equation points that both aid and the adjustment parameter ( $X_{t-1}$ ) failed to cause policy. This result shows the presence of a unidirectional causality which runs from policy to foreign aid through another channel where the converse does not hold. This implies that the role of foreign aid in causing the policy environment is weak at best. Rather, it can be argued that donors favour countries with good economic policy.

---

<sup>24</sup> It is a model selection guide. That is, a lag length which minimizes the mean square error of the model is selected.

## CHAPTER SIX

### CONCLUSION AND POLICY IMPLICATION

#### 6.1 Conclusion

To identify the impact of aid on growth, this paper has investigated the relationship between several variables.

The study is conducted on annual data covering the period 1962/63 to 2000/01. The Johansen Maximum Likelihood Procedure is used in the analysis. In the study, two equations are identified - investment and growth equations. The time series property of the variables contained in the two equations is addressed through the test for stationarity and the result found that all the variables are stationary after first difference. Therefore, VAR and error correction models are estimated to assess the growth impact of aid. The test for cointegration is performed in both equations and the result confirmed the existence of long run relationship among the variables in the model.

Since investment is one of the channel through which aid can affect growth, an investment equation is developed to examine its interaction with aid, instability of aid flow and other variables. The main outcome of the empirical assessment confirms that both in the long and short run foreign aid has significant contribution to investment. Moreover, aid flow instability (that creates uncertainty of aid flow) and political unrest negatively influence the capital formation activity. The results are consistent with other studies in the area. The result further showed that the role of saving in improving investment is weak. The same holds for the impact of debt servicing on investment.

The other investigation is concerned with the relationship between foreign aid economic

policies and growth. In the model the policy index is constructed to capture the fiscal, monetary and trade policy situations so as to proxy the economic policy environment. Moreover, econometric technique is used to avoid the problem of double counting when aid and investment variables are included together in the growth equation.

The result points that the contribution of aid is weak at best. However, when it is interacted with policy, the growth impact of aid appeared significant. Furthermore, improvement in the policy environment is found to increase the level of aid that can be used productively. In general, the study highlighted that the growth impact of aid is dependent on the quality of the policy environment.

The other question that this paper attempted to address is the relationship between foreign aid and economic policies. The interest here is to assess the existence of causal relationship and also determines the direction of causality between the two variables. The test for causality was performed based on vector error correction model. This model is preferred than the standard Granger causality test because it captures causality both from the variables and the error correcting term. The empirical result confirms the existence of significant unidirectional causality from policy to growth. This suggests that among other objectives donors reward (or give more weight to) good policy environment. However, the converse was not statistically significant. That is, the influence of foreign aid in affecting the policy status of the recipient country is found to be negligible.

## **6.2 Policy Implication**

The empirical results obtained from the analysis have the following policy implications. The results show that in the long run though aid produced significant positive effect on

investment, it failed to bring about significant influence on economic growth when the policy environment is not controlled. Therefore, the government is advised to give more attention towards the improvement of the policy environment. Because as the result points out, good policies promote investment efficiency and also increase the level of aid that can be consumed productively.

The insignificant contribution of aid to growth further points the existence of inefficiency in investment. Therefore, from the long term point of view the role of aid should be closing the gaps rather than bridging the gaps (between import and export, revenue and expenditure, and saving and investment). This is because measures in favor of closing the gap is likely to bring relatively higher efficiency in investment. Moreover, such thing tends to minimize aid dependency in the long run. Thus, the long run objective of foreign aid should be improvement of the export sector so as to cover the required import. This needs diversifying the export base and ultimately minimizing the dependence in the agricultural export. In the same way emphasis is needed on improving the revenue base as well as the efficiency of public spending.

The growth impact of aid can be further facilitated by providing more emphasis to the development of human capital. This is due to the presence of positive and significant contribution of human capital variable to growth.

The result obtained from the investment equation stress that the problem of aid volatility (that creates uncertainty of aid flow) must be taken care of to facilitate the allocation of aid to investment. Though identifying the factors that create instability of aid is not the objective of this paper, other studies point that the main reason is the failure to comply with the conditionalities associated with aid disbursement (Bulir and Lane, 2002). Therefore, the

government should, as much as possible, fulfill the conditionalities that it agreed to abide by. In addition to this, to minimize the consequences of aid instability when ever it occurs, other options must be sought. This includes developing domestic sources so as to offset any short fall of aid money. To this, developing the domestic capital market (bond market in this regard) can contribute a lot. However, to materialize this, more emphasis should be given to the expansion of the financial market.

