12/1

ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

ECONOMIC GROWTH AND FOREIGN DEBT: THE ETHIOPIAN EXPERIENCE (1964-1995)



BY

ALFRED KEBBIE SESAY

JUNE, 1998

ADDIS ABABA UNIVERSITY
School of Graduate Studies

Economic Growth and Foreign Debt: The Ethiopian Experience (1964-1995)

By
Alfred Kebbie Sesay
Faculty of Business and Economics

Approval by Board of Examiners:

Dr. Alemayehu Geda Advisor	Signature
Dr. Gerard Kambou Examiner	Signature
Ato Getachew Yoseph Examiner	Signature

የአዲስ አበባ ዩኒቨርሲቲ
ቤተ መጻሕፍት
ADDIS ABABA UNIVERSITY
LIBRARIES

ECONOMIC GROWTH AND FOREIGN DEBT: THE ETHIOPIAN EXPERIENCE (1964-1995)

A Thesis Presented to the
School of Graduate Studies
Addis Ababa University

In Partial Fulfilment of
the Requirements for the Degree of
Master of Science in Economics (Economic Policy Analysis)

By
ALFRED KEBBIE SESAY

June, 1998
Addis Ababa

TABLE OF CONTENTS

PAGE

CHAPTER I

1.0 INTRODUCTION..... 1

1.1 Statement of the Problem 2

1.2 Working Hypotheses of the Study..... 4

1.3 Objectives of the Study 4

1.4 Significance of the Study 5

1.5 Scope of the Study 5

1.6 Organization of the Thesis 5

1.7 Data Sources and Description 6

1.8 Limitations of the Study..... 7

CHAPTER II

LITERATURE REVIEW 8

2.1 External Flows and Development 8

2.2 Growth Theories and the Debt Component..... 11

2.2.1 The Neoclassical View 12

2.2.2 The Harrod-Domar Growth Model 14

2.2.3 The Structuralist Model of Growth 16

2.2.4 The Endogenous Growth Theory.....18

2.3 The Impact of Debt on Growth: Some Theoretical Perspectives 18

2.3.1 The Debt Overhang.....18

2.3.2 Import Compression 19

2.3.3 Some Macroeconomic Effects of External Finance..... 19

2.4 Some Empirical Evidences on Debt and Investment.....21

2.5 A Brief Review of Empirical Works on Debt and Debt Overhang in Africa.....22

CHAPTER III

3.0 TRENDS IN ETHIOPIAN DEBIT 25

3.1 A Brief Overview of the Ethiopian Economy 25

3.2 Inflow of Foreign Aid to Ethiopia: Sources, Types and Magnitude 27

3.2.1 Aid From Major Donors During the Imperial Era 29

3.2.1 (a) USAID 30

PAGE

3.2.1 (b) SWEDISH Aid 30
3.2.2 Inflow of Aid During the Derg Regime 31
3.2.3 Inflow of Aid Under the Transitional/Federal Government of Ethiopia... 33
3.3 Causes of the Debt Crises 34
3.4 The Extent of Ethiopia's Indebtedness 42
3.5 Structural Features of the Ethiopian Economy 45

CHAPTER IV

4.0 MODEL SPECIFICATION AND METHODOLOGY 47
4.1 Debt-Growth Relationship 47
4.2 Debt-Investment Relationship 52
4.2.1 External Factors and Private Investment 54
4.3 External Factors In a Model of Private Investment 55
4.4 The Econometric Approach of the Study 57

CHAPTER V

5.0 ANALYSIS OF RESULTS, POLICY RECOMMENDATIONS AND CONCLUSION 59
5.1 Empirical Result of The Debt-Growth Relationship 59
5.1.1 Determination of the ICOR 59
5.1.2 The Debt-Growth Test 60
5.2 Estimation of the Private Investment Model 64
5.2.1 Time Series Properties of the Variables in the Private Investment Model 64
5.2.1.1 Unit Root tests on the variables 64
5.2.1.2 Testing For Cointegration 66
5.3 Conclusion 71
5.4 Policy Recommendations 72
REFERENCES 73-81
APPENDIX 82-87

LIST OF TABLES

		PAGE
Table 1:	Terms of Concessionary Loans to Ethiopia (1952-1993)	27
Table 2:	Sources and Types of Bilateral Aid During the Imperial Era	29
Table 3:	Multilateral Sources of Aid during the Imperial Era	31
Table 4:	Structure of Ethiopia's External debt	38
Table 5:	Growth rates in Export, GDP and Debt	40
Table 6:	Ethiopia's Debt Service burden (1993-1994)	43
Table 7:	Debt-Growth Sign Test	61, 62
Table 8:	The DF and ADF Statistics	65
Table 9:	Testing for Unit Root in the Residual	67

ADDIS ABABA UNIVERSITY LIBRARIES

LIST OF FIGURES

	PAGE
Trends in Debt-Service ratio	44
Trends in Debt-Service ratio and Investment	45
Plot of CUSUM and CUSUMSQ	88, 89

ADDIS ABABA UNIVERSITY LIBRARIES

DEDICATION

This piece of work is dedicated to my Guardian Mr. and Mrs. M.O Mackay, my beloved mother "Mama" Isatu Bangura and my brothers; Abu Bakarr Sesay and Osman Sesay.

ACKNOWLEDGEMENTS

First and foremost, I wish to express my profound and sincere gratitude to the African Economic Research Consortium (AERC) for the sustained cooperative spirit in strengthening local capacities in Africa.

In particular, I am greatly indebted to this consortium for offering me an MSc scholarship.

Also, I owe a great deal of gratitude to my lecturers of the MSc program: Dr. Andre Croppenstedt, Dr. Gerard Kambou all of the Centre for African Studies, Oxford; Dr. Marios Obwona of Makerere University; Dr. Christopher Mupimpila of the University of Zambia; Dr Osei Kufour of the university of Science and Technology, Kumasi, Ghana; and Dr. Boo Sjoo of the School of Economics and Commercial Law, Gothenburg University, Sweden. Their knowledge impacted onto me cannot be paid for, as a way of showing appreciation, I pledge my love and loyalty to them. At this juncture, I would like to express my appreciation and gratitude to my Advisor Dr. Alemayehu Geda for his patience and constructive advice through out the development of this Thesis. In close link to Dr. Alemayehu, is Dr. Assefa Admassie (Chairman Department of Economics). His fatherly treatment accorded me served as an inspiration to the completion of this piece of work.

It would have been ungrateful on my part if had forgotten to mention other members of the Department of Economics: W/o Yergedu Begashaw; W/o Zenebech Medhane; W/o Emebet Kassa and Ato Demissie Chanyalew. Their services accorded me served as a catalyst to the completion of this work.

Last but not least, I owe so much to my colleagues: Gerson Harupara; Ebson N. Uanguta; Yakub M. Dahiye; Manoko M.L. Katambo; Patrick M. Kenyatta; Shanickwa Malone and Benethelin Zaaruka. Their love and cooperation served as an inspiration to the completion of this work.

Africa's debt burden is now intolerable. We cannot pay. You know it and all our creditors know it. It is not a rhetorical question when I ask, should we really let our people starve so that we can pay our debts?

- OAU Chairman,
Juluis K.Nyerere (1985).

ABSTRACT

This Thesis investigates the relationship between foreign capital (subsequently debt) and growth on the one hand, and the effect of debt overhang on private investment in Ethiopia on the other hand.

In the first part, a debt-growth relationship based on a marginal condition (partial derivative) was formulated. The contribution of foreign capital to growth shows mixed results. During the Imperial era and under the TGE, foreign capital contributed positively to growth, while during the Derg era the contribution was negative.

In the second part, using an accelerator principle, a private investment model having debt overhang as one of the explanatory variables was developed. The effect of debt overhang on private investment was found to be insignificant in the short-run, but the long-run t-statistic of the debt overhang indicate the possibility of debt overhang in the long run.

CHAPTER I

1.0 INTRODUCTION

Aggregate economic performance in sub-Saharan Africa during the last decade has remained unsatisfactory. Both domestic and external factors have contributed to this disappointing overall performance. The external environment, characterized by sharp declines in world commodity prices and substantial losses in the terms of trade, has been generally unfavourable. For many countries, the effects of these adverse external developments have been compounded by unfavourable weather. Also, virtually all countries in the region have been confronted with deep-rooted developmental constraints, rapid population growth, low human capital development, and inadequate infrastructure which have constituted major impediments to private sector development and the supply response of the economies in general. In addition, ethnic conflicts, political instability and protracted civil wars have aggravated the economic performance of several African countries(World Bank, 1994). Hans W.Singer, a prominent development economist, described the 1980s as a lost decade for the developing countries as a group (Singer, 1989).

Attempts to turn the tide have taken various forms. While some countries have expressed interest in, and in many cases attempted to restructure their economies, they have sought to enlist the support of the developed countries to share the social cost that such an adjustment is bound to entail. A prominent aspect of this cost sharing is the debt issue.

Externally available resources in the form of loans from donor to recipient nation are commonly rationalized in terms of their being beneficial to a recipient if the loans assist to improve the productive capacity to the extent that in future, the economy of a borrowing country becomes self-sustaining rendering further borrowing unnecessary[1]. One of the conditions essential for external loans to have a positive growth impact on the economy is to ensure that the Marginal productivity of each foreign loan is, at least greater than the cost

---

[1]. See Krumm (1985), Chenery and Srivanisan, (1988).

of the principal and interest repayment[2]. This condition would further necessitate that foreign loans, once obtained should be used in the most productive sectors of the borrowing country so that external debt servicing does not constrain the debtor's economic performance. The outcome of not servicing maturing foreign debt obligations is an accumulation of repayment arrears which damages the credit worthiness stance of a recipient country. As a country becomes less credit worthy, further lending to such a country becomes risky and creditor nations and institutions alike tend to reduce if not totally freeze external loans to debtors nation. As Mjema and Musonda (1994) pointed out, this action harms the economic performance of the debtor nation as its economic growth is dependent on among other factors, the availability of foreign loans.

1.1. STATEMENT OF THE PROBLEM

There has been growing concern about the extent to which accumulated large stocks of external debt by Less Developed Countries (LDCs) act as a deterrent to their growth and development. The debt crisis, it has been argued, resulted from a complex combination of elements, some of which are external to the individual debtor countries, while others were the direct result of economic policies pursued within particular indebted countries (Sachs and Larrain, 1994). Ethiopia as a developing country has not been spared either. By 1964, the country utilized Birr 247.9 million, of which Birr 48.0 million was repaid, and the outstanding debt amounted to birr 199.9 million. By 1974, the cumulative disbursement was Birr 875.9 million of which Birr 227.7 million was repaid leaving an outstanding balance of Birr 648.2 million. Thus over the 1964 - 74 decade, the cumulative disbursed debt increased by more than 250 per cent, growing at an annual rate of 13 per cent (Befekadu, 1992). Debt outstanding and disbursed increased from 6.7 per cent of GDP and 58 per cent of exports of goods and services to 12 per cent of GDP and 78 per cent of exports at the beginning and end of this period[3]. On a net basis, external debt increased from Birr 46.3 million in 1964 to reach a maximum of Birr 380 million in 1972, declining to birr 173 million by 1974 (*ibid* : 20-23).

---

[2]. See for example Cline (1985).

[3]. Befekadu Degefe (1992), AERC Research Paper 13.

As Wikens (1983) pointed out, because of the worldwide stagnation of demand, interest rates which are still high and the lack of new finances in the usual volume, debt servicing (interest and principal payments due) on the accumulated external debts is causing a great many countries to face very difficult adjustment problems.

Also, unserviced debt obligations impairs the economic growth of a country, in that further lending to indebted countries is considered by most donors as a risky venture. Shrinking foreign financial resources combined with hardening borrowing terms and export performance have all intertwined and produced both direct and indirect negative effects on real growth (see Osei, 1995).

As has been well documented in the Olivera - Tanzi effect, due to fiscal drags as a result of collection lags and declining revenue yields beyond a certain level of inflation rate [Olivera (1967), Tanzi (1977, 1988), Aghevli and Khan (1977), Roe (1990)], increases in net foreign resource inflows and reductions in foreign debt servicing largely owed by governments have important implications for reducing monetization of the fiscal deficits and hence inflation.

Also, the debilitating foreign debt service burden constitutes a very large leakage from current resources to support growth.

In summary, the problems posed by a huge stock of debt are:

1. the burden of principal and interest payments drains the nation's resources and curtail the possible expenditure of resources on other productive ventures.

2. a rising external debt contracted on floating rates leads to a rising debt service. This will have great implications on resource use and hence economic growth.

3. the size of the debt relative to the size of the economy can lead not only to capital flight but also discourage private investment as a result of private investors viewing the debt as anticipated foreign tax on future income and returns on investment.

These general problems are reflected in the evolving debt structure of Ethiopia. Thus, these are the main problems that will be discussed in this study.

Many alternatives for reducing the debt burden have recently emerged. The new debt initiative that is recently suggested (already in operation) is the debt for nature-swaps or debt-to-equity conversion. Debt-for-nature swaps link environmental issues to the debt problem directly.

1.2. WORKING HYPOTHESES OF THE STUDY

Debt servicing capacity of a developing country may be discussed in terms of benefits and cost of foreign capital in the process of economic growth.

Against the benefit to the nation's economy, the cost of foreign capital is viewed in terms of payment of debt service. This payment implies that the borrower country has to forego a certain amount of purchasing power , which could otherwise be needed for investment and hence economic growth.

It is against these backdrops that the following hypotheses are developed:

1. The debt overhang problem in Ethiopia had contributed negatively to growth.

2. The level of debt to GDP ratio (debt overhang) significantly affects private investment. In Ethiopia, we are not sure whether private investment contributes to growth. To the extent private investment contributes to growth, the impact of debt on the Ethiopian Economy depends not only on the direct impact of debt on growth but also on the initial direct impact of debt on private investment.

1.3. OBJECTIVES OF THE STUDY

The objectives of the study are:
first, to review various growth theories and the integration of debt into the theories, second, to develop models that will help us to determine the impact of external borrowing on growth

and private investment, third, to provide policy recommendations that will help in alleviating the debt crisis in Ethiopia.

1.4. SIGNIFICANCE OF THE STUDY

Many empirical studies on debt, especially in developing countries, have been carried out. For instance, Ajayi (1991) on Nigeria, Kouassy and Bohoun (1993) on Ivory Coast and Befekadu (1992) on Ethiopia and a host of others. However, most of these studies used models that are largely *ad hoc*.

One basic significance of this study is that, it employs models with strong theoretical underpinnings that relate debt and growth on the one hand, and debt and private investment on the other. Second, given the dearth of empirical studies on the relationship between debt and economic growth in Ethiopia, and the growing concern of the subject of debt, it would be useful to explore the above-mentioned issues and come up with results that would help in the policy building up of the Ethiopian economy.

1.5. SCOPE OF THE STUDY

The study attempts to explore the behaviour of debt, growth as well as private investment in Ethiopia. A 32 - year period of debt is covered. The period begins in 1964, a date chosen not only because of the appearance of dark spots on the economy but also because 1964 marks the beginning of the country's indebtedness, and ends in 1995, a date chosen because of the availability of data on most of the variables used in this study.

1.6 ORGANIZATION OF THE STUDY

This study is apportioned into five chapters. Following this introductory chapter, chapter II presents a review of the existing literature regarding debt and growth and debt and investment. A brief review of socio-economic conditions and the extent of Ethiopia's indebtedness are presented in chapter III. Chapter IV entails the formulation of the debt-growth model, and that of private investment and debt. The time series properties of

variables in the private investment model are provided in chapter V. Also in this chapter, are: Empirical analyses of both the debt-growth model and private investment and policy recommendations.

1.7 DATA SOURCES AND DESCRIPTION

The data used in this study come from different sources. In particular, the study uses annual time series data. Data on import, export, Gross Domestic Product (at market prices), transfer payments, import of capital and consumer goods, Gross Fixed Capital Formation (GFCF) and Debt outstanding and disbursed figures were drawn from various issues of the Annual Report of the National Bank of Ethiopia.

The fraction of capital formation supplied by domestic output(θ) is calculated as (1-MI/GFCF)[4], where MI is import of capital goods and GFCF is as defined above. Data on interest rate on debt, scheduled debt service to export of goods and services, actual debt service to exports of goods and services, scheduled debt service to exports plus grants, were all drawn from various World Bank Debt Tables. Foreign aid figures were obtained from the Ministry of Finance, Ethiopia. Gross fixed investment figures were drawn from the International Financial Statistical Yearbook (IFS). The variables in our debt-investment relationship are all expressed as ratios of GDP(nominal terms) so as to overcome the problem of units of measurement.

Data on private and public investment expressed as percentages of GDP for the periods 1970-1990 were extracted from Alemayehu (1996) "Consistent macrodatabase for selected African Countries, Institute of Social Studies (ISS), The Hague, 1996, and for the periods 1991-1996 from MSc thesis: "Determinants and constraints of private investment in Ethiopia" (1974-1994), by Workie Mitiku (Addis Ababa University), May 1997.

[4] This follows Befekadu, 1992.

1.8 LIMITATIONS OF THE STUDY

Although this study attempts to shed light on the debt crisis in Ethiopia, yet the study suffers from certain limitations.

The first limitation arises from the problem of inconsistency in data as reported by different institutions. Even data from the annual reports of the Bank of Ethiopia shows different figures for the same year. The choice of the magnitudes of the variables was based on deduction. Also, the lack of long series of data limits the ECM model adopted. However compared to the simple OLS estimation method, our result is better. This is true since such estimation might be spurious as can be inferred from the non-stationarity of the variables.

Second in the marginal analysis, the theories of macroeconomic impact of external finance are completely neglected.

CHAPTER II

LITERATURE REVIEW

This chapter is designed to provide a review of the existing literature on the subject of our interest. Much of the discussion here centres around external flows and development, various theories of growth and how the debt component fits into these theories and an evaluation of the line of causation between debt and growth on the one hand, and debt and investment on the other are thoroughly examined. Empirical evidences are also provided. As a preamble to the discussion, we will begin with a brief review of the link between external flows and development.

2.1 EXTERNAL FLOWS AND DEVELOPMENT

By external flows we mean, grants, loans, and development aid. The idea of external flows date back to the 1950s when Walt Rostow developed a theory of foreign aid based on the Marshall plan and the Keynesian growth theory. Writing in the mid 1950s, Rostow made a number of judgements about the world economy; the most influential of which were about the process of "take-off into self sustaining growth". Rostow explicitly explained how the poorer countries of the world would achieve the take-off to self sustaining growth by relying heavily on the Harrod-Domar model of long-term economic growth. For the take-off to occur, Rostow defined necessary conditions and one of which was a significant increase in the rate of investment in the economies of poor countries. It is in increasing the investment rate to accelerate the process of economic growth and achieve the take-off that Rostow gives a critical role to economic aid.

The general consensus in the 1950s was that domestic savings during the take-off period could be supplemented by capital inflows which could in turn increase the level of investment required for the growth process. In support of the above argument, Rosentein-Rodan (1961) developed a theory specifying the purpose of aid to underdeveloped countries. He stated that:

> aid to underdeveloped countries is to accelerate their economic development up to a point where a satisfactory rate of growth can be achieved on a self-sustaining basis.But the principal element is what the citizens of the recipient countries do to achieve the desired growth [Rosentein-Rodan, 1961:107].

Therefore, the general aim of aid was to provide in each underdeveloped country a positive incentive for maximum national effort to increase the rate of growth of that economy.

Chenery and Strout (1966) explained the role of aid within the context of theories of economic development which investigate the process by which a poor, stagnant economy can be transformed into one whose normal condition is sustained growth. Aid contributes to growth according to Chenery and Strout by relieving some of the potential bottlenecks of skills, savings, foreign exchange etc. that inhibit domestic growth and development [Chenery and Strout, 1966:680].

The model of Chenery and Strout was characterized by three different sort of gaps in domestic resources that can be filled by external assistance;

> In the first, growth is limited by the ability to invest; second, skills and savings are in short supply; and third, trade-limited growth, foreign exchange is in short supply because export earnings are lower than import needs (Chenery and Strout, 1966).

What they are arguing is that foreign aid can help to bridge each of these gaps at the different stages of development. In these circumstances, foreign aid was considered to be the main engine to growth. It was not only viewed as a source of high level of investment via the transfer of resources as explained by Rostow and Rodan, but also allowed efficient utilization of domestic resources by relaxing the foreign exchange constraint.

However, in the late 1970s and early 1980s, for many developing countries, particularly the poorest, the expected development was not occurring or the pace was slowing down. Thus the slow down of growth and continuous wide spread of poverty in the third world countries

led to their inability to honour their foreign liabilities incurred. This in turn led to the debt crisis that Africa as a continent has to grapple with.

In sub-Saharan Africa in 1985-87, only Nigeria and Cote d'Ivoire were among those severely indebted countries termed the "Baker Seventeen". During this period, Some 85 percent of the sub-Saharan African debt was owed to official creditors (Nafziger, 1993). However, at the end of the 1980s most African countries were severely indebted. The question of how to tackle this problem attracted considerable attention and thus a wider range of literature on the topic.

One component of the literature which is related to the issue of alleviating the debt problem is the idea of the Debt Laffer Curve associated with Krugman (1989) and followed by Cohen(1994) and Cline(1995). What Krugman was saying is that: "high debt levels result in efficiency losses". This idea was first discussed by Sachs and Huizinga (1987). They found out that most debtor's current debt far exceeded the present value of expected service payment. This, according to Krugman will give rise to efficiency losses. Efficiency losses in this context refer to the cost and time involved in rescheduling negotiations between creditors and debtors; the potential disruptions of trading arrangements as a result of a breakdown of negotiations which impacts on the debtors' current trade; and the heavy (marginal) tax, debt can impose on future returns to current adjustment and investment efforts, which give rise to disincentives for adjustment and investment. As a result, the relationship between the nominal value of debt and the market value of debt could exhibit the well-known shape of a Laffer Curve (Sachs and Huizinga, 1987). The existence of a Debt Laffer Curve has been used as an argument that, it is in the creditors' collective interest to forgive some of the external debt of a heavily indebted country.

The other side of the debt problem of developing countries is that of net resource flows. It is a matter of analyzing the tolerable feature of resource flows related to the repayment of previous loans. This concern has been expressed in the literature when defining the country's ability to service its debt. Foreign borrowing can contribute to growth if the net inflow of the debtor country is greater than the interest payment on the debt and the level of capital flights is low enough (the so called round tripping phenomenon). This is one indicator

of a country's ability to repay its debt (Bohoun and Kouassy, 1993). Also, the repayment of the debt within the given time limit is an indicator of the debtors' credit worthiness and assures them an easier access to international capital markets.

The above-mentioned elements turn the debt service into a key variable in the discussion of debt and growth since it defines at the same time the capital inflows related to previous borrowings and the future access to capital markets. The question raised by Dornbusch (1987) summarizes quite well the issue at this stage. The question is, whether the current global environment, characterized by unstable foreign interest rates, fluctuating exchange rates and falling primary commodity prices, does not exacerbate the problem of the repayment of loans. The question raises in fact the issues of the burden of debt service borne by borrowing countries.

Many studies have taken into account the repayment capacity in their analysis of the debt process (for instance: McDonald, 1982 and Dornbusch, 1987). This issue of the capacity to meet the debt service obligation has an opposite side which is the fear of debt repudiation as elaborated by Sachs and Cohen (1985), and Krugman (1989) among others.

In summary, the main constraint to the repayment of debt is the structural rigidities arising from poor export earnings and the consequent foreign exchange crisis. This does not only hinder the repayment of the stock of debt, but also poses serious problems to growth.

2.2 GROWTH THEORIES AND THE DEBT COMPONENT

This section provides various theories of economic growth and how the debt component can be integrated into these theories.

The simplest measure of economic growth (g) is the rate of change of national income through time denoted as:

$$g=\frac{dy}{dt} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}1)$$

while the rate of economic growth ($\dot{Y}$)

is given as:

$$\dot{Y} \equiv \left(\frac{dy}{dt}\right)/y = \frac{g}{y} \quad \ldots\ldots\ldots (2\text{-}2)$$

The theoretical view about economic growth can be classified under four broad headings, namely: (1) the neoclassical view; (2) the keynesian perspective (Harrod-Domar growth model); (3) the structural view (Models for Developing Countries); and (4) the endogenous growth theory.

2.2.1 THE NEOCLASSICAL VIEW

In the neoclassical tradition, economic growth is the result of capital accumulation, increase in labour quantity and quality, increase in intermediate inputs and the overall growth of total productivity within sectors of an economy. Their models generate long-term growth relying on exogenous changes in technology or population. Their specification is based on three fundamental assumptions: (1) there are no fixed, nonaugmentable factors of production; (2) there exists a unique rate of growth of the labour force which is exogenously given; and (3) planned investment (I) is always equal to planned savings(S) (the saving ratios being constant) (Ott *et al*, 1975).

An additional assumption is that economic growth will reach the optimum level if all the chief factors of production are engaged in full swing, which is only possible under conditions of perfect competition (Chenery, 1986).

With these assumptions, Solow (1956) and Swan (1956) (cited in Ott *et al,* 1975) specified the first neoclassical model of long-run growth. The model is specified as:

$$Y_t = A_t F(K_t, L_t) \quad \ldots\ldots\ldots (2\text{-}3)$$

Where:

A_t is the exogenously given technology parameter, Y_t is output and F(.) is the constant returns technology with labour (L) and capital (K) as factor inputs.

The model explains that steady state growth depends on technological progress which is exogenous to the model. In the absence of technological progress, steady state per capita output does not grow. In this framework, an increase in the savings rate raises per capita economic growth in the short run. However, owing to diminishing returns to capital, per capita output in the long run grows at the rate of exogenously given technological progress. As such, economic policies do not affect steady state economic growth, although they can affect the level of output or its growth rate when the economy is in transition from one steady state to another (Ott *et al*, 1975). An important prediction of the neoclassical growth models is that, the output levels of countries with similar technologies should converge to a given level in the same state. A number of recent papers have shown that the unconditional convergence hypothesis does not appear to be consistent with the empirical evidence. Nevertheless, support for conditional convergence is usually found when account is taken of the effects of per capita growth on the rate of investment, population growth, and public policies (Barro, 1991; Barro and Sala-i-Martin, 1992).

The integration of debt in the Neoclassical model was explained by Williamson (1982:113). He started with a simple Neoclassical growth model with the following functional form:

$$Y=\beta K^{\alpha}L^{(1-\alpha)} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}4)$$

$$y=\beta k^{\alpha} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}4)$$

where:

$y=Y/L$, $k=K/L$, are income and capital stock per capita respectively. Here savings(S) is assumed to be proportional to income(Y), so that:

$S=sY$.....(2-5).

where s is the marginal propensity to save.

The labour force is assumed to grow at a constant proportion λ. He defined the proportional rate of change of capital per head as the difference between the growth rate of capital and the growth rate of the labour force, given as:

$$\hat{K} = (\dot{K}/K) - (\dot{L}/L) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}6)$$

where: $\dot{k} = \Delta k$

Based on the assumption that the labour force grows at a constant proportion λ, we can then rewrite equation (2-6) as :

$$\hat{K} = (\dot{K}/K) - \lambda = (sY/K) - \lambda = (sy/k) - \lambda \quad \ldots\ldots\ldots\ldots\ldots (2\text{-}7)$$

Substituting the logarithmic time derivative of equation (2-7) in equation (2-4), gives:

$y = \alpha \hat{k} = \alpha(sy\text{-}\alpha)$.....(2-8).

Equation (2-8) describes a Neoclassical growth model for a closed economy.
Our main point of focus is; what happens if this economy is allowed to borrow and lend unlimited sums on the world market at an interest rate i^* so that in equation (2-8) sy is positively affected? The answer to this question is provided by Williamson (1982:113). williamson stated that:

> *If the interest rate on the stock of debt is equal to the marginal product of capital at equilibrium k_e, then if the country integrate its capital market when its initial capital stock ko is less than the equilibrium capital stock k_e, then the return to capital will be higher. This will attract a high level of investment that will foster growth* (Williamson, 1982).

2.2.2 THE HARROD-DOMAR (KEYNESIAN) GROWTH MODEL

Closely related to the Solow-Swan growth model is the Harrod-Domar Model. This model occupied centre stages in the 1940s and 1950s (after the Keynesian revolution) and was one of the earliest models to attempt to take into account investment on productive capacity and the requirement that labour and capital be fully employed as the economy grows. This model assumes that: (1) the labour force grows at a constant rate over time; (2) there exist no technological change; and that (3) the capital-output ratio remains constant, (cited in Ott *et al*, 1975).

In addition, the Harrod-Domar model adds the equilibrium condition that; in the absence of lags, planned investment(I) is equal to planned savings(S).

The equilibrium version of the Harrod-Domar (see appendix for a complete derivation) model is given as:

$$\dot{Y} = \dot{N} = \dot{K} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3-1)$$

Where:

$\dot{Y}$ is the growth rate of output, $\dot{N}$ is the growth rate of the labour force and $\dot{K}$ is the change in capital-labour ratio over time (i.e. the time derivative of K).

Similar to the integration of debt in the Neoclassical growth model, Eaton (1992) fitted the debt component in the Harrod-Domar model. His framework describes a very simple economy with four parameters: (1) the capital-output

ratio $\frac{1}{\alpha}$, (2) the savings ratio out of income, S, (3) the rate of growth of

the labour force, n and (4) the rate of depreciation of the capital stock δ. These variables were assumed exogenous and constant over time. He started with the assumption of a closed economy. The growth rate "warranted" by savings and technology, g^w, for this economy is given by:

$$g^w = s\alpha - \delta \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3-2)$$

A drawback of this model is that g^w may not be equal to the natural growth rate n, this according to Eaton is referred to as the "knife-edge" problem. Defining D_t as foreign debt, d_t the ratio of debt to output, r the interest rate on debt, $\dot{D}_t$ the net borrowing, rD_t debt service. Net transfer is defined as $\dot{D}_t - rD_t$ [Eaton, 1989).

With these definitions of variables, the rate of change of capital over time $(\dot{K})$ is defined as:

$$\dot{K}=S\alpha K_t-S'rD_t+S''\dot{D}_t-\delta K \quad \ldots\ldots\ldots\ldots\ldots\ldots (3-3)$$

Where:

S'is the dissaving rate out of interest payments, S'' the savings rate out of net borrowing and δk is the depreciation of capital.

If the ratio of debt to output (D/Y) is given as g_t, this according to Eaton (after some algebraic derivation) is defined as:

$$g_t=\frac{\dot{K}_t}{K_t}=[(S-S'rd_t+S''\dot{d}_t)\alpha-\delta]/(1-S''\alpha d_t) \quad \ldots\ldots (3-4)$$

The rate of change of the ratio of debt to output is therefore

$$\dot{d}=\frac{g-g^w+(S'r-S''g)\,d\alpha}{S''\alpha} \quad \ldots\ldots (3-5)$$

If the debt-output ratio is maintained at some constant level $\bar{d}$ then the warranted growth rate allowing for debt, g^d is:

$$g^d=(g^w-S'r\bar{d}\alpha S\delta)/(1-S''\bar{d}\alpha) \quad \ldots\ldots (3-6)$$

The long run effect of a permanent change in the ratio of debt to output can be obtained by partially differentiating equation (3-6) with respect to d.

The result is that, higher debt raises growth if and only if $S''(S\alpha-\delta) > S'\delta$. This explains that higher debt will contribute positively to the growth rate if and only if the warranted growth rate exceeds the interest rate. This condition is referred to as the "solvency condition". That is, a debtor country is solvent or "credit worthy" if it grows at a faster rate than the interest rate on the proposed stock of debt.

2.2.3 THE STRUCTURALIST MODEL OF GROWTH

The Structuralist view emanates from the issue of the need for capital accumulation as the source of growth. This approach assumes no perfect competition rather imperfect foresight,

factor immobilities and rigidities such as: inelastic food supply, foreign exchange constraints, budget constraints etc, within developing economies. This poses serious constraint to growth in these economies.

One of the first proponents of the structural view is Michael Kalecki. Kalecki (1976) identified three rates of growth, namely: (I) the rate of increase of demand for necessities (c); (II) the rate of growth of national income (r) and (III) the rate of growth of population (q). According to his conception, the main problem of financing development is that of adequate agricultural production. And the key to "financing" a more rapid growth is the removal of obstacles to the expansion of agriculture (Kalecki,1976).

In line with Kalecki's ideas, Taylor (1985) developed a macroeconomic model (including debt) which points out the main constraints to economic growth in developing economies. In his view, structural parameters are major determinants of economic growth. He also established a growth-debt relationship by the use of a marginal condition[5]. In his conclusion, debt can only have a favourable impact on the long-run steady state growth if it contributes positively to the current account balance.

Probably motivated by the works of Kalecki (1976) and Taylor (1985), Ndulu (1991) extended his original contribution based on Tanzania (1986) to a number of African countries. His findings in 1991 emphasized that the process of growth entails not only the trade-off between current consumption and capacity growth, which was the focus of most labour-surplus models, but also capacity growth and capacity utilization in an import compressed situation (Ndulu, 1991).

Given the structural features of the Ethiopian economy, as will be shown in the subsequent chapter, the debt-growth relationship as developed in chapter IV can best be explained by this Structuralist frame work.

---

[5]. See Chapter IV for detailed analysis.