In addition, the result of investment equation conveys the importance of political stability to the growth of investment. Therefore, the government should give due attention to improve the political environment.

## **Bibliography**

- Adam C. and O'Connell S. (1997), "Aid, Taxation and Development: Analytical Perspectives on Aid Effectiveness in Sub-Saharan Africa.
- Alogoskoufis G. and Smit R. (1995) "On error Correction Models: Specification, Interpretation, Estimation" Surveys in Econometrics (Donard O.,George A., Roberts C. ed), Basil Blackwell Inc.
- Anoruo E. and Ahmed Y. (2001), " Causal Relationship between Domestic Savings and Economic Growth: Evidence from Seven African Countries", African Development Bank
- Areskoug (1973), "Foreign Capital Utilization and Economic Policies in Developing Counties", Review of Economics and Statistics, 55(2):182-189.
- Bacha E. (1990), "A Three Gap Model of Foreign Transfer and the GDP Growth Rate in Developing Countries", Journal of Development Economics, 32(2):279-296.
- Befekadu D. and Berhanu N (eds.)(2000) "Annual Report on the Ethiopian Economy, The Ethiopian Economic Association"
- Berhanu A. (2001), "Post Socialist Reformers - Ethiopia" - Aid & Reform in Africa, (Dervarjan, Dollar and Homgren ed.) World Bank.
- Bulir A. and Lane T. (2002), "Aid and Fiscal Management", IMF Working Paper, WP/02/112
- Burnside C. and Dollar D. (1997), Aid, Policies and Growth", Macroeconomics and Growth Division Policy Research Department, World Bank.
- Burnside C. and Dollar D. (2000), Aid, Policies and Growth", American Economic Review 90(4), 847-868.

- Chenery H. and Stout A. (1966), "Foreign Assistance and Economic Development", American Economic Review, 56(4): 679-733
- Collier P. and Hoeffler, A. (2002), "Aid, Policy and Growth in Post-Conflict Societies, World Bank Policy Research Working Paper 2902.
- Dalgaard C. and Hansen H. (2000), "On Aid, Growth and Good Policies", CREDIT Research Paper 00/17, Center for Research in Economic Development and International Trade University of Nottingham.
- Dawit W. and Yemisrach T. (2001) "The Impact of Foreign Financing on Economic Performance in Ethiopia". Paper Presented at the 11<sup>th</sup> Annual Conference on the Ethiopian Economy.
- Devarajans and Swaroop V. (1998), "The Implications of Foreign Aid Fungibility for Development Assistance", World Bank Policy Research, WP 2002.
- Devvarajan S. , Rajkumar S. and Swaroop V. (1999), "What Does Aid to Africa Finances?" Development research Group, The World Bank
- Dollar D. and Easterly W. (1999), "The Search for the Key: Aid, Investment and Policies in Africa", Journal of African Economies 8(4): 546-577
- Dowling J. and Hiemenz U (1983), "Aid, Saving and Growth in the Asian Region", The Journal of Institute of developing Economics, 21(1):3-13.
- Durbarry R., Gemmell N. and Greenaway D. (1998), "New Evidence on the Impact of Foreign Aid and on Economic Growth. CREDIT No. 98/8 University of Nottingham.
- Easterly W. (1998) "The Quest for Growth", [http://www.worldbank.org/research/growth/ notes/html](http://www.worldbank.org/research/growth/notes/html)
- Enders W. (1996) "RATS Hand Book for Economic Time Series" , John Wiley & Sons, Inc.
- Fischer S. (1993), "Does Macroeconomic Policy Matter? Evidence from Developing Countries, ICS Press.

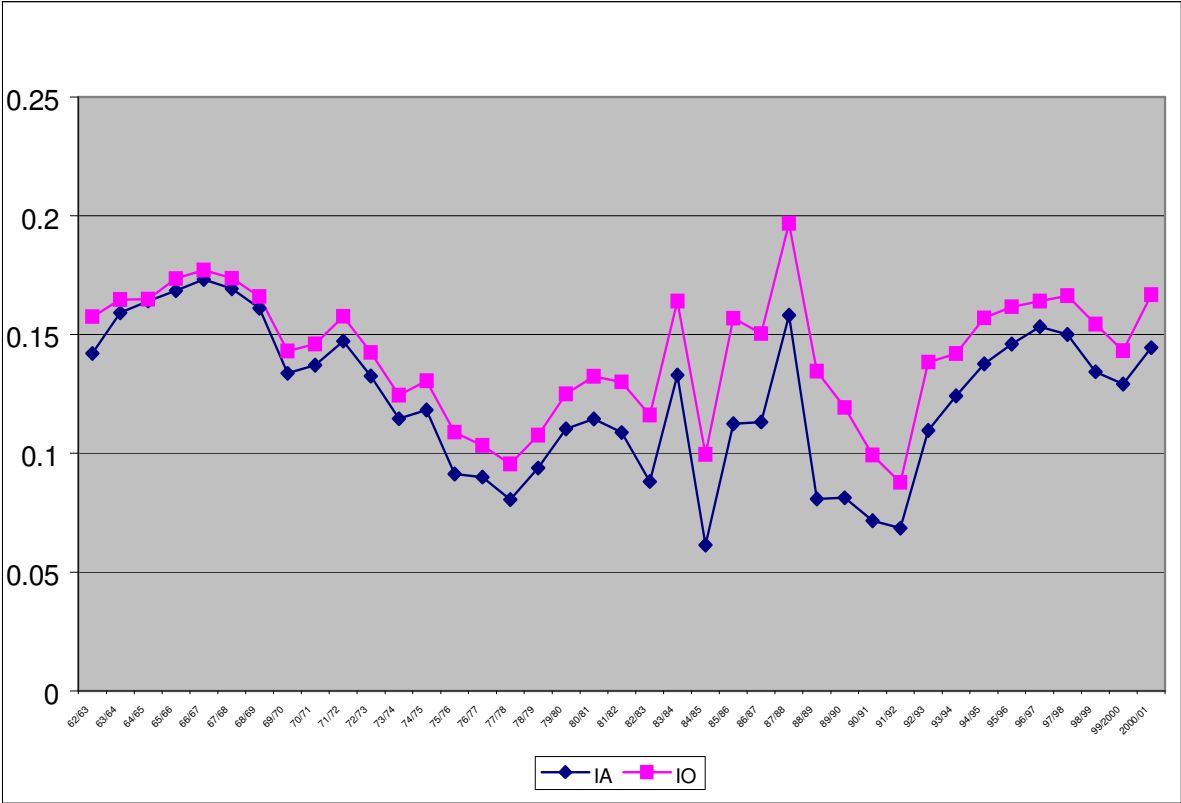
- Gebrehiwot A. (1997), "An Analysis of Financial Sector and Credit Policies During the Derg Period and Post-Derge Reforms", Ethiopian Journal of Economics, VI(1): 53-86.
- Ghura D. and Hadjimichael M. (1995), "Growth in Sub Sahara Africa", IMF Working Paper, WP/95/36.
- Gomanee K., Girma S., Morrissey O. (2001) Aid and Growth: Accounting for Transmission Mechanism in Sub-Saharan Africa.
- Gujarati D. (1995), "Basic Econometrics", Mc Graw-Hill, Inc. 3<sup>rd</sup> ed.
- Hadjimichael, M. and Ghura, D. (1995) "Public Policies and Private Savings and Investment in Sub-Saharan Africa: An Empirical Investigation", IMF Working Paper, WP/95/19
- Haile K. and Alemayehu G. (2000) "Savings, Foreign aid and Economic Growth: A Review of the Theory and the Existing Evidence", Paper Presented at the Tenth Annual Conference on the Ethiopian Economy.
- Hansen H. and Tarp F. (2000), "Aid Effectiveness Disputed", Journal of International Development, 13:375-398.
- Hansen H. and Tarp F. (2001), "Aid and Growth Regressions", Journal of Development Economics, 64(2): 547-570.
- Harris R. (1995), "Using Cointegration Analysis in Econometric Modeling", Prentice Hall/Harvester Wheat Sheaf.
- Hendry D. (1994), "The Encompassing Implications of Feedback versus Feedforward Mechanism in Econometrics - Testing Exogeneity (Ericsson N. and Irons J. ed). Oxford University Press.
- Hendry D. (1997), "Dynamic Econometrics", Oxford University Press
- Hjertholm P., Laursen J., and White H. (1998) "Macroeconomic Issues in Foreign Aid, DREG, University of Copenhagen