2.2.4 THE ENDOGENOUS GROWTH THEORY

Recent endogenous growth models have shown that human capital formulation is an important source of long-term growth, either because it is a direct input into research (Romer, 1990) or of its positive externalities (Lucas, 1988; Becker, Murphy, and Tamura, 1990).

Lucas (1988) proposed a model in which investment in human capital enhances the productivity of both the recipients of such capital and the society at large, thereby creating positive externalities. The decision of individuals to invest in human capital enhances technological progress. Hence, policies that enhance public and private investment in human capital are considered to contribute positively to long-run growth. Also, using a Neoclassical framework, Mankiw, Romer, and Weil (1992) have shown that the contribution of human capital to growth is consistent with the predictions of the Solow-Swan model.

Given this framework of the endogenous growth theory, it can be said that, the debt component which is our focus in this study, cannot fit in this theory, unless one thinks that the formation of Human Capital is financed by debt creating flows. Even then, it will be difficult to evaluate this, because, evaluation of capital formation requires long gestation period.

2.3 THE IMPACT OF DEBT ON GROWTH: SOME THEORETICAL PERSPECTIVES

The effect of foreign borrowing (debt) on growth in developing countries has been identified through three broad channels, namely: the debt overhang; import compression, and in general macroeconomic disequilibrium.

2.3.1 THE DEBT OVERHANG

The debt overhang effect describe a situation where the level of outstanding debt is so large that investors view the burden of debt service as anticipated foreign tax on current and future

income. This shatters the confidence of both foreign and domestic private investors who are usually sensitive to uncertainty. The declining trend of private investment (as a share of GDP) in most African countries from the late 1970s onwards can partly be attributed to this factor (see Alemayehu, 1997:11). The other disadvantage of a debt overhang is that, it discourages capital accumulation and thus promotes capital flight. As noted in this chapter, the extent to which foreign borrowing can contribute to growth depends on the level of capital flight. Capital flight is presumably inversely related to private investment in the domestic economy. This poses serious constraints to growth.

2.3.2 IMPORT COMPRESSION

Import compression describes a situation wherein the servicing of external debt erodes the meagre foreign exchange available for import. This has been described as a policy response arising from balance of payment crisis, where the balance of payment crisis sets a limit to imports (Ndulu 1986, 1991 and Rattso, 1994; cited in Alemayehu, 1997).

Given such constrained import capacity, governments are forced to set priority between imports of intermediate goods and investment goods. This sets a trade off between capacity utilization and capacity expansion (*ibid*).

2.3.3 SOME MACROECONOMIC EFFECTS OF EXTERNAL FINANCE

The effects of external finance on an economy can be discussed from three angles, namely: (1) The two gap model; (11) Dutch Disease; and (111) the recipient fiscal response.

The two-gap model (Chenery and Strout, 1966) basically links a simple Harrod-Domar growth model with flows of external assistance. The essential feature of this model is that, growth is constrained by supply of skills and organizational ability, supply of domestic saving and the supply of imported commodities and services. The constraints to growth are generally seen in three phases. In phase I, growth is limited by the ability to invest and the saving gap determines the capital inflow. Phase I ends when investment reaches the level adequate to sustain the target growth rate. In phase II, capital inflow is required to fill the

saving gap. It should be noted that the tapering of capital inflow in this phase requires that export grows faster than imports. But this is found to be difficult for most LDCs and this new set of restriction which is binding in this event is phase III, (Alemayehu,1997).

Using this model, the authors concluded that although its impact varies in different phase, foreign economic assistance is generally productive either in supplementing domestic or relieving foreign exchange constraints.

The other aspect of external finance is the "Dutch Disease". This relates to a situation wherein aid or revenue is obtained from a booming sector. If part of this is spent (the spending effect) on nontradable goods, it leads to a real appreciation (that is a rise in the relative price of nontradable). This in turn leads to resource movement (resource movement effect) out of the non-booming tradeable sector into the nontraded sector (Alemayehu, 1997).

According to Wijnbergen (cited in Alemayehu,1997), in the African context, the resource allocation consequence of the "Dutch Disease" is to shift labour from agricultural cash crop production in rural areas to service employment, mostly in urban areas. However, Alemayehu (1997) rejects this formulation by noting that this formulation does not tally with the stylized facts in Africa. Alemayehu (1997) noted that mobility of resources is not that easy especially in the short-run, and second most African countries are characterized by urban unemployment. Thus according to Alemayehu (1997), inflation due to structural bottlenecks in the non-traded sector has been observed to be more important than the demand for labour which is hypothesised by Wijnbergen.

The advocates of the fiscal response to foreign inflow states that: "foreign inflows can reduce governments efforts to raise revenue, especially tax revenue". This concern has been originally formalized by Heller (1975). He built a model that assumes public sector decision makers are maximizing a utility function subject to the constraint that government expenditure should be equal to its revenue. Mosley et al 1987 (cited in Alemayehu 1996), extended the work of Heller by including a component that determined the impact of aid on growth of output. The empirical finding is that: "aid on the aggregate has no demonstrable

effect on growth in the recipient countries either in the 1960s or the 1970s". They argued that theoretically, this could be due to the possibility of leakage into non-productive expenditure in the public sector and of the transmission of negative price effects to the private sector.

2.4 SOME EMPIRICAL EVIDENCES ON DEBT AND INVESTMENT

The debt problem emerged earlier in Africa than in Latin America. Beginning with Zaire (now called Democratic Republic of Congo) in 1976, ten low-income sub-Saharan African countries rescheduled official debt claims nineteen times and commercial bank debt five times before the first rescheduling of the Mexican debt in 1982[6].

Several methods have been used in analyzing the effects of Debt overhang on Macroeconomic variables. To mention but few are: Marginal Analysis; Logit Analysis; Discriminant Analysis; Sensitivity Analysis; principal components; Debt-cum Growth Models; Neoclassical Growth model; Harrod-Domar model etc.

For instance, Arrau (1990) used a dynamic neoclassical growth model to determine how the debt overhang affect investment and growth in Mexico. His findings showed that the debt overhang faced by the Mexican economy during the reviewed period discouraged investment particularly private investment. And that the best case for growth was inflation financing and the worst was, national debt financing.

Also, Krugman (1988), Corden (1988), and Sachs (1988) have subsequently established the debt overhang proposition that the existence of a heavy debt burden reduces the incentive to invest (both foreign and domestic) and to save. Some preliminary analysis by the IMF (1989) has also provided that the debt overhang plays a large part in explaining a slump in private investment in problem debtor countries.

---

[6]. Nafziger (1993, P. XIX).

Borenzstein (1990) directly tested for the existence of a debt overhang for the Philippines by estimating a standard neoclassical investment demand function and testing the significance of the addition of a term representing the extent of the foreign debt burden. His results pointed out that the debt overhang did infact contributed to the decline in gross (foreign plus domestic) investment relative to the GDP that occurred in the Philippines between 1982 and 1989.

He also observed the credit rationing effect; that is a highly indebted country is likely to face credit constraints on international capital markets and this will pose a constraint to investment. Diwan and Rodrick (1992) also made a similar observation.

2.5 A BRIEF REVIEW OF EMPIRICAL WORKS ON DEBT AND DEBT OVERHANG IN AFRICA

On the African front, most models that have been used to analyze the debt problem are single equation models in which economic growth is hypothesized to be negatively affected by accumulation and servicing of external debt(see Mjema, 1996). Such single equations took the form:

$$\Delta Y_t = a_o + a_{11}\,\Delta A_t + a_{12}\Delta X_t + a_{13}P_t + U_t$$

where:

ΔY_t = *real GDP growth in time t*

ΔA_t = *real growth in domestic absorption (defined as private final consumption expenditure + investment + government final consumption) in period t.*

ΔX_t = *growth of exports of goods and services in period t.*

P_t = *debt-service ratio in period t.*

U_t = *is a residual term.*

Applying the above-cited model to the Nigerian case, Ajayi (1991) found a negative coefficient for the debt service ratio (P). He concluded that Nigeria had implemented policies

that led to the accumulation of debt in excess of what was sustainable as judged by her export performance.

Also, Osei (1995) used the same framework to determine the burden of debt service payment under Structural Adjustment in Ghana. From his findings, external debt represents a major constraint to Ghana's economic performance.

Mjema (1994) emphasized that using a single equation model to estimate the impact of debt servicing on economic growth captures only the "direct effects of debt servicing on growth and misses the "feedback" effects. In other words, it is only the partial (debt service) effects that are taken into account in the real growth equation.

To capture both the "direct" and "feedback" effects, Mjema used both a single equation (similar to the one above) and a set of simultaneous equation to determine the impact of external debt servicing on the economy of Tanzania. In the simultaneous equation he used three endogenous equations and five predetermined variables. The predetermined variables were: rate of growth of real domestic absorption; rate of growth of exports of goods and services; rate of growth of real savings; interest rate; and foreign capital inflow. In one of the equations, debt service ratio (at time t) was expressed as a function of total debt service ratio (in period t), interest rate (at time t) on foreign debt and rate of growth of exports of goods and services. In another equation, total debt service ratio (in period t) was expressed as a function of debt-service ratio(at period t)(thus the simultaneous equation characteristics) and rate of growth of real savings(in period t). From his conclusion, the result of the simultaneous regression showed that, the impact of the debt service ratio on real growth in Tanzania was, akin to the single equation results, a negative one.

Faini and de Melo (1990), by examining the adjustment record for a large sample of developing countries (including African countries), distinguishing between countries exporting manufactured goods and those exporting primary goods, found strong support for the debt overhang argument in both groups. That is, after adjusting for other factors they found that the resumption of private investment growth has been hampered in countries with heavy debt burden and unstable macroeconomic environment.

By employing pooled time series and cross-sectional data, Hajimichael (1995) examined the determinants of investments in heavily indebted sub-Saharan countries during the past 15-20 years with the use of a single equation similar to the one stated at the beginning of this chapter. He concluded that increase in the external debt burden was associated with a decline in both total and private investment.

One basic disadvantage of both the single and simultaneous equations approach described above is that; they provide no theoretical underpinning and are, thus, largely *ad hoc*. To have a theoretical framework, both the single and simultaneous equations models need to be a reduced form of a set of structural equations [see the works of Taylor (1985), Hossein (1987), and Befekadu (1992) on this discussion].

To overcome the *ad hoc* problem, Befekadu(1992), based on the structuralist views, formulated a growth-debt model for Ethiopia. His analysis is based on a simple marginal (partial derivative) condition which took into account exports, import of intermediate inputs, import of consumer goods, interest rate on foreign debt and capital accumulation.
He concluded that external capital contributed positively to growth during the Imperial era and negatively to growth under the *Derg* regime. He emphasized that the negative contribution of external capital during the *Derg* era was as a result of the policies pursued. His conclusion brings to mind an important question relating the debt problem. The question of concern is; is it plausible to say that the debt crisis is a policy problem arising from a change in political regimes?

It is against this backdrop that we are going to develop a model that considers the impact of debt under the three regimes mentioned in chapter one. Let us first provide a review of the extent of Ethiopia's indebtedness and the structural features of the economy. This will help us to formulate a model that can best explain the effects of debt on growth and investment in Ethiopia.

CHAPTER III

3.0 TRENDS IN ETHIOPIAN DEBT

In this chapter, we first provide a brief overview of the socio-economic conditions in Ethiopia. Following this, are issues relating: flow of aid to Ethiopia (sources, types and magnitude), the extent of Ethiopia's indebtedness and a discussion on the structural features of the Ethiopian economy.

3.1 A BRIEF OVERVIEW OF THE ETHIOPIAN ECONOMY

Ethiopia with a population close to 60 million according to recent information from the Central Statistics Authority(CSA) and an area of 1,097 thousand km^2 (OAU,1998 Report), is one of the most populous country in sub-Saharan Africa. Its population is split between the majority of African groupings of which the Oromo and the Amhara are the largest. The country has experienced three political regimes, namely: The Imperial era (1941/42-1973/74), the *Derg* regime (1974/75 -1990/91) and the Transitional Government of Ethiopia (TGE) now Federal (1991/92-).

Ethiopia's known natural resources include: gold, platinum, tantalum, soda ash and potash and natural gas. Except for gold, none of these resources has been exploited on a large scale (World Bank Report, 1994:166-169). The country's largest sector (the agricultural sector) is largely subsistence employing approximately 80 percent of the working force and contributing an average of 50 percent to Gross Domestic Product (GDP) and 85 percent to export-earnings. The Industrial sector contribute 12 percent of GDP and 15 percent of export earnings (*ibid*).

Coffee is the main export, producing nearly 60 percent of foreign exchange earnings. On the services account, Ethiopian Airlines account for the largest share of foreign exchange earnings (MEDAC, 1994).

Despite her reputation for her natural and human resource potentials, the country ranks as one of the poorest in the World according to World Bank classification. The Gross Per Capita of US$ 130 per annum is one of the lowest in the World. The infant mortality rate at 111 per 1000 is one of the highest in the World. Life expectancy is low at 46 years and attendance at primary school is poor at 31 percent (World Bank report, 1994:168). Malnutrition is rampant with a daily Per Capita calorie supply of 1,620 which is again one of the lowest in the African continent and the World at large. Only about 12 percent of the rural and 80 percent of the urban population have access to safe drinking water (*ibid*). The poor performance of this economy can be to attributed to both internal and external factors.

Among the internal factors are: political instability, rapid population growth, backward and inappropriate technology, poor physical and human infrastructure, and environmental degradation all of which have left the economy vulnerable to external shocks. On the external front, the oil price of 1973-74 and 1978-79; the deteriorating terms of trade and the consequent foreign exchange crisis that emerged; the high foreign interest rate and a period (1974-78) of internal conflict together with the war with Somalia adversely affected the economic performance of the country. During this period, growth in GDP dropped from a 4.4 percent per annum between 1967-1972 to 1.9 percent for the period 1973-1990.

All of these factors left the Ethiopian economy and the African continent as a whole highly dependent on foreign aid for its development objectives.

In the Ethiopian context, this dependency date back to the 1950s when the country was liberated from five years of Italian occupation. The period between 1941 and 1945 was taken up by efforts toward pacification and re-establishment of the central government and its authority over the entire country. By 1945, the structure for a stable state was completed and the government was able to face the challenges of socio-economic development (Befekadu, 1992)

From the very beginning, the government had no illusions about its own endowments, nor the entrepreneurial capacity of its people to bring about accelerated and self-reliant development.

First, it was governing a people ravaged by poverty, ignorance , ill-health and war. Thus foreign aid was inevitable(*ibid*).

3.2 INFLOW OF FOREIGN AID TO ETHIOPIA: SOURCES, TYPES AND MAGNITUDE

Inflow of foreign aid to Ethiopia Started around 1950, the year in which US-Ethiopian relation began. However by the end of 1995, Ethiopia had received aid from all willing sources, both bilateral and multilateral. Table I shows a summary of the sources, grace periods and interest rates of all concessionary loans to Ethiopia from 1952 to 1993.

Table 3.1.1: Terms of concessionary loans to Ethiopia (1952-1993)

Donors	Maturity (years)	Grace period (years)	Interest rates (%)
Bilateral			
USAID	40	10	3
ITALY	15-20	4.5-10.5	1.5-2.5
F.R of GERMANY	25	7	3
CHINA	17-20	7-10	0
Multilateral			
IDA	50	10	0.75
ADF	50	10	0.75
EDF	40	10	0.75
IFAD	50	10	1
OPEC FUND	17-22	5	3
ARAB LOAN FUND	25	10	1

Source: Ministry of Finance, Addis Ababa.
Note : the loans mentioned above, are considered for major donors and on average basis.

From the above table, it is evident that the maturity, grace period and interest rates of the loans were very generous (soft). The shortest maturity period being 15 years and the highest rate of interest was 3 percent.

On the bilateral side, loans from the United States Agency for International Development (USAID) carried the highest maturity and grace periods of 40 and 10 years respectively. Whilst on the multilateral side, loans from the International Development Association (IDA),

African Development Fund (ADF) and the International Fund for Agriculture Development (IFAD) offered the highest maturity and grace periods.

On the other hand, loans from Italy (bilateral) and funds from the Organization of Petroleum Exporting Countries (OPEC) (multilateral) attached low maturity and grace periods. Given the major sources of aid, we now examine the flow of aid under the three regimes.

3.2.1 AID FROM MAJOR DONORS DURING THE IMPERIAL ERA (1952- 1974).

Table 3.1.2: Sources and Types of Bilateral Aid (in million Birr).

Year	USAID LOANS	USAID GRANTS	SWEDISH LOANS	SWEDISH GRANTS
1952	-	29.8	-	-
1953	-	3.2	-	-
1954	3.7	48.1	-	-
1955	-	8.1	-	-
1956	-	11.0	-	-
1957	-	8.8	-	-
1958	1.9	10.4	-	-
1959	-	6.1	-	-
1960	1.3	22.0	-	-
1961	-	7.2	-	-
1962	14.9	4.4	-	-
1963	10.0	-	-	-
1964	-	7.8	-	-
1965	12.3	22.6	-	-
1966	-	5.0	-	7.48
1967	19.6	-	-	3.84
1968	0.8	1.5	-	5.37
1979	25.0	1.8	-	8.03
1970	116.1	2.7	-	12.19
1971	6.5	4.0	-	7.8
1972	-	1.8	-	8.74
1973	9.9	16.1	-	8.05
1974	-	2.9	-	8.51
Total	222	225.3	0	70.01

Source: Ministry of Finance, Addis Ababa.

3.2.1 (a) USAID

After the liberation of the country from Italian occupation in 1941, the first inflow of aid to Ethiopia came from the USAID. This was given in the name of post war assistance. (Harry, 1969).

In a broader view, the United States' foreign aid policy was designed to serve the aims of control. Through foreign aid, the United States was sustaining and strengthening alliance with low income countries so that it was less likely for the former Communist bloc to have had control over them *(ibid)*. Hence from the very beginning, US foreign aid policies according to purpose were classified as follows: (1) to implement the world-wide military and political policies of the US; (2) to ensure that economic development in underdeveloped countries is firmly rooted in capitalist ways and practices; (3) to enforce the "open door policy" : trade and investment opportunities for US.

In the Ethiopian context, aid from the US was as a result of the country's strategic location (the horn of Africa) relative to the Red Sea, the Gulf of Aden, and the Indian Ocean; and Ethiopia's significant role in African affairs (Harry, 1969: 125-126)

3.2.1 (b) SWEDISH AID

The first Swedish financed project in Ethiopia was the Ethio-Swedish Institute of Building Technology (ESIBT) [Tadesse,1994]. As shown in Table 2, Swedish Development Aid to Ethiopia was in grant form. On aggregate, this amounted to 70.01 million Birr at the end of 1974. This aid was geared towards development objectives. The government of Sweden of whatever party has always emphasized that its aid policy is "an international expression of social values that are widely shared within Swedish society". The main reason that Sweden takes part in development cooperation, it is argued, is that solidarity with the underdeveloped is regarded as a moral responsibility. Thus, the stated goals of Swedish development aid policy are based upon the criteria that Swedish efforts should contribute to "economic growth, social justice and a fair distribution of resources, economic and political independence and democratic social development" (Selim, 1983:162).

Table 3.1.3: Multilateral Sources of Aid(During the Imperial era)

Year	IDA Concessionary loans to Ethiopia (in Million Birr)
1963	33.8
1964	-
1965	-
1966	18.7
1967	-
1968	19.3
1969	8.8
1970	18.0
1971	34.8
1972	38.9
1973	153.7
1974	65.2
Total	391.2

Source: (1) Ministry of Finance, Addis Ababa (1963-1969)
(2) World Bank, Ethiopia and the World Bank, (1970-1974), Washington D.C.

During the Imperial era, the only source of multilateral aid was the Italian Development Aid (IDA). This was given in the form of concessionary loan. At the end of 1974, the volume of concessionary loan from this source totalled 391.2 million Birr. It was provided towards reducing some of the structural bottlenecks in the agricultural sector.

3.2.2 INFLOW OF AID DURING THE *DERG* REGIME

In 1974, the Imperial regime was removed from power by a Provisional Military Administrative council (PMAC)- the *Derg* regime. The seizure of power by the *Derg* regime occurred at a time when developing economies started to feel the pinch of global economic disturbances, such as the unprecedent increase in crude oil prices in 1974. This coincided

with an increase in the price of manufactured goods, the decline in the world market price of the country's main export- coffee (see Alemayehu, 1997, for trends of these variables).

Faced with this unhealthy economic situation, the *Derg* regime outlined developmental objectives. The objective of the government was summarized in a catch-all motto of "Ethiopia Tikdem" which literally meant "Ethiopia first". The first major step in explaining what it meant and showing the overall objectives was the declaration on 20 December 1974 of socialism as the guiding ideology. The formal declaration stated that "Ethiopia Tikdem" meant equality, self reliance, and the dignity of labour, supremacy of the common good and the indivisibility of Ethiopia's unity[7].

Despite the ideologies of self-reliant and socialism, foreign aid continued to be the source of external finance to the Ethiopian economy. Except that the USAID terminated its assistance in 1979. The termination Probably emanated from the ideology of socialism relative to the capitalist practice of the United States.

However, by the end of 1991, the then *Derg* regime had received a total of 6286.3 million Birr as development aid relative to 908.41 million Birr during the Imperial era[8].

In composition terms, out of the 908.41 million Birr received during the pre-revolution period, 295.48 (32.5%) million Birr was in the form of grants, while 612.92 million Birr was in the form of loans (67.5%). During the period of 1974-1991, grants constituted 2887.3 million Birr (45.9%) and loans amounted to 3398.7 million Birr (54.1%). From the above-cited figures, one can deduce that before 1975, aid was mostly in the form of loans. Whilst in the post 1975 periods (1975-1991) the gap between loans and grants was narrowed.

The large volume of aid during the periods of the *Derg* regime was as a result of increase in the sources of aid. By 1981,the number of aid donors increased from three during the

---

[7]. For full details, see the declaration of the Provisional Military Government of Ethiopia (PMGE) (1974).

[8]. These figures were obtained from the ministry of External Economic Cooperation and the ministry of Finance, Addis Ababa.

Imperial era to thirteen under the Derg regime. The new sources included the: Italian Development Aid (IDA); Federal Republic of Germany; China; Canada and Finland -all were bilateral. On the multilateral side were the: African Development Fund (ADF); European Development Fund (EDF); United Nations Development Program (UNDP); United Nations Capital Development Fund (UNCDF) and the Arab Loan fund (Ministry of Fiance).
Of these sources, funds from: IDA, ADF, IFAD, UNCDF and EDF were given in support of projects and programs. In particular, EDF finances programs and projects in Africa, the Caribbean and Pacific countries that have signed the Lome convention. This convention which was negotiated with the European Economic Commission (EEC) by the Imperial Government of Ethiopia, was signed in 1975 by the Derg regime. Since then, Ethiopia had signed all the four phases of this convention[9]. This make best eligible for EEC funding.

On the other hand, funds from China, Canada, Finland and the Arab Loan Fund were provided as development aid and the UNDP provided technical assistance.

3.2.3 INFLOW OF AID UNDER THE TRANSITIONAL/FEDERAL GOVERNMENT OF ETHIOPIA

In May 1991, the *Derg* regime was ousted by a coalition group headed by the Ethiopian People's Revolutionary Democratic Front (EPRDF). Following a national conference, a transitional government consisting of a broadly based council of ministers was installed.
In 1991, the transitional government published an economic policy statement which spelt out the framework for restructuring and reforming the economy. The policy document emphasized a limited economic role for the state and established the basis for liberalizing the economy. At the centre of this shift, is a commitment to strengthen the private sector and subject public enterprises to competition. The policy calls for fiscal restraint and restructuring public enterprises in favour of economic and social services. In agriculture, the vast state

farm structure is being dismantled. Initiatives are being taken to reform public enterprises and change ownership in selected enterprises (see Action-Aid report, Ethiopia, 1996).

---

[9]. See text Ethiopia and the European Communities, Brussels; December 1990 .

The transitional government was accorded an International Monetary Fund (IMF) Structural Adjustment Facility (SAF), and Ethiopia is eligible for participation in the special program for Africa. A consultative group meeting to mobilize donor assistance for Ethiopia took place in November 1992. Paris Club discussion in December, 1992, resulted in rescheduling eligible external debt on enhanced concessional terms[10]. At the end of 1995, inflow of external capital totalled 17684.1 miillion Birr (Annual Report of the Bank of Ethiopia, 1995). Most of the disbursement was from multilateral sources, of which more than 75% was allotted to the social sector. This could be attributable to the intensive implementation of the Structural Adjustment Program.

3.3 CAUSES OF THE DEBT CRISES

The literature abounds with causes of debt crisis in Third World countries. The underlying issue emphasized by Dornbusch and Fischer (1985) as well as Greene and Khan (1990) relates to the fundamental aim of borrowing: that the addition to the stock of external debt over time must contribute to growth and development and in particular, to the country's ability to make payment to creditors.

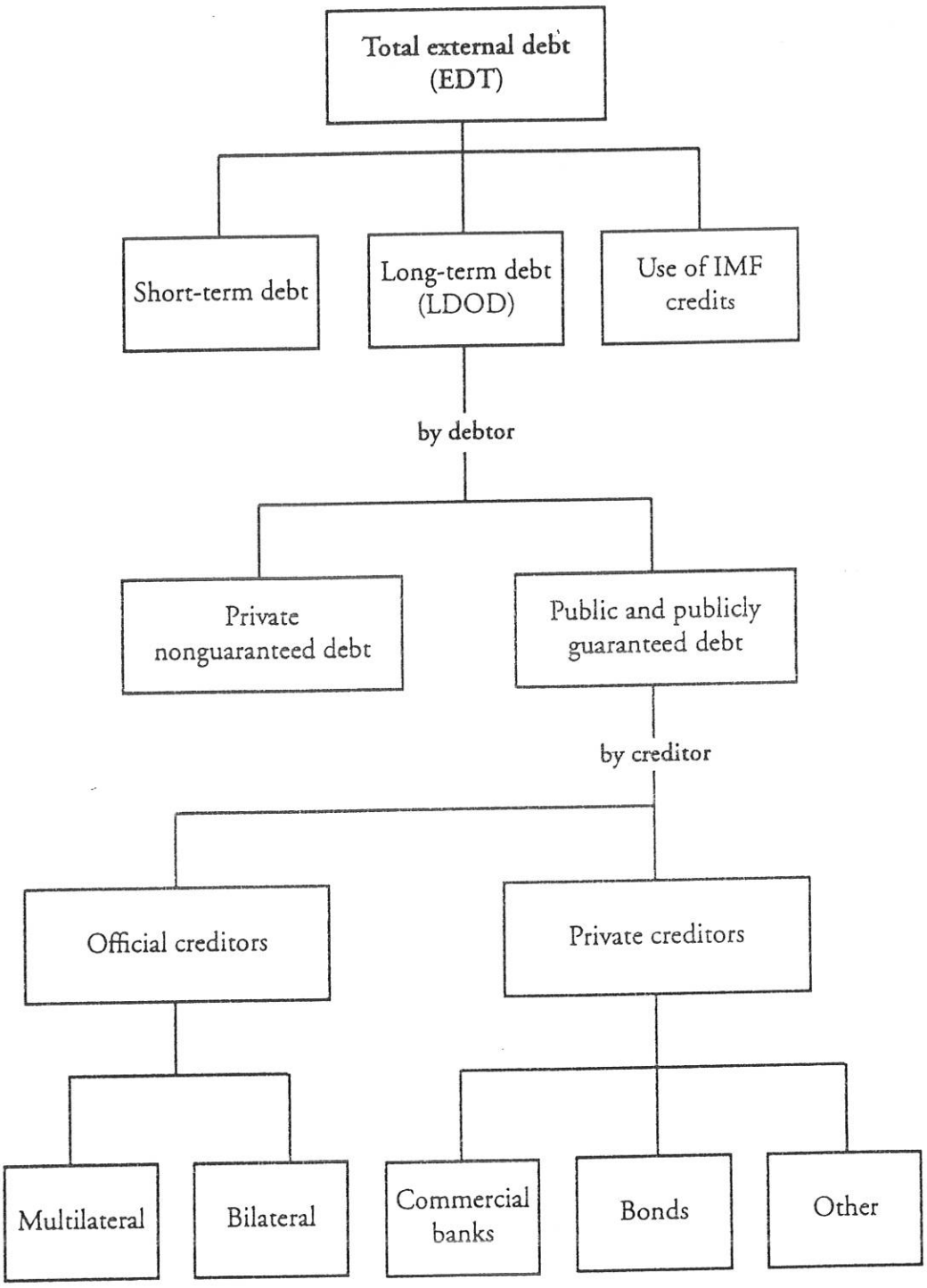
The argument is that a debtor country will face repayment difficulties if it is unable to generate sufficient increase in output and export earnings. Many factors - domestic and external are responsible for this outcome. The domestic factors often cited include wrong macroeconomic policies such as fiscal irresponsibility and exchange rate misalignment (Muns, 1984; Khan and Knight, 1983). Other factors include policies that deter savings, such as negative real interest rates, which in turn reduce private investment and encourage capital flight. Also, when long- run projects are financed with short-term credits, debt problems occur (Tanzi and Blejer, 1984). External factors, including oil shocks, deterioration in the terms of trade (Greene and Khan, 1990) and rising foreign interest rates (Krumm, 1985), also contribute to the debt problems. And in the African context, African countries depends

[10].See IMF, Ethiopia- selected issues, April 1996 and the World Bank, Ethiopia: An Economic overview November 1996.

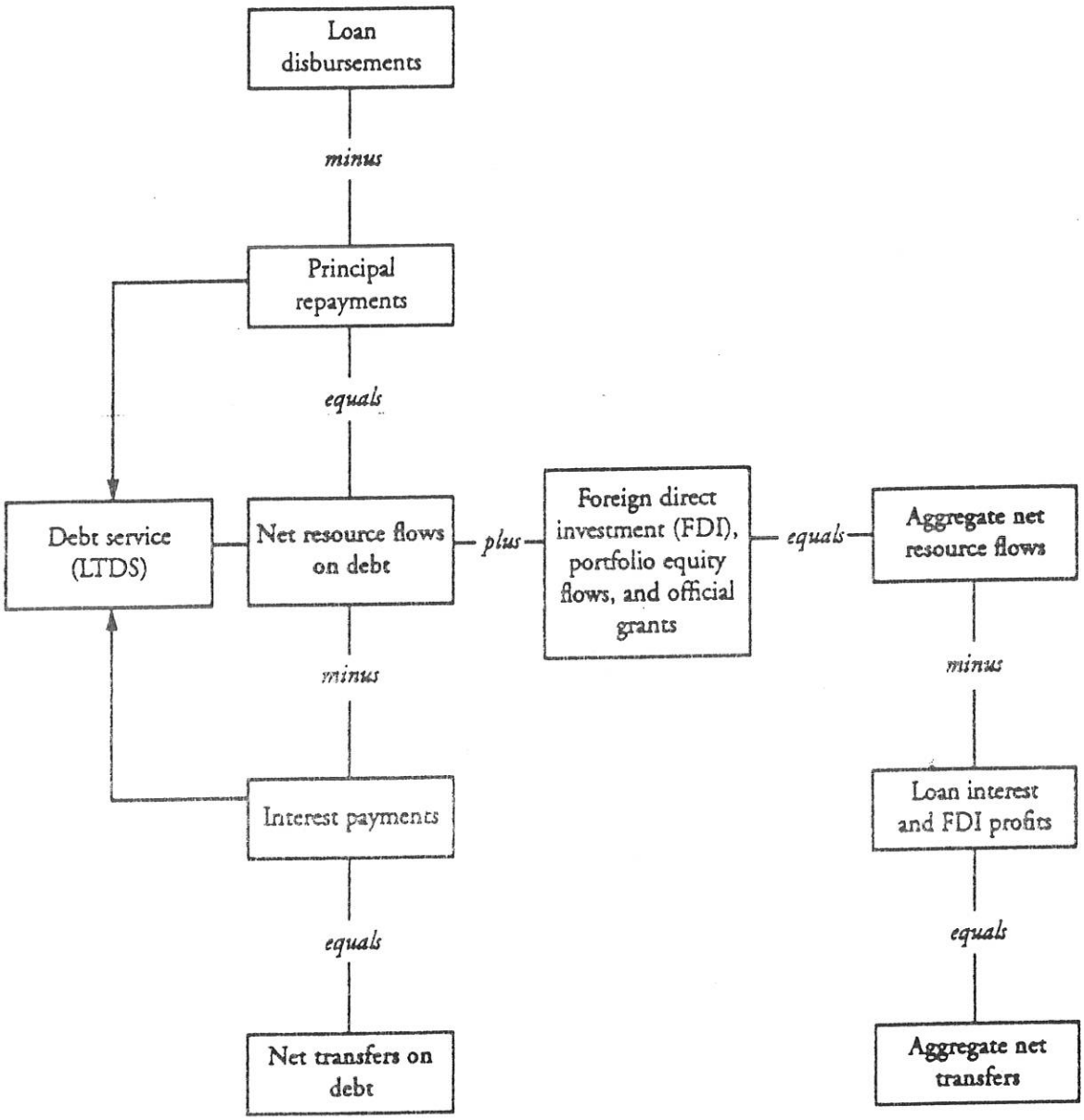
on primary commodity export due to historical reasons is cited as the major problem (see, Alemayehu, 1997).

The Total external debt according to World Bank can be disaggregated into various components. The organograms overleaf shows the various components of debt and the aggregate resource flows and net transfers (according to World Bank) to developing countries.