- Imperial Ethiopian Government (1956), "Five Year Development Plan, 1957-1961"
- Imperial Ethiopian Government (1962) "Second Five Year development Plan, 1963-1967"
- Jiffar T. (2002), "The Impact of Foreign Aid on Public Spending: The Ethiopian Case",  
Unpublished M.Sc. Thesis, AAU.
- Johns C. (1998) "Introduction to Economic Growth". W. W. Norton & Co.
- Jonse G. (2002), "External debt and Economic Growth in Ethiopia", Unpublished MSc. Thesis, AAU.
- Jonsson G. and Subramanian A. (2000), "Dynamic Gains from Trade: Evidence from South Africa", IMF Working Paper WP/00/45.
- Juselius K. (1994), "Domestic and Foreign Effects on Prices in an Open Economy: The Case of Denmark - Testing Exogeneity (Ericsson N. and Irons J., ed.) Oxford University Press.
- Kormendi R. and Meguire P. (1985), "Macroeconomic Determinants of Growth: Cross Country Evidence", Journal of Monetary Economics, Vol. 16, No. 2.
- Lensink R. and Morrissey O. (2000), "Aid Instability as a Measure of Uncertainty and the Positive Impact of Aid on Growth, Journal of Development Studies, 36(3):31-49
- Levy, V. (1987), "Anticipated Development Assistance, Temporary Relief Aid and Consumption Behavior of Low-Income Countries", The Economic Journal, 97, 446-458.
- Lloyd T., Morrissey O. and Osei R. (2001), "Aid Exports and Growth in Ghana, CREDIT Research Paper 01/01, Center for Research in Economic Development and International Trade, University of Nottingham.
- MEDaC (1999), "Survey of the Ethiopian Economy: Review of Post Reform Developments, 1992/93 - 1997/98"

- MEDaC (2001), "Ethiopia: Development Framework and Plan of Action, 2001-2010". A Paper presented on the Third United Nations Conference on LDC's, Brussels
- Mosley P., Hudson J., Horrell S. (1987), "Aid the Public Sector and the Market in Less Developed Countries", The Economic Journal, 97, 616-641.
- Mwega F. (1997) "Saving in Sub-Saharan Africa: A Comparative Analysis", Journal of African Economics (6):3, 199-228
- Nachege J. (2001), "Financial Liberalization, Money Demand, and Inflation in Uganda", IMF Working Paper WP/01/118.
- Nalo D. (1993) "Constraints to Growth in Developing Countries and the Three-Gap Model", Eastern Africa Economic Review (9)2:247-264
- Nyoni T. (1997), Foreign Aid and Economic Performance in Tanzania, AERC, Research Paper 61.
- Papanek G. (1973), "Aid, Foreign Private Investment, savings, and Growth in Less Developed Countries", Journal of Political Economy 81(1): 120-130.
- Provisional Military Government of Socialist Ethiopia (1984), "Ten-Year Perspective Plan 1984/85 - 1993/94"
- Rana P. and Dowling J. (1988), "The Impact of Foreign Capital on Growth: Evidence from Asian Developing Countries", The Journal of Institute of Developing Economics, 26(1): 3-11.
- Sachs J. and Warner A. (1997), Sources of Slow Growth in African Economics", Journal of African Economics, 6(3), 335-376.
- Schimidit - Hebbel, Serven L. and Solimano A. (1996), "Saving and Investment: Paradigms, Puzzles, Policies" The World Bank Research Observer, 11(1) 87-117
- Sepheri A. and Lodhi H. (1999), "Does Paradise have a future? A three-Gap analysis of the Fiji Economy, Institute of Social Studies, WP 301