Debt stock and its components



Aggregate net resource flows and net transfers (long-term) to developing countries



Note: Includes only loans with an original maturity of more than one year (long-term loans). Excludes IMF transactions.

Table 3.1.4: Structure of Ethiopia's External debt (in millions of US$)

	1980	1987	1988	1989	1990	1991	1992	1993	1994
TOTAL DEBT STOCK (EDT)	824	2909	3259	3471	3786	4179	4363	4703	5059
Short-term debt	57	98	135	112	146	194	156	152	171
Official creditors	0	2	1	15	40	76	91	115	132
Private creditors	0	2	1	1	3	8	4	6	8
Long-term debt (LDOD)	688	2736	3071	3329	3634	3986	4188	4503	4816
Private nonguaranteed	0	0	0	0	0	0	0	0	0
Public and publicly guaranteed	688	2736	3071	3329	3634	3986	4188	4503	4816
Use of IMF credit	79	76	55	30	6	0	19	49	72
TOTAL DEBT FLOWS									
Disbursement	119	491	582	489	357	431	346	408	250
Long-term debt	110	491	582	489	357	431	327	379	20
IMF purchase	9	0	0	0	0	0	20	30	50
TOTAL DEBT SERVICE PAID	45	248	309	303	236	134	104	89	92
TOTAL DEBT SERVICE DUE	-	-	-	348	439	428	409	314	414

Source: Word Debt Tables, 1996.

The above table shows Ethiopia incurred a higher level of long-term debt relative to short-term debt. The total debt-service paid shows an increasing trend between 1980 and 1990. This is a pointer that Ethiopia had been honouring its debt obligation.

The volume of long-term debt increased from 688 million dollars in 1980 to 4,816 million dollars in 1994.

Ethiopia's severe debt situation is the combined effect of a number of factors. The crucial factor is the country's inability to generate sufficient foreign exchange through export earnings due to its long-standing dependence on a few export commodities (cash crops, skins and hides), the international prices of which has been subject to wide fluctuations. This situation is also exacerbated by the frequent drought thereby resulting to lower export earnings and thus poor growth in GDP (since export contribute a larger percentage to GDP). See table 3.1.5 for trends in growth rates, export and debt.

Table 3.1.5: Growth rates in Export, GDP and Debt (in %)

Year	Growth in Export	Growth in GDP	Growth in Debt
1964	14.5	4.2	2.8
1965	10.4	5.4	21.5
1966	-4.4	7.7	7.4
1967	29.0	6.4	5.7
1968	-25.6	6.1	12.1
1969	12.1	5.6	9.6
1970	2.6	10.4	10.5
1971	2.8	5.6	12.3
1972	23.2	0.7	9.0
1973	29.0	5.5	3.0
1974	11.4	11.0	10.6
1975	-14.0	-5.0	18.1
1976	12.7	8.0	17.7
1977	19.2	14.4	10.5
1978	4.3	6.4	9.7
1979	11.1	9.9	20.7
1980	27.6	8.2	12.6
1981	-10.4	3.0	29.4
1982	-8.6	3.0	27.3
1983	4.0	9.4	15.6
1984	14.8	18.1	13.4
1985	-20.0	17.1	21.9
1986	24.2	4.4	23.7
1987	-14.0	7.0	11.3
1988	-2.7	3.2	14.7
1989	16.8	5.5	5.1
1990	-16.2	5.9	11.8
1991	-48.4	10.9	3.3
1992	29.1	2.9	-12.6
1993	99.9	27.8	86.6
1994	97.6	5.1	36.9
1995	52.0	24.3	7.8

Source: Annual Report of Bank of Ethiopia, various issues.
Note: These figures are expressed in nominal terms since we are comparing movements in variables for which the price index can be assumed to be uniform.

From table 3.1.5, the growth rate of debt was higher during the 1964-9 period, amounting to 14 percent per annum. While there was a considerable slowing down during the 1970-74 period at 9.1 percent. Growth rate of export was 6 percent and 13.8 percent respectively, and GDP grew from an average of 5.9 percent to an average of 6.6 percent. The increased growth in GDP and the slowing down of the rate of growth of debt during the 1970-4 period was attributed to a declined in imports of goods and non-factor services which grew on average at 3.4 percent per annum in 1972/73, but declined by 4.5 percent in 1972/73. During this period, export rose from a period average of 10.3 percent during 1967/68-1971/72 to 13 and 14.8 percent in 1972/73 and 73/74. With this development, the government was able to reduce its outstanding debt (Eshetu and Makonnen, 1992).

During the post-revolution period (1974-1991), debt outstanding and disbursed increased from Birr 648 (12 percent of GDP and 78 percent of exports) to Birr 4.8 billion (43 percent of GDP and 326 percent of exports in 1986) (already cited in the introductory chapter). Such a phenomenal increase is due to a number of factors:

(1) the volume of disbursed debt increased by more than seven-fold between 1975 and 1986 at an average annual rate of 18.4 percent;

(2) during the same period, nominal GDP averaged 8.4 percent and export averaged 4.7 percent.

The combination of higher growth of external indebtedness relative to the rates attained by GDP and export earnings increased the ratios of debt service and debt GDP.

However, the period of the TGE (1991-95) witnessed a sharp increase in export and GDP relative to that of debt (see table 4). This good economic performance was attributed to the on going Economic Reform Program which built upon the peace and stability achieved in the wake of establishment of foreign exchange for imports of spare parts. Consequently mobilization of unused capacities in agriculture and industry, coupled with unrestricted trading resulted in a sharp economic upturn (Annual Report of the Bank Governor of Ethiopia, 1994/95).

3.4 THE EXTENT OF ETHIOPIA'S INDEBTEDNESS

In analyzing the extent of debt burden, the following ratios are often used:

(1) total debt service to export of goods and services (debt-service ratio);

(2) interest payment to export of goods and services;

(3) interest payment to GDP;

(4) total external debt to export of goods and services;

(5) debt outstanding and disbursed to GDP;

(6) total debt service to GDP and;

(7) total external debt to GDP.

However, movements in the ratio of debt service payment to export of goods and services (debt-service ratio) and total external debt to GDP are the two most important indexes (see Ajayi, 1995 and Osei, 1995) used to asses the debt burden; the higher the ratios, the greater the burden (World Bank, World Debt Tables, 1995, vol.I).

The debt-service ratio brings to mind an important aspect of debt management. This explains that for a country to be able to minimize the burden of debt servicing, the rate of growth of export should be greater than the rate of growth of servicing the debt.

In view of the above-mentioned, selected ratios on debt-Service burdens for Ethiopia are compared with the average for other Selected Indebted Low Income countries (SILICs), comprising of 32 countries, as well with other East African countries.

Table 3.1.6: Ethiopia's Debt service burden (1993-1994)

Country	Scheduled debt service to exports	Actual debt service to exports	Scheduled debt service to exports plus grants
SILICs	43.0	18.2	36.8
Ethiopia	47.4	9.0	23.3
Kenya	29.7	28.0	25.5
Tanzania	78.8	25.1	36.8
Uganda	81.1	60.6	34.3

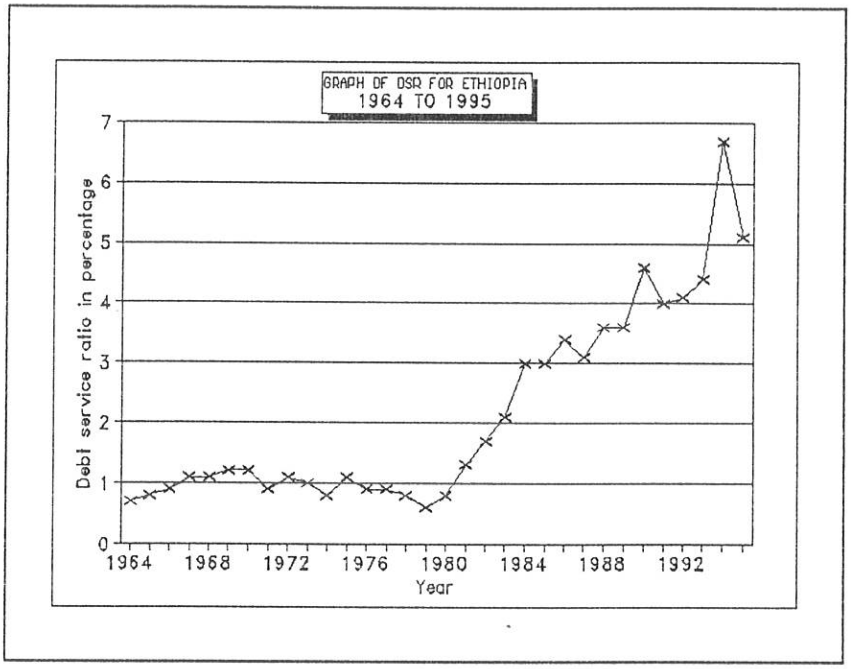
Source: World Debt Tables, 1994-95, Vol.I, chapter 3; 1991-93 average for exports and grants.

From the above table, the ratio on scheduled debt service to exports of goods and services at 47.4 percent for Ethiopia was slightly greater in comparison to the average of 43.0 percent for all other SILICs. This ratio was substantially greater than its actual debt service to export ratio, highlighting that Ethiopia has been facing heavy burden of debt servicing.

For instance in 1993, the actual debt service to export for Ethiopia was 9 percent in comparison to 18 percent for all SILICs. This statistic is more significant compared to all other SILICs. This is one basic indicator of debt overhang. The burden of debt is also depicted by figure 1 overleaf.

The graph of debt service ratio for Ethiopia shows an upward trend. This shows the increasing trend of debt service burden over the years.

Fig.1. Trends in Debt-Service ratio

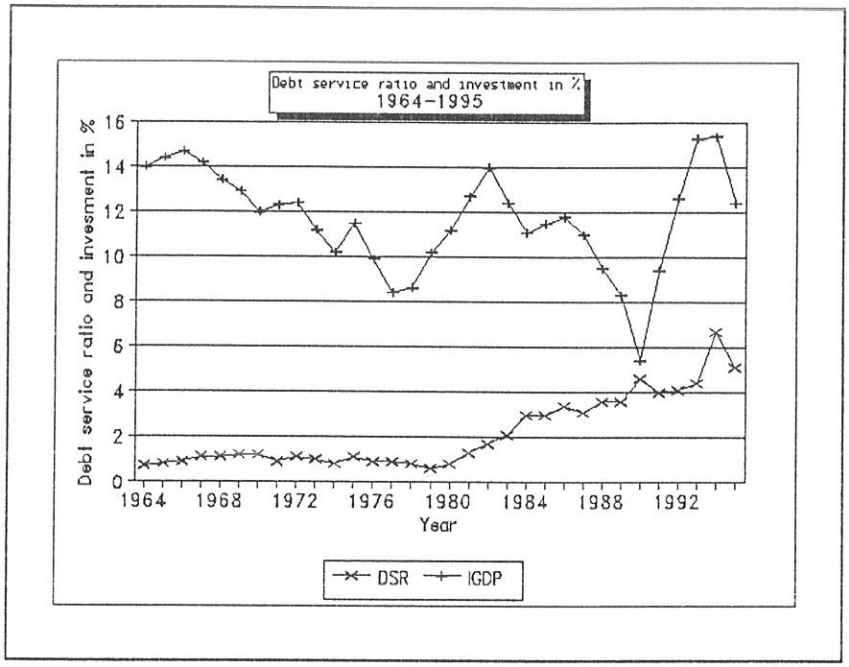


Another form of determining the burden of debt is by comparing movements in debt and investment (gross investment). It is believed that debt and investment particularly private investment move in opposite direction over time. Figure 2 illustrates trends in these variables.

Fig 2. Trends in Debt-Service ratio(DSR) and investment(IGDP) (expressed as a ratio of GDP)

As evident from figure 2, whilst the debt service ratio variable followed an upward trend, the ratio of investment to GDP declined continuously between 1964 and 1979. The declining nature of investment relative to the increasing trend in debt service ratio also indicate the severity of debt.

A crucial factor that has been identified as exacerbating the debt overhang, is the structural rigidities of the economy. This poses serious constraints to the repayment of debt.



3.5 STRUCTURAL FEATURES OF THE ETHIOPIAN ECONOMY

The agricultural sector which engages the majority of the Ethiopian people, is backward and employs primitive technology. This sector has been vulnerable to drought and natural disaster. The natural disaster is viewed in the context of accelerated environmental degradation. This assumes its most acute form in the degradation of land - the very foundation of agricultural production. The Ethiopian Highland Reclamation study of 1986 showed that about half of the highlands, some 270 thousand square kilometer, is already significantly eroded. Out of this, about 140 thousand square kilometer is seriously eroded and left with shallow soils. The combination of drought and environmental degradation has resulted to chronic food deficit.

The industrial sector which depends on the agricultural sector for its raw materials had also been affected (due to the distress state of the agricultural sector). This sector depends on imported machinery, some component of raw materials and spare parts. Despite the import of machinery, this sector suffers from built-in obsolescence and primitive technology. Social and economic services are poor and inadequate (Eshetu and Makonnen, 1992).

Worsening the present state, Ethiopia's external terms of trade have shown sharp fluctuations and a generally declining trend[11]. The deterioration in the terms of trade is closely associated with fluctuations in the price of coffee (the country's main cash crop). The declining trend of this index was worsened in 1989/90 resulting from the suspension of the International Coffee Agreement (ICA) in June 1989. During this period, coffee prices fell sharply, a fact which in 1989/90 removed at one stroke some 30 percent of the 1989/90 export earnings of Ethiopia from coffee. Thus, the decline in coffee prices, together with the general rise in the price of manufactured goods and food imports, caused a decline in the terms of trade, thereby contributing to the crisis of foreign exchange shortages (*ibid*).

Another crucial factor of the Ethiopian economy is its rapid population growth. This has shown an upward trend over the years. As Eshetu and Makonnen (1992) pointed out:

> *"this demographic dynamics, even if it does not directly cause underdevelopment, it will certainly exacerbate it and also renders the tasks of breaking out of the poverty trap even more formidable "*

Some of these structural features are used in chapter IV to analyse the impact of foreign capital on growth in Ethiopia.

---

[11]. For terms of trade statistics, see macroeconomic performance of the Ethiopian economy (Eshetu and Makonnen, 1992:33 -in proceedings of the First Annual Conference of the Ethiopian Economy, edited by Mekonnen Tadesse, 1992).

CHAPTER IV

4.0 MODEL SPECIFICATION AND METHODOLOGY

4.1 DEBT-GROWTH RELATIONSHIP

To reflect some of the main structural features of the Ethiopian economy presented in chapter III, and in order to concentrate on the foreign debt growth relationship, it seems appropriate to construct a macroeconomic model that takes into account the agrarian nature of the Ethiopian economy. The Model used in this study is derived from Lance Taylor (1985, chapter 7), with adjustment to reflect Ethiopian conditions. The most appealing features of this model is that: it combines structural parameters with debt to determine the effect of debt on growth. Also, it provide room for determining the contribution of external capital to growth on a year-to-year basis.

Consider the Ethiopian economy as a simple developing economy with a domestic output X of a single (agricultural) commodity whose production requires, in fixed proportions, a capital good (K), and imported intermediate material (M_i) and labour (L). For the specific case of Ethiopia we assume that the conditions of labour surplus prevails, so that the supply of unskilled labour is taken to be infinitely elastic. The aggregate production function can then be stated (for notational convenience all time subscripts are suppressed) as:

$$X = Min\{\frac{1}{\sigma}K, \frac{1}{a_i}M_i\}. \ldots . (4\text{-}1)$$

where σ is the constant capital-output ratio, which also equals the incremental capital output ratio (ICOR), and a_i is the imported intermediate material requirement per unit of output (Taylor, 1985).

In a capital constrained economy like Ethiopia's, aggregate domestic output is thus proportional to the size of the capital stock, so that the growth rate of the economy is given by:

$$g=\frac{\dot{X}}{X}=\frac{1}{\sigma}\frac{\dot{K}}{X}=\frac{I}{K}=\frac{1}{\sigma}\frac{I}{X}\ldots(4\text{-}2)$$

where $\sigma=\frac{K}{X}$ is the constant capital-output ratio or the ICOR. We can further specify that a fraction θ of capital formation K is supplied by domestic output and the rest, $(1\text{-}\theta)$ is imported.

Thus

$$K = K_d+K_f \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4\text{-}3)$$

where: $K_d = \theta K$

$K_f = (1\text{-}\theta)K$

K_f and K_d representing imported and domestic portions of capital stock. Thus the economy's productive function is given by:

$$X = Min\{\frac{1}{\theta}K_d, \frac{1}{1-\theta}K_f\}\ldots.(4\text{-}4)$$

U.B.E. LIBRARY

One can think of the domestic good as an elementary equipment, and the imported capital good as a more technology sophisticated one.

Foreign trade possibilities are open to this economy. This economy is assumed to export a share ε of national output at a foreign price P. Imports consists of a capital good (K_f), and intermediate good (M_i) and a consumer good (M_c) at prices P_k, P_i and P_c, respectively.

On the capital account side, this economy receives foreign exchange, F, from exports of goods and services, and transfer payments (both private and public), and incurs some borrowing, B, at a World interest rate r^*. At any point in time, the country's stock of debt is given by D. Thus B is the amount by which the stock of debt (D) increases annually.

It is assumed that the rate of growth of the stock of debt increases at the same rate as GDP (this is a steady-state condition), so that the debt-output ratio remains constant, i.e.

$$\frac{B}{D}=g_d=\frac{\dot{D}}{D}=g\ldots(4\text{-}5)$$

where:

g_d is the rate of growth of the stock of debt and g is the growth rate of GDP.

Foreign borrowing and transfers as well as import prices are denominated in foreign currency (taken here to be US$), which can be converted into the local currency using the exchange rate denoted here by e.

External balance is characterized by the equality of the current and capital accounts, which in turn are the sum of the trade deficit and interest payments on the debt; and the sum of net foreign borrowing and transfers, respectively. Using the assumptions and notation set above, we can represent the balance of payment equilibrium as:

$$eB+eF = \{eP^*_i a_i X+eP^*_k(1-\theta)I+eP^*_c Mc-P\varepsilon X\}+r^*eD \quad \ldots\ldots\ldots\ldots (4\text{-}6)$$

Implicit here are the assumptions of no change in foreign reserves and no accumulation of arrears since the country has been respecting its external obligations[12], so that the current account deficit has to be financed by borrowing.

Noting that in a steady-state[13] situation the debt-output ratio remains constant so that:

$$g_d = g \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4\text{-}7)$$

Dividing equation (4-6) by X (domestic production) gives:

$$\frac{eB}{X}+\frac{eF}{X}=\{\frac{ep^*_i a_i X}{X}+\frac{ep^*_k(1-\theta)I}{X}+\frac{eP^*_c M_c}{X}-\frac{P\varepsilon X}{X}\}+\frac{reD}{X} \quad \ldots\ldots (4\text{-}8)$$

Letting

---

[12]. Since 1964, the country has been honouring its obligation. See Befekadu (1992:20) for a summary of debt repayment by the Ethiopian government.

[13]. A sustainable external debt situation is defined here by a steady state situation in which the debt-output ratio remains constant over time. We therefore analyze the impact on the long-run growth rate of the economy when it moves from one steady-state with a lower debt-output ratio to another steady-state situation characterized by a higher debt-output ratio.

$$f=\frac{F}{X}, d=\frac{D}{X} \text{ and } a_c=\frac{M_c}{X}, \text{ then equation (4-8) can be rewritten as}$$

$$e\frac{B}{X}+ef=(ep_i^*a_i+ep_k^*(1-\theta)\frac{I}{X}+eP_c^*a_c-p\varepsilon)+red \ldots (4-9)$$

Where:

f, d and a_c are the ratios of foreign transfers, foreign debt and imported consumer goods to domestic production, respectively.

From equation (4-9) we solve for the growth rate g. First rearranging equation (4-9)

$$\text{gives: } P\varepsilon-ep_c^*a_c-ep_ia_i^*+ef-erd=eP_k^*(1-\theta)\frac{I}{X}-e\frac{B}{X} \ldots (4-10)$$

but from equation (4-5), B = g_dD and from (4-2) g= $\frac{1}{\sigma}\frac{I}{X}$ so that gσ = $\frac{I}{X}$.

Substituting gσ for $\frac{I}{X}$ and g_dD for B in equation (4-10) gives

$$P\varepsilon-ep_c^*a_c-ep_i^*a_i+ef-erd=eP_k^*(1-\theta)g\sigma-eg_d\frac{D}{X} \ldots\ldots (4-11)$$

but in a steady state, g_d = g so that equation (4-11) can be rewritten as:

$$P\varepsilon-ep_c^*a_c-ep_i^*a_i+ef-er^*d=eP_k^*(1-\theta)g\sigma-egd \ldots\ldots (4-12)$$

From equation (4-12), Solving for g gives

$$g=[P\varepsilon-ep_c^*a_c-ep_i^*a_i+ef-erd]\,[eP_k^*(1-\theta)\sigma-ed]^{-1} \ldots\ldots (4-13)$$

Finally, as we want to address issues related to the effect of debt on growth, we consider the partial derivative of g with respect to d, which is given by:

From equation (4-14), it is evident that the denominator is positive (Since it is squared), this

$$\frac{\partial g}{\partial d} = e \frac{\{P\varepsilon - ep_i^* a_i - ep_c^* a_c + ef - rep_k^* (1-\theta)\sigma\}}{[eP_k^*(1-\theta)\sigma - ed]^2} \quad \ldots\ldots (4\text{-}14)$$

implies that the effect of debt on growth can be determined by variables in the numerator. Equation (4-14) is a marginal condition that states how the steady state growth will change when foreign debt, as a fraction of GDP, is increased.

This marginal condition states that; increased debt, on the one hand contributes to the growth rate by financing imports of capital goods needed for expanding the productive capacity, and on the other hand, it adds to the interest payments imputed to imported goods, thereby increasing (reducing) the current account deficit (Surplus), and *ceteris paribus*, reducing the foreign exchange available to finance capital goods imports in subsequent periods. This latter effect is reflected by the term $r^*eP^*_k(1-\theta)\sigma$ in equation (4-14). So in order for increased debt to have a favourable impact on the long-run steady-state growth rate, it must have a net positive contribution to the current account balance, i.e.

$$\frac{\partial g}{\partial d} > 0 \; If: P\varepsilon - ep_i^* a_i - ep_c^* a_c + ef > r^* ep_k^* (1-\theta)\sigma \ldots\ldots (4\text{-}15)$$

Equation (4-15) is our main equation of focus in this study. This equation explains that foreign borrowing or an increase in indebtedness would contribute to growth of the economy provided:

(a) the share of exports in GDP (ε) is high;

(b) transfer payment (ef) as a share of GDP is high;

(c) imports of intermediate inputs ($eP^*_i a_i$) are relatively low;

(d) imports of consumer goods ($eP^*_c a_c$) are relatively low;

(e) the share of imported capital ($1-\theta$) is small;

(f) interest rates on foreign debt (r) are low.

(g) the Incremental Capital Output Ratio (ICOR) is smaller, and in general if (a)+(b) > (c)+(d)+(e)+(f)

One can provide a more conventional interpretation of equation (4-15) by noting form equation (4-12) that

$P\varepsilon - eP^*_i a_i - eP^*_c a_c + ef = g[eP^*_k(1-\theta)\sigma - ed] + r^* ed$, substituting this in equation (4-13) and

differentiating partially with respect to d gives:

$$\frac{\partial g}{\partial d} = (g - r^*)\,[P_k^*(1-\theta)\sigma - d]^{-1} \ldots\ldots (4\text{-}16)$$

$$\text{Thus} \quad \frac{\partial g}{\partial d} \gtrless 0 \quad \text{as} \quad g \gtrless r^*$$

This is the conventional wisdom of foreign borrowing, which states that increased foreign debt can lead to an increase (decrease) in the growth rate of the borrowing economy if the borrowed amounts are utilized so as to generate a growth rate higher (lower) than the interest rate(r) to be paid on the debt incurred. It can also be noted from equation (4-16) that as long as the borrowed amounts can yield a growth rate equal to the interest rate on debt, i.e. $g=r^*$ the debt (d) as a ratio of output will not affect the growth rate of the economy, hence $\frac{\partial g}{\partial d}=0$.

Here we assume that other factors such as; macroeconomic management problems - the "Dutch Disease" and Fiscal Response problems - that are associated with external finance are at rest (see Alemayehu, 1997 for a discussion on these issues in the African context), however, another interesting issue about debt, is its effect on investment, particularly private investment.

4.2 DEBT-INVESTMENT RELATIONSHIP

At this stage of our study, we first focus our attention on the relationship between investment and growth, then we will focus on the debt-investment relationship. The investment-growth relationship bears closer examination in two respects. First, De Long and Summers (1992) have shown that investment in machinery in particular appears to be associated with higher growth.

An issue of concern in the structural adjustment debate has been the relationship between public and private investment (see for e.g. Taylor 1988). The mechanisms under discussion are: the negative effect of public investment funding on private profitability through increased taxes or higher interest rates as well as credit rationing on the one hand ("crowding out");

and the positive effect of public investment on aggregate demand and thus private investment as well as provision of infrastructure ("crowding in") on the other. It is broadly agreed that in developing countries the former is ruled out by the narrow, fragmented and regulated nature of domestic capital market (as was the case for the Ethiopian economy during *Derg* rule), while the latter may occur, although it is more likely that increases in public investment are inflationary rather than reflationary under foreign exchange constraint or supply constraint (FitzGerald *et al*, 1992). FitzGerald et al (1992) pointed out that, crowding out in Least Developed Countries (LDCs) can be hypothesized as occurring because:

> *public investment displaces private investors from profitable project opportunities; domestic funding of public investment by bond issues reduces credit supply to the private sector; funding by monetary expansion causes inflation and business uncertainty; and funding by external debt increases the perceived risk by foreign and domestic investors* (FitzGerald *et al, 1992).*

The second aspect is the crowding-in hypothesis, as FitzGerald *et al* (1992) also pointed out, crowding-in through aggregate demand impulses is likely to be less important in most developing countries. They observed that another channel of crowding-in can occur when the expansion of private investment is constrained by the availability of infrastructure provision. It is hypothesized that this is a longer-term effect and further that infrastructure provision (roads, schools etc.) : (1) increases the profitability of those private sector activities directly affected; (2) leads to faster aggregate output growth, inducing higher private investment demand. These conditions were also buttressed by Dornbusch and Fischer (1994) who pointed out that, "building roads and Sewers will not cause output growth without private investment."

In Ethiopia private investment was not a significant factor to growth during the days of the *Derg* regime. This is because this sector was suppressed (Eshetu and Makonnen, 1992, cited in Mekonnen, 1992).

Private investment plays an important role in developing nations for the same reason as it does in industrial countries: investment determines the rate of accumulation of physical capital and is thus an important factor in the growth of productive capital. Moreover, because

investment is a forward-looking activity with irreversible aspects, it tends to be a volatile component of aggregate demand. Interest in the behaviour and determinants of private investment in developing nations has recently increased as a response to the collapse of private capital formation in many heavily indebted countries during, and in the aftermath of the international debt crisis. One aspect that has attracted attention, is the effect of external factors on private investment.

4.2.1. EXTERNAL FACTORS AND PRIVATE INVESTMENT

The effect of external factors on private investment can be viewed from two angles.

First, a rise in international interest rates (World interest rates) on debt will increase the burden of debt and thus, reduce the import capacity which may have a direct negative effect on the level of private investment (Alemayehu,1997). Second, the domestic private sector itself holds foreign assets and if the burden of future debt is viewed as a heavy tax burden, this can lead to capital flight.

Several studies relating the above-mentioned issues have been carried out. In the Ethiopian context, Befekadu (1992) used a method of eye-balling to test the debt overhang effect on investment using Ethiopian data. In his conclusion, the debt overhang hypothesis does not seem to hold for the case of Ethiopia.

One basic disadvantage of the eye-balling method is that it does not provide sufficient empirical evidence between the regressand and the explanatory variables (since it only provides trends in economic variables). Another weakness of this approach is that, it does not distinguish between private and public investment. However, It is a widely accepted fact that the debt overhang negatively affect private investment rather than public investment, in that the government here is referred to as the debtor. Thus, we focus here on private investment.

4.3 EXTERNAL FACTORS IN A MODEL OF PRIVATE INVESTMENT

To overcome the weaknesses of the Befekadu's approach and that of the single equation, and to gauge the relationship between private investment and the debt overhang, a macroeconomic model is developed. The model follows closely FitzGerald *et al* (1992), and Alemayehu (1997).

We start with a " simple accelerator model" that defines private investment as

the difference between the desired capital stock (K_{pt}^*) and that inherited from the previous period (K_{pt-1}). Thus we write our private investment (I_{pt}) function as:

$$I_{pt} = \lambda_t(k_{pt}^* - K_{pt-1}) \ldots\ldots\ldots (4.2.1)$$

where λ_t *represent an adjustment coefficient reflecting implementation lags, financial constraints or uncertainty about future conditions.*

The desired private capital stock for the current year (k_{pt}^*) depends upon the current level of output (Yt); the stock of public capital already installed (K_{gt-1}); import(M_t); capital flight (J_t); current level of external debt (E_xD_t) and the previous level of external debt (E_xD_{t-1}). Thus the desired level of capital stock is expressed as:

$$K_{pt}^* = b_1Y_t + b_2K_{gt-1} + b_3M_t + b_4J_t + b_5E_xD_t + b_6E_xD_{t-1} \ldots.(4.2.2)$$

substituting equation (4.2.2) in equation (4.2.1), gives:

$$I_{pt} = \lambda_t[(b_1Y_t + b_2K_{gt-1} + b_3 M_t + b_4J_t + b_5E_xD_t + b_6E_xD_{t-1})-K_{pt-1}]\ldots(4.2.3$$

To circumvent the capital stock data problem, we take the first difference of equation (4.2.3). This gives us:

$$I_{pt} - I_{pt-1} = \lambda_tb_1\Delta Y_t + \lambda_tb_2\Delta K_{gt-1} + \lambda_tb_3\Delta M_t + \lambda_tb_4\Delta J_t + \lambda_tb_5\Delta E_xD_t + \lambda_tb_6\Delta ExD_{t-1} - \lambda_t\Delta K_{pt-1} \ldots\ldots\ldots\ldots (4.2.4)$$

Let $B_i = \lambda_tb_i$, and from definition $\Delta K_{gt-1} = I_{gt-1}$ and $\Delta K_{pt-1} = I_{pt-1}$ Hence equation (4.2.4) can be rewritten as:

$$I_{pt} = [B_1\Delta Y_t + B_2I_{gt-1} + B_3\Delta M_t + B_4\Delta J_t + B_5\Delta E_xD_t + B_6\Delta E_xD_{t-1} - \lambda_tI_{pt-1}] + I_{pt-1} \ldots\ldots\ldots\ldots (4.2.5)$$

Replacing ΔE_xD_t by (E_xDt-E_xD_{t-1}) and ΔE_xD_{t-1} by (E_xD_{t-1}-E_xD_{t-2}) in equation (4.2.5) and collecting like terms. We can rewrite equation (4.2.5) as:

$$I_{pt} = B_1\Delta Y_t + B_2I_{gt-1} + B_3\Delta M_t + B_4\Delta J_t + B_5E_xD_t + (B_6-B_5)E_xD_{t-1} - B_6E_xD_{t-2} + (1-\lambda)I_{pt-1} + \mu_t \ldots\ldots\ldots\ldots\ldots (4.2.6)$$

We impose the linear restriction that (B_6-B_5) is not equal to zero, so that the variable representing debt overhang (E_xD_{t-1}) is non-zero. This restriction will be tested in chapter V (the analysis section).

The variables are defined as follows:

I_{pt}, I_{pt-1}, are private investment at time t and at time t-1 respectively, whilst I_{gt-1} is public investment at time t-1. E_xD_t, E_xD_{t-1} and E_xD_{t-2} are the stocks of external debt at time t, t-1 and t-2, respectively. Y_t, M_t, J_t and E_xD_t are as defined earlier, and μ_t is assumed a white noise disturbance term.

Equation (4.2.6) is our main equation of focus in this study. The interesting features of this model are: (1) it has sound theoretical basis and thus overcome the *ad hoc* problem of both the single and simultaneous equations stated in the literature, (2) the fact that some variables are expressed in growth rates and in lag structure, might help us to eliminate the problem of non-stationarity. However, a basic disadvantage of this model is the problem of multicollinearity that is usually identified with models of this nature (autoregressive distributed lag models).

Dividing equation (4.2.6) by the current level of output (Y_t), so as to eliminate the problem of unit of measurement, will result in:

$$(I_p/Y)_t = B_1(\Delta Y/Y_{t-1}) + B_2(I_g/Y)_{t-1} + B_3(\Delta M/Y)_t + B_4(\Delta J/Y)_t + B_5(E_xD/Y)_t + (B_6-B_5)[E_xD/Y]_{t-1} + B_6(E_xD/Y)_{t-2} + (1-\lambda)[I_p/Y]_{t-1} + \mu_{1t} \ldots\ldots (4.2.7)$$

where:

$\Delta Y/Y_{t-1}$ define economic growth. Variables with coefficients B_2, B_3 and B_4 are : public investment (in time t-1); import (in time t) and capital flight (in time t) all expressed

as ratios of GDP respectively. Whilst variables with coefficients B_5, (B_6-B_5) and B_6 are the ratios of current and past stock of debt to GDP. Debt overhang is represented here as $(E_xD/Y)_{t-1}$.