- Serven L. (1996), "Irreversibility, Uncertainty, and Private Investment, Analytical Issue and Some Lessons for Africa", World Bank
- Sewasew P. (2002), "The Relationship between Import and GDP Growth in Ethiopia: An Empirical Analysis", Unpublished M.Sc. Thesis, AAU.
- Shiferaw B. (1995) "An Economic History of Ethiopia", Vol. 1: The Imperial Era, 1941-1974; the CODESRIA Book Series, Senegal.
- Stiglitz J. and Uy M. (1996), "Financial Markets, Public Policy and the East Asian Miracle", The World Bank Research Observer, Vol. 11, No. 2.
- Taylor L.(1994), "Gap Models", Journal of Development Economics, 45(1)17-34.
- Tolessa A. (2001), "The Impact of Foreign Aid on Domestic Saving, Investment and Economic growth: The Case of Ethiopia", Unpublished M.Sc. Thesis, AAU.
- Villanueva D. (1993), "Openness, Human Development and Fiscal Policies: Effects on Economic Growth and Speed of Adjustment", IMF Working Paper WP/93/59
- Walt T. and Wet G. (1993), "The Constraining Effects of Limited Foreign Capital Inflow on the Economic Growth of South Africa", Journal of the South African Journal Economies 61(1): 3-12
- Weisskopf, T. (1973), "An Econometrics Test of Alternative Constraint on Growth of Under Developed Countries". Review of Economics and Statistics 54 (?): 67-68.
- World Bank (2002), "African development Indicator"

**APPENDIX -I**



where IO is constructed using Residual Generated Regressor,

## ***Appendix II***

### **Residual Generated Regressor**

To construct the level of investment not financed by aid (IO) we first regress aid on investment and obtain the estimates as follows.

$$INV = \beta_0 + \beta_1 (AID)$$

Accordingly, the following result is obtained from investment-aid regression.

$$I_0 = INV - 0.097773 (AID)$$

### ***Appendix III***

To construct the policy index, the first step is developing growth equation where budget deficit, openness to trade and financial liberalization (measured by private sectors' access to credit) are the explanatory variables. The result obtained from the growth regression reported below.

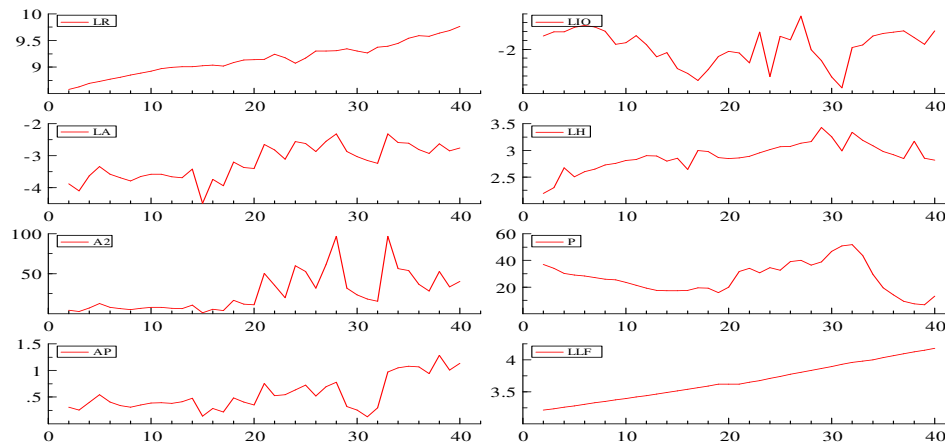
$$\ln R = 0.916 - 0.167 (\text{budget deficit}) + 0.466 (\text{openness}) + 0.107 (\text{liberalization})$$

By taking the coefficients of the policy variables, the policy index corresponding to each period is constructed as follows.