Due to unavailability of data on capital flight, this variable was dropped from our analysis.

We expect on a priori grounds the coefficients of the variables to carry the following signs: B_1, $(1-\lambda)$, $B_3>0$; B_5, B_6, $(B_6-B_5)<0$. The sign of B_2 depends on whether public investment crowds in private investment $(B_2>O)$ or crowds out private investment $(B_2<0)$.

4.4 THE ECONOMETRIC APPROACH OF THE STUDY

The debt-growth relationship established in Section 4.1 is a marginal condition which is based on a sign test to determine the effect of external borrowing on economic growth. The model in section 4.1 differs from many economic models, in that, the problems of functional form; multicollinearity; heteroscedasticity; spurious regression and a host of other estimation problems that are frequently encountered in modelling macroeconomic variables are overcome.

On the other hand, the debt-investment relationship exhibit a linear functional form involving time series data, the vast majority of which are non-stationary in levels. The regression of non-stationary series on another non-stationary series is most likely to generate a spurious regression result. According to Granger and Newbold (1974) as a rule of thumb, a regression result is spurious if the coefficient of determination (R^2), is greater than the Durbin-Watson (DW) statistic. One pitfall of using this approach in determining spurious regressions is that, even though variables may carry significant t-statistics and high R^2, the DW statistics will be low which will converge to zero as the sample size increases. The low DW values positively influence the potential of the test to reject the null hypothesis of no relationship between variables even when this may be true. Second, R^2 is not invariant to model

specification and thus provide no clue on the long-run properties of the variables in our specification.

Two basic techniques that are used to overcome the problem encountered when using the DW and the R^2 statistics to determine whether a regression result is spurious are: (1) cointegration technique as advocated by Engle and Granger, (1987), or (2) Differencing variables up to a point that the transformed variables exhibit stationarity (integrated of order zero) before applying the classical regression technique.

The basic idea behind cointegration analysis is that although macroeconomic variables may tend to move up or down overtime, groups of variables may drift together overtime (Johansen, 1988). If there is some tendency for some linear relationships amongst a set of variables over long periods of time, then cointegration analysis will help us to discover it.

The variables in our debt-investment relationship are likely to be integrated of order greater than zero (if not all). It is against this backdrop that we shall employ the test of cointegration to determine whether there exist long-run equilibrium relationship (even at different levels of integration) of the variables.

Before applying test of cointegration, we shall first employ the Dickey-Fuller (DF) and Augmented-Dickey Fuller (ADF) tests to help us determine the order of integration of the variables. Also, the stability of the parameters will be determined (see technical appendix for an extensive exposition of these tests).

CHAPTER V

5.0 ANALYSES OF RESULTS, POLICY RECOMMENDATIONS AND CONCLUSION

This chapter provides empirical results based on the models developed in chapter IV. Also included in this chapter, is the time series properties of the variables in the private investment model.

5.1 EMPIRICAL RESULT OF THE DEBT-GROWTH RELATIONSHIP

5.1.1 Determination of the Incremental Capital Output Ratio(ICOR)

The year-to-year calculation of the ICOR(σ) showed considerable volatility (including negative values in some years), hence were of little use. To have a stable value of σ(the ICOR) that would more reliably reflect the output contribution of investment, an econometric estimate based on the definition of the ICOR was formulated (see technical appendix). The formulation is based on a simple aggregate investment relationship.

The relationship was estimated by Ordinary Least Squares (OLS) and was corrected for autocorrelation by the Cochrane-Orcutt method after two iterations (this method is available in the computer package: **MICROFIT 286, VERSION 3.0**). Following this method, the estimated equation is:

$$X_t = 4256.4 + 0.2041 I_t$$

$$(2.01) \quad (3.06)$$

$$R^2 = 0.92$$

Thus the ICOR which is 4.9 according to the estimates, was obtained by taking the reciprocal of the coefficient of I_t.

5.1.2 THE DEBT-GROWTH TEST

The debt-growth test is based on a simple condition. This states that: a positive sign indicate that foreign borrowing contributed positively to growth; and a negative sign indicate negative contribution.

Table 5.1.1 'Continued

1981	0.120	0.014	0.134	0.060	0.035	0.090	0.044	3.8	0.442	0.082	-
1982	0.115	0.031	0.146	0.073	0.050	0.123	0.023	4.1	0.544	0.109	-
1983	0.118	0.025	0.143	0.080	0.053	0.133	0.010	4.5	0.586	0.129	-
1984	0.127	0.033	0.160	0.059	0.062	0.121	0.039	4.6	0.498	0.112	-
1985	0.114	0.035	0.149	0.059	0.076	0.145	0.014	3.4	0.561	0.093	-
1986	0.136	0.028	0.164	0.053	0.072	0.125	0.039	3.6	0.648	0.114	-
1987	0.134	0.029	0.163	0.057	0.076	0.133	0.030	3.6	0.649	0.115	-
1988	0.142	0.032	0.174	0.061	0.067	0.128	0.046	4.0	0.520	0.102	-
1989	0.133	0.038	0.171	0.056	0.071	0.127	0.044	3.6	0.660	0.116	-
1990	0.111	0.024	0.135	0.066	0.053	0.119	0.016	3.8	0.630	0.117	-
1991	0.200	0.051	0.251	0.022	0.027	0.049	0.020	3.5	0.630	0.108	-
1992	0.132	0.076	0.126	0.060	0.056	0.116	0.059	2.6	0.459	0.011	-
1993	0.232	0.011	0.150	0.061	0.064	0.125	0.029	2.5	0.238	0.595	+
1994	0.118	0.105	0.223	0.082	0.078	0.160	0.063	2.3	0.325	0.036	+
1995	0.144	0.132	0.276	0.076	0.065	0.141	0.135	2.7	0.216	0.029	+

Definition of variables:

$P\varepsilon$	=	share of exports in GDP
ef	=	transfer payment as a share of GDP
$eP^*_ia_i$	=	imports of intermediate inputs as a percentage of GDP
$eP^*_ca_c^*$	=	imports of consumer goods as a percentage of GDP.
$(7)^*$	=	Left Hand side of equation 4-15 in chapter 4
r	=	interest rate of foreign debt (in%)
$eP^*_k(1-\theta)$	=	the share of imported capital good in GDP.
σ	=	the Incremental Capital Output Ratio (ICOR).

As evident from table 5.1.1, external borrowing contributed positively to growth between 1964 and 1977, and thereafter up to 1992 the effect was negative but between 1993 and 1995 the effect was positive.

These mixed results can be attributed to a number of factors: First, it is not the volume of external capital that matters but rather how it was used. The positive contribution of foreign capital to the growth of the Ethiopian economy between 1964 to 1977 can be attributed to the fact that during this period, foreign capital was used in the development of infrastructure. The expansion of physical infrastructure such as roads into hitherto inaccessible regions was likely to be followed by developers.

On the other hand, a large proportion of the funds obtained during the *Derg* era were devoted to security spending. As Teshome (1994) pointed out:

> *increasing levels of government expenditure during the Derg era was made in defence with noticeable neglect of the social and economic sector development. As a result, health and educational standards deteriorated and the rate of economic growth decelerated considerably* (Teshome, 1994).

The share of defence expenditure in total government expenditure was considerably low for the period 1992-1995 (under the TGE). This averaged 16.2% relative to 29.6% and 34.3 during the Imperial and Derg regimes respectively (*ibid*).

The second aspect of debt relates to the growth in interest rate relative to the growth in GDP. During the Imperial era, World interest rate on debt grew at an annual average of -3.6%, whilst GDP grew at an annual average of 6.2%. The opposite was observed during the *Derg* era. During this era, World interest rate on debt grew at a higher rate (8.0%) relative to that of GDP growth (1.9%)(Eshetu and Makonnen, 1992). This situation was reversed under the TGE. Between 1992 and 1995, GDP recorded a higher growth over that of interest rate on debt.

The higher growth in GDP under the TGE has been attributed to the on going Economic Reform Program.

The growth in GDP relative to interest rate on debt bring us to the solvency condition that a country will be able to repay its debt if the growth rate in GDP is higher than that of interest rate on debt. In this regard, the *Derg* was unable to honour a large proportion of its external obligations. This led to the TGE inheriting a large stock of debt which could generate a debt problem. The next issue of concern in this study is; did the debt overhang have a significant impact on private investment?

5.2 ESTIMATION OF THE PRIVATE INVESTMENT MODEL

5.2.1 Time series properties of the variables in the private investment function

A knowledge of the time series properties of the data is of particular importance to making a decision on whether the subsequent estimation should be done on the variables on their levels or needs to be first differenced [I(1) series] or second differenced [I(2) series] to induce stationarity [I(0) series]. As was mentioned in the econometric approach of this study, the DF and ADF tests provide details on this. Both tests are based on the null hypothesis that the variables exhibit unit root (non-stationary), relative to the alternative hypothesis that the variables are stationary.

5.2.1.1 Unit Root tests on the variables in the private investment model

Unit Root tests were applied to variables in their levels and differences for the sample period 1964 through 1995. The DF and ADF statistics are presented below.

Table 5.2.1: The DF and ADF statistics

variable	DF		ADF(1)		Order ofintegration
	With Trend	W/out Trend	With Trend	W/outTrend	
I_p/Y	-1.6341 (-2.9591)	-1.8722 (-3.5615)	-1.5733 (-2.9627)	-1.6555 (-3.5671)	At least I(1)
$\Delta(I_p/Y)$	-5.9002 (-2.9627)	-5.8619 (-3.5671)	-4.9991 (-2.9665)	-5.1128 (-3.5731)	I(1)
$\Delta Y/Y_{t-1}$	-5.3002 (-2.9627)	-5.9425 (-3.5671)	-2.5723 (-2.9665)	-3.1212 (-3.5731)	At least I(1)
$\Delta(\Delta Y/Y_{t-1})$	-10.6685 (-2.9665)	-10.4992 (-3.5731)	-5.3087 (-2.9706)	-5.3026 (-3.5796)	I(1)
$(I_g/Y)_{t-1}$	-0.39028 (-2.9627)	-2.2777 (-3.5671)	-0.69252 (-2.9665)	-3.3428 (-3.5731)	At least I(1)
$\Delta(I_g/Y_{t-1})$	-1.6065 (-2.9750)	-1.4975 (-3.5867)	-3.5698 (-2.9798)	-3.3156 (-3.5943)	At least I(2)
$(\Delta M/Y)_t$	-3.8256 (-2.9627)	-4.1595 (-3.5671)	-2.2130 (-2.9665)	-2.5259 (-3.5731)	At least I(1)
$\Delta(\Delta M/Y)_t$	-8.7134 (-2.9665)	-8.6906 (-3.5731)	-5.4870 (-2.9706)	-5.3535 (-3.5796)	I(1)
$(E_xD/Y)_t$	-3.9797 (-2.9591)	-5.3269 (-3.5615)	-2.4169 (-2.9627)	-3.7562 (-3.5671)	I(1)
$(E_xD/Y)_{t-1}$	-4.1095 (-2.9627)	-5.3056 (-3.5671)	-2.5717 (-2.9665)	-3.7997 (-3.5731)	I(1)
(ExD/Y_{t-2})	-4.6271 (-2.9665)	-5.5652 (-3.5731)	-2.9971 (-2.9706)	-3.9180 (-3.5796)	I(1)
$(I_p/Y)_{t-1}$	-1.6049 (-2.9627)	-1.7440 (-3.5671)	-1.5316 (-2.9665)	-1.4749 (-3.5796)	At least I(1)
$\Delta(I_p/Y)_{t-1}$	-5.8317 (-2.9965)	-5.8389 (-3.5731)	-4.9170 -2.9706)	-5.1061 (-3.5796)	I(1)

95% critical values in bracket

The decision criteria of both the DF and ADF tests is: when the absolute value of a calculated statistic (figures not in bracket) is greater than the absolute value of the critical statistic (figures in bracket) we conclude that a given variable is stationary (accepting the alternative hypothesis). The critical values of the tests depend on whether a test was done with a trend or without a trend.

The ADF test is better than the DF test in that the augmentation in the ADF leads to empirical white noise residuals (Sjoo, 1997). Based on the ADF test, the second lag of external debt (expressed as a ratio of GDP) was found to be the only stationary variable. On the other hand private and public investment, change in output, change in import and external debt (both current and previous) were found to be non-stationary. However, these variables were found to be stationary after first differencing. This implies that these variables are integrated of order one. The one period lagged public investment variable was stationary after second differencing - integrated of order two. Having conclusively accepted the non-stationarity of some of the variables in the private investment function, we now proceed to check for whether the dependent variable (private investment expressed as a ratio of GDP) drift too far apart from the explanatory variables or not (the principle of cointegration).

5.2.1.2 TESTING FOR COINTEGRATION

In testing for cointegration, the Engle-Granger Two Step procedure and the Johansen's approach are often used (see technical appendix for extensive exposition of these methods). Due to the large sample properties of the Johansen's procedure and taking into account the degree of freedom in our study (less than 30), the Johansen's approach was avoided. The test for cointegration was carried out using the Engle-Granger Two Step procedure.

In the Engle-Granger procedure, we first save the residual from the levels equation, and in the second step, we test for unit root in the residual. Due to the properties of super convergence the estimated parameters in the levels equation are viewed as long-run estimates and the residual (lagged once) can be used as an error correction term . Both the DF and ADF statistics are used for making inferences.

Table 5.2.2 Testing for Unit root in the residual of the levels regression

DF		ADF	
With trend	Without trend	With trend	Without trend
-5.3115 (-3.5731)	-5.412 (-2.9665)	-4.6182 (-3.5796)	-4.7041 (-2.9706)

95% critical values in bracket

As evident from the above table, both the DF and ADF statistics with and without trend shows that the residual of the levels regression is white noise (since absolute values of the calculated DF and ADF statistics are greater than their critical values). The implication of this is that, private investment is cointegrated with GDP growth, public investment (lagged once), import, external debt (previous and current) and the one period lagged private investment.

However, applying OLS to the differenced variables (in stationary form), will only describe the short-run behaviour of private investment hence information on levels (long-run information) is lost. To capture both the short-run and long-run dynamics of private investment, a one period lag Error Correction Model (ECM) was adopted (see Technical appendix for an exposition of the ECM). A first order ECM is chosen in this study so as to minimize the complexity of the lag structure and loss of degrees of freedom (since we are using annual data for which the degrees of freedom is less than 30).

Our first order ECM of the private investment function is specified as:

$$\Delta(I/P)_t = B_1\Delta(\Delta Y/Y_{t-1}) + B_2\Delta\Delta(I_g/Y)_{t-1} + B_3\Delta(\Delta M/Y)_t + B_5\Delta(E_xD/Y)_t$$
$$+(B_6 - B_5)\Delta(E_xD/Y)_{t-1} + B_6(E_xD/Y)_{t-2} + (1-\lambda)\Delta[I_p/Y)_{t-1} + K[(I/P)_{t-1}$$
$$- B_{11}(\Delta Y/Y)_{t-2} - B_{12}(I_g/Y)_{t-2} - B_{13}(\Delta M/Y)_{t-1} - B_{15}(E_xD/Y)_{t-1}$$
$$-(B_{16}-B_{15})(E_xD/Y)_{t-2} + B_{16}(E_xD/Y)_{t-3} - (1-\lambda)(I_p/Y)_{t-2}]$$

K represent the error correction coefficient. The variables in the square bracket depict the long-run relationship, whilst other variables together represent the short-run dynamics of private investment.

When OLS was applied to this functional form, the problem of serious multicollinearity was realized. This problem was more severe in the debt variables (the current level, one and two-periods lag of debt) as was observed from their correlation matrix. This is no surprise, since the one and two periods lagged values of the debt variables were derived from the current level of debt. This problem was overcome by dropping the current level of debt and the second lag of debt (since our variable of interest is the first lag of the debt stock). Thus, the estimated ECM is given as:

$$\Delta(I_p/Y) = \underset{(0.52)}{0.02}\Delta(\Delta Y/Y_{t-1}) \underset{(-3.05)^*}{-0.36}\Delta\Delta(I_g/Y)_{t-1} + \underset{(2.98)^*}{0.24}\Delta(\Delta M/Y)_t \underset{(-0.19)}{-0.17}\Delta(E_xD/Y)_{t-1}$$

$$+\underset{(3.56)^*}{0.43}\Delta(I_p/Y)_{t-1} \underset{(-2.06)^*}{-0.66}[(I_p/y)_{t-1} - \underset{(0.72)}{0.49}(\Delta Y/Y)_{t-1} \underset{(3.20)^*}{-0.86}\Delta(I_g/Y)_{t-2}$$

$$+\underset{(-2.56)^*}{1.8}(\Delta M/Y)_{t-1} + \underset{(-1.57)}{0.70}(E_xD/Y)_{t-2} - \underset{(4.2)^{**}}{0.71}(I_p/Y)_{t-2}]$$

R^2-adj = 0.46 F(11,17) = 7.56(0.01) DW = 2.17; Values in bracket are t-values *significant at 1% **significant at 5%.