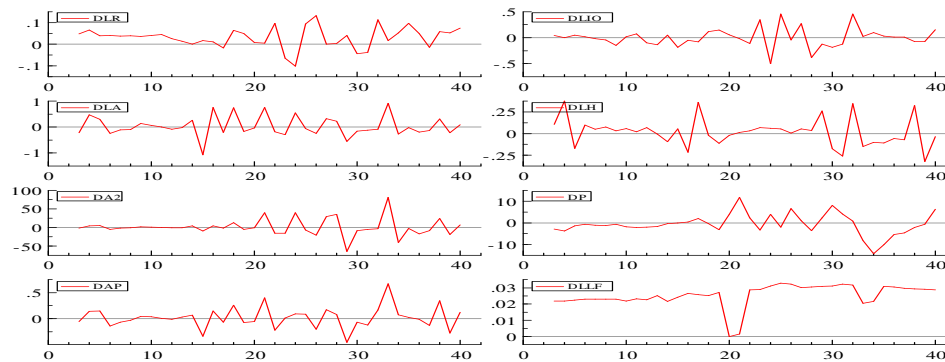
$$P_t = -0.167 (\text{budget deficit})_t + 0.466 (\text{openness})_t + 0.107 (\text{liberalization})_t$$

## Appendix IV Plot of the variables

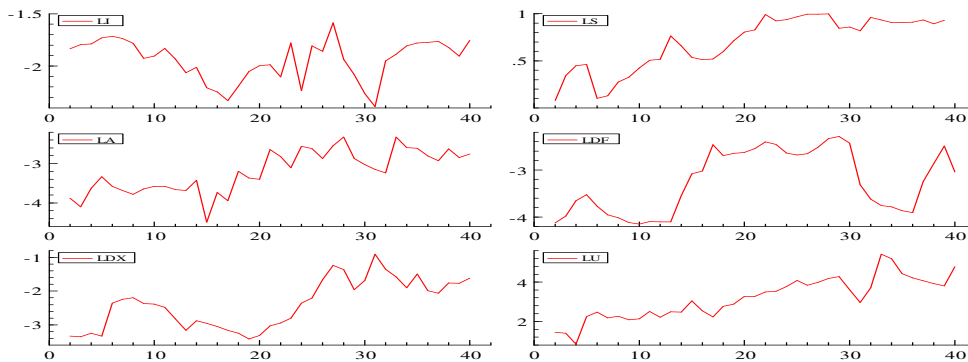
### A) Variables used in the growth equation (in levels)



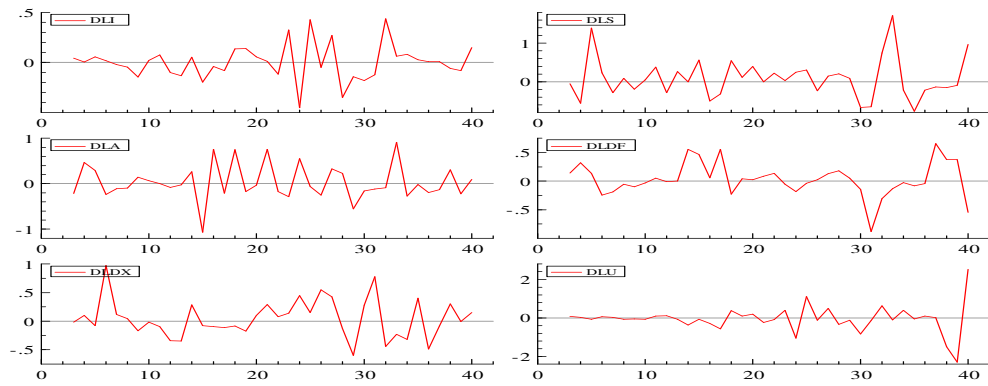
### B) Variables used in the growth equation (in first difference)



### C) Variables used in the Investment equation (in level)



D) Variables used in the investment equation (in first difference)



**APPENDIX-V****(A)****TEST OF WEAK EXOGENEITY (i.e. Test for Zero Restriction on  $\alpha_i$ ) FOR GROWTH EQUATION**

VARIABLE	LR	LI <sub>0</sub>	LA	PA	A <sup>2</sup>	LH	LLF
$\alpha$ Coefficient	-0.48995	-0.041835	0.000002	-0.04427	0.00167	0.012766	0.11659
LR Test $\chi^2$	8.4798	2.3376	0.006052	0.85237	0.0000003	10.382	0.21945
P Value	[0.0036]**	[0.1263]	[0.9380]	[0.3559]	0.9999	[0.0013]**	[0.6395]

\*\*denotes rejection at 1% level of significance

**TEST OF PARAMETER SIGNIFICANCE (i.e. Test for Zero Restriction on  $\beta_i$ ) FOR GROWTH EQUATION**

VARIABLE	LIO	LA	PA	A <sup>2</sup>	LH	LLF
$\beta$ -Coefficient	0.17108	0.034891	-0.50819	0.0029066	-0.44652	-0.70297
LR Test $\chi^2$	3.5741	0.38161	15.01	8.8833	11.443	13.742
P Value	[0.0587]	[0.5367]	[0.0001]**	[0.0029]**	[0.0007]**	[0.0002]**

**(B)****TEST OF WEAK EXOGENEITY (i.e. Test for Zero Restriction on  $\alpha_i$ ) FOR INVESTMENT EQUATION**

VARIABLE	LI	LS	LA	LDF	LDX	LU
$\alpha$ Coefficient	-0.55407	-1.3539	0.35707	0.11722	0.39443	-1.5450
LR Test $\chi^2$	9.8551	3.3706	0.2264	0.32597	1.4127	1.6683
P Value	[0.0017]**	[0.0664]	[0.6342]	[0.5680]	[0.2346]	[0.1965]

\*\*denotes rejection at 1% level of significance

**TEST OF BETA SIGNIFICANCE (i.e. Test for Zero Restriction on  $\beta_i$ ) FOR INVESTMENT EQUATION**

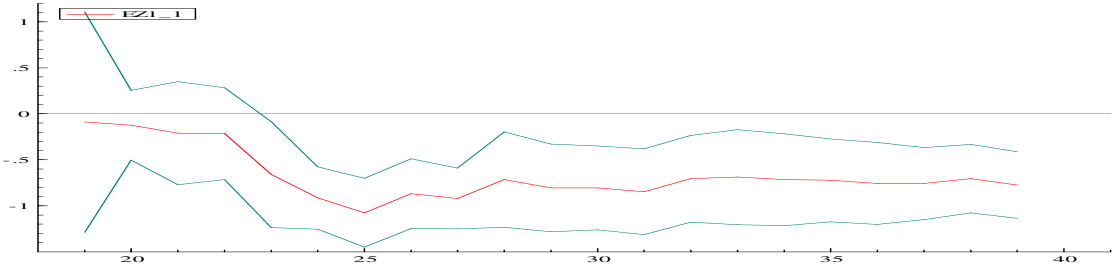
VARIABLE	LS	LA	LDF	LDX	LU
$\beta$ Coefficient	-0.23045	-0.75435	0.22047	-0.12462	0.38888
LR Test $\chi^2$	2.3662	10.35	8.9358	2.6673	14.727
P Value	[0.1240]	[0.0013]**	[0.0028]**	[0.1024]	[0.0001]**

\*\*denotes rejection at 1% level of significance

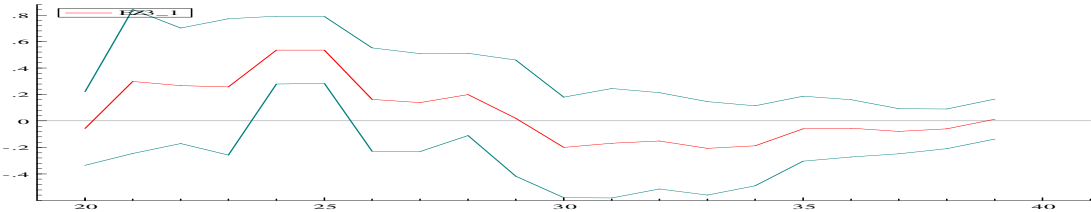
**APPENDIX-VI**

**Plot of Recursive estimate with plus or minus twice the standard errors of the error correcting terms**

*For Growth of RealGDP*



*For Human Capital*



## APPENDIX- VII Cointegration Test Result

<b>Ho: rank=r</b>	<b>eigenvalue</b>	<b><math>\lambda_{\max}</math></b>	<b>95%</b>	<b><math>\lambda_{\text{trace}}</math></b>	<b>95%</b>
$r \leq 0$	0.339069	14.08*	14.1	15.92*	15.4
$r \leq 1$	0.052699	1.841	3.8	1.841	3.8