Diagnostic tests:

LM test of residual serial correlation: CHI-SQ(1)=0.30(0.32);
Ramsey's RESET test for **functional form**: CHI-SQ(1)= 0.37(0.55);
Jarque-Bera test for normality: CHI-SQ(2)=0.02(0.99);
Breush-Pagan-Godfrey test of **Heteroscedasticity**: CHI-SQ=0.23(0.63);
LM test on the **linear restriction** $(B_6-B_5)=0$: CHI-SQ(1)=0.66(0.42).

The Lagrange Multiplier (LM) test for serial correlation does not provide any indication of the presence of serial correlation in the residual of the private investment function. The

Ramsey's RESET test provide no indication that the functional form of the Error Correction Model (ECM) is inadequate. The Jarque-Bera tests of skewness and kurtosis of the residuals revealed normality. This implies the absence of outliers in the ECM.

The result of the heteroscedasticity test on the residuals does not show any case for heteroscedastic errors. This indeed is not surprising, since heteroscedasticity is not much of a problem in time series data (Greene, 1997). The F-statistic shows joint significance of the regressors. The Lagrange multiplier test on the linear restriction shows that we reject the null hypothesis of $(B_6-B_5)=0$, thus our debt-overhang variable is non-zero. This is a good indication of the presence of debt overhang, if we had accepted the null hypothesis (H_o) it would have implied no debt overhang problem in Ethiopia.

In order to strengthen our analysis, the stability of the parameters in the private investment model was examined. The CUSUM (Cumulative Sum of recursive residuals) and CUSUM SQ (Cumulative Sum of Squares of recursive residuals) tests were employed. In employing the CUSUM and CUSUM SQ tests, graphical plots were used (see appendix for graphical plots) to check for parameter stability. According to the graphs, the null hypothesis of parameter stability cannot be rejected since the plots were within the 5% critical boundaries. These tests shows that the parameters are stable at the 5% level of significance.

With this battery of tests, we can strongly rely on our ECM as a representation of both the short-run and long-run dynamics of private investment.

The estimated coefficients of the private investment model are consistent with a priori expectations. The error correction coefficient (-0.66) shows that 66 percent of any deviation from the equilibrium condition is made up in the current period.

The results indicate a positive but insignificant relationship between private investment and growth rates of GDP for both the short-run and long-run. The slow response of private investment to economic recovery may reflect continued macroeconomic uncertainties.

Second, private investment is negatively related to public investment in the short-run but positive in the long-run. This implies that public investment crowds out private investment in the short-run whilst in the long-run crowding in is observed. The result further shows that the long-run impact of public investment is stronger than that of the short-run. During the *Derg era*, this crowding out was seen in the form of little access to capital markets. On the other hand, government investment concentrated in infrastructural projects (roads, transport, irrigation, etc) contribute positively to private investment in the long-run. This indicates that a one Birr increase in infrastructural public investment would increase private investment by about 56 cent (note that the variables are not expressed in **Logs**) in the long-run. This result is consistent with the hypothesis that infrastructural investment is complementary to private investment.

Third, the import variable shows significant coefficients for both the short-run and long-run. In the short-run, import is positively related to private investment but turned out to be negative in the long-run. The positive coefficient of import lend credence to the import compression argument. Its long-run coefficient is probably due to its limited role in capacity creation.

Furthermore, the estimates suggests that in both the short and long runs, external debt is not a significant factor in explaining private investment in Ethiopia. Although the effect of Debt overhang is not significant at conventional levels of significance (1% and 5%) the value of the t-statistic (-1.57) of the long-run coefficient of the debt overhang variable suggest the possibility of debt overhang in the long-run. The debt problem may also indirectly affect private via import compression resulting from servicing the debt.

In both the short-run and long-run, the lagged private investment shows significant estimates. Since the lagged private investment was non-stationary and found to be significant in explaining current private investment, we conclude that private investment in Ethiopia has a permanent memory.

5.3 CONCLUSION

In this study, we have examined the effect of long-term foreign borrowing on economic growth and private investment.

From the debt-growth relation, the effect of long-term foreign borrowing on growth had had a mixed result. During the Imperial era and under the TGE (1993-1995) the effect was positive, whilst during the *Derg* era the effect was negative. These mixed results provide an answer to the question (posed earlier) of whether the debt crisis is a policy problem arising from changes in political regimes. It was observed that during the Imperial era, most of the funds obtained were used in the development of infrastructure whilst the *Derg* era used a large proportion of foreign capital in the procurement of arms. Thus, we conclude that the debt crisis is more of a policy problem. This is in close link with Ajayi's findings that Nigeria had implemented policies that led to the accumulation of debt in excess of what was sustainable.

In the estimation of the private investment model (a distributed lag model), the Hendry (1983) approach was adopted. This approach which is also known as the "general to specific ("top-down") approach" is based on starting with a general model and then whittles it down to a suitably parsimonious final model.

Our model conforms quite well to the conditions of the "top-down" approach, in that: (1) the model is consistent with economic theory (the signs of the coefficients are consistent with a priori expectations);(2) the model exhibit parameter constancy; and (3) data coherency (white noise residual).

The findings shows that the most significant factors explaining private investment in Ethiopia are: public investment; import; and previous level of private investment. Hence our main hypothesis of debt overhang is conclusively rejected in the short-run but there is an indication of its possible impact in the long-run.

Given the analyses of the results obtained, we now provide policy recommendations that could assist in the restructuring of the Ethiopian external sector.

5.4 POLICY RECOMMENDATIONS

Effective debt management should be pursued as follows:

From the marginal analysis, it was observed that the positive contribution of foreign capital to growth was due to how the funds were used while during the derg era, its negative contribution to growth was as a result of diversion of foreign capital to military expenditure. Thus, external capital should be used to promote high and stable rates f economic growth that are consistent with the achievement of a sustainable balance of payment position over the medium and long term. This requires the use of borrowed funds - with appropriate support from other policies - generates an adequate future stream of external resources so as to permit the timely servicing of the foreign liabilities incurred.

Second, external debt management should complement policies influencing domestic credit expansion, thereby ensuring that internal and external imbalances do not arise as a result of deficits in the operations of the public sector.

Third, it was observed that the rate of growth of interest rate on debt was higher than the rate of growth of GDP during the *Derg* while the opposite was observed for the periods of the Imperial government and the current Federal government of Ethiopia. This is a pointer that in order to increase the growth of national income, the marginal product of capital should exceed the interest rate charged on foreign borrowing.

Also, debtor countries need to pursue strong and selective adjustment programs, supported by determined structural reforms, aimed at increasing domestic resource mobilization, attracting non-debt creating flows, and reducing impediments to growth.

Last but not least, public sector investment in infrastructural facilities that are complementary to private sector investment is required to put the Ethiopian economy on longer-term growth paths.

REFERENCES

Action Aid-Ethiopia (1996), Recent Trends and Policy Issues in the Macroeconomy of Ethiopia, A survey (1990).

Aghevli, B. and M. Khan(1997) 'Inflationary Finance and the Dynamics of Inflation: Indonesia 1951-72', American Economic Review, June 1977.

Ajayi, S.I (1991), 'Macroeconomic Approach to External debt: The Case of Nigeria', AERC Research Paper 8, AERC, Nairobi, Kenya.

Alemayehu Geda (1997), Finance and Trade in Africa: Modelling Macroeconomic response In a World Economy Context' (Ph.D.Thesis). The Hague, Institute of Social Studies.

Barro, Robert J. and Sala-I-Martin Xavier (1995) 'Economic Growth', London: Macmillan press.

Befekadu Degefe (1992) 'Growth and Foreign debt: The Ethiopian Experience', AERC Research Paper 8, AERC, Nairobi, Kenya.

Boreinzstein E. (1990) 'Debt Overhang, Credit Rationing and Investment', Journal of Development Economics 32 : 315-35.

Chenery, Hollis, B.(1986) 'Industrialization and Growth: A Comparative study', Oxford: Oxford University press.

Chenery, H. and A. Strout (1966). Foreign Assistance and Economic Development. American Economic Review, 56(4).

Chenery, H. and N. Srivanisan (1988) (ed). Handbook of Development Economics, North Holland: Holland publishing.

Cline, W. (1985) 'International debt: Analysis, experience and prospects', Journal of Development Planning 16.

Corden, W.M. (1984) 'Booming sector and Dutch Disease Economics' Oxford Economics Papers, 36 : 359-80.

Corden W. Max (1988) 'Debt Relief and Adjustments Incentives', IMF Staff Papers 35: 628-643.

Delong and Summers (1991) 'Equipment Investment and Economic Growth' Quarterly Journal of Economics 106(2): 445-502.

Dickey, D.A. and W.A. Fuller (1979) 'Distribution of estimates For Autoregressive time Series Unit root' Journal of American Statistical Association, 74 : 427-31.

Diwan I. and D. Rodrick (1992) 'Debt Reduction, Adjustment Lending and Burden sharing' NBER working Paper No. 4007, March.

Dornbusch R. (1987) 'Dollars, Debts and Deficits', Leuven and London: Leuven University Press and MIT press.

Eaton, Jonathan (1989) 'Sovereign Debt, A Primer', World Bank Working Papers, WPS 855.

Eaton, Jonathan (1989a) 'Foreign Public Capital Flows' Amsterdam: North Holland publishing.

Elias, V.J. (1992). Sources of Growth: A Study of Seven Latin American Economies, International Centre for Economic Growth, San Francisco, California.

Engle, R.F. and C.W.J. Granger (1987) 'Cointegration and Error Correction: Representation, Estimation and Testing' Econometrica, 55:22.

Eshetu Chole and Mekonnen Manyazewal (1992) 'The macroeconomic performance of the Ethiopian Economy, 1974-91', in The Ethiopian Economy:Structure, problems and Policy Issues, edited by Mekonnen Tadesse, proceedings of the First Annual conference on the Ethiopian Economy.

Faini and de Melo (1990) 'Adjustment, Investment and the Real Exchange Rate in Developing Countries', WPS 473, The World Bank.

Fei J. and D. Paauw (1965) 'Foreign Assistance and Self Help: A Reappraisal of development finance'. In Kouassy and Bohonu (1993), AERC Research Paper 15, AERC, Nairobi, Kenya.

FitzGerald, E.V.K, K. Jansen and R. Vos (1992) 'External Constraints on Private Investment Decisions in Developing Countries, sub-series on Money, Finance and Development No.43, The Hague, Institute of Social Studies.

Granger, C.W.J. and P. Newbold (1974) 'Spurious Regression Economics' Journal of Econometrics, 35:143-159.

Granger, C.W.J. (1986) 'Development in the Study of Cointegrated Economics Variables, Oxford Bulletin of Economics and Statistics, 48:3.

Greene, William H.(1997). Econometrics Analysis, Prentice-Hall Inc.

Hajimichael et al (1995) 'Sub-Saharan Africa, Growth, Savings and Investment, 1996-93', IMF Occasional Paper 118.

Hendry, D.F. (1986) 'Econometric Modelling with Cointegrated Variables: An Overview' Oxford Bulletin of Economics and Statistics, 48 : 201-212.

Hossein, Farzin, Y. (1987) 'The relatioship of external Debt and Growth Sudan's Experience' 1975-1984, World Bank Discussion Papers 24, The World Bank, Washington.

International Monetary Fund (1995). Official Financing For the Developing Countries, Washington.

International Financial Statistical Year Book (IMF), Various issues.

Kalecki Michal(1976). Problem of Financing Economic Development in a Mixed Economy. Kaminarides, J and E. Nissan (1993). The Effects of International Debt on Economic Development of Small Countries in World Development, 21 : 2, London: Pergamn Press Ltd.

Kouassy and Bohonu (1993) 'The Determinants of Fiscal Deficit and Fiscal Adjustment in Cote D' Ivoire', AERC Research Paper, No. 15, AERC, Nairobi, Kenya.

Krugman, Paul (1987) 'Financing Vs. Forgiving a Debt Overhang' Mimeo, MIT, January 1987.

Krugman, Paul, R. (1989) 'History Vs Expectations', National Bureau of Economic Research Working Paper No. 2587, Cambridge, Massachussettes.

Krumm, K.L. (1985) 'The external debt of sub-Saharan Africa: Origins, Magnitude and Implications for action', World Bank Staff Working Papers, No. 741. Washington, D.C.: The World Bank.

Lucas, Robert E. Jr. (1988) 'Mechanics of Economic Development', Journal of Monetary Economies, 22 July, pp. 3-42.

Mankiw, N. Gregory, Romer, David and Weil, David (1992) 'A contribution to the Emprics of Economic Growth', Quarterly Journal of EConomics, (152): 407-437.

Mcdonald, D.(1982) 'Debt capacity and Developing Country Borrowing, A survey of the Literature', IMF Staff papers, 29(4):603-47

Mjema, G.D. (1996) 'The Impact of Foreign Debt and Debt Servicing in The Economy of Tanzania: A Simultaneous Equation Approach', Journal of African Economics, 3(1) June 1996.

Mjema, G.D. and Musonda, F. (1994) 'Aid and Debt Issues in Tanzania: Past Trends and Future Prospects', Eastern African Economic Review, 6(1).

Nafziger Wayne, E.(1993). The Debt Crisis in Africa, Baltimore and London: Johns Hopkins University Press.

Ndulu, B., (1990) 'Growth and Adjustment in Sub-Saharan Africa', World Bank Conference on African Development Issues, June.

OAU (Organization of African Unity) (1998), Diary consisting a summary of economic indicators of African countries.

Osei B. (1995) 'The Burden of Debt Service Payment Under Structural Adjustment', AERC Research Paper 33, AERC, Nairobi, Kenya.

Ott David, Ott Attiat F., Jang H. Yoo, (1975). Macroeconomic Theory, USA: McGraw-Hill Inc.

Rebelo, S. (1991), "Long Run Policy Analysis and Long Run Growth", Journal of Political Economy, 99, pp. 500-521.

Roe, A. (1990) 'Internal Debt Management in Africa', AERC Special Papers, No. 4, AERC, Nairobi, Kenya.

Riddle, Roger, C (1987). Foreign Aid reconsidered, London: James Currey.

Romer P.M. (1986) 'Increasing Returns and Long-Run Growth', Journal of Political Economy, 94 : 1001-1037.

Romer, P.M. (1990) 'Endogenous Technological Change', Journal of Political Economy, 98: 71-102.

Rodan-Rosentein, P.N. (1961) 'International Aid For Developing Countries' Review of Economics and Statistics, 43(2).

Sachs J.D. (1988). Conditionality, Debt and the developing Country Debt Crisis, The International Financial System, Chicago 1 : 255-295.

Sachs, J.D. (1990) 'A strategy For Efficient Debt Reduction', Journal of Economic Perspectives, 4:19-30.

Sachs J. D. (1992). Macroeconomics in the Global Economy, New York: Prentice Hall.

Sachs, J. and Huizinga(1987) 'U.S Commercial Banks and the Developing Country Debt Crisis', Brooklings Papers, Economic Activity, 1987.

Sachs and Larrain (1994). Macroeconomics in the Global Economy, New York: Harvester, Wheatsheaf.

Serven L. and Solimano A (1993). Debt Crisis, Adjustment Policies and Capital Formation in Developing Countries Where Do We Stand? World Development 21 (1) 127-140.

Selim, Hassan M.(1983). Development Assistance Policies and the Performance of Aid Agencies: Studies in the performance of OPEC, the regional Development Banks and the World Bank Group. London: Macmillan press Ltd.

Singer W.H. (1989) 'Lessons of Postwar Development Experience' African Development Review, 1(2).

Sjoo (1997) 'A Guide for Testing for Units Roots and Cointegration', Lectures in Econometrics Time Series, 1997.

Solis L. and E. Zedillo (1985) 'The Foreign Debt of Mexico' in Kouassy and Bohoun (1993) AERC Research Paper, No. 15, AERC, Nairobi, Kenya.

Solow, R.M. (1956) 'A contribution to the Theory of Economics', The Quarterly Journal of Economics, 70: 65-94.

Selowsky M. and A. Van der Tak (1986) 'The debt Problem and Growth', World Development, 14(9).

Tanzi, V. (1977) 'Inflation Lag in Collection and the Real Value of Revenues', IMF Staff Paper, 24: 154-67.

Tanzi, V. (1988) 'The Impact of Macroeconomic Policies on the Level of Taxation (and on the Fiscal Balance) in Developing Countries', IMF Working Paper WP/88/95.

Taylor, L. (1985). Structural Macroeconomics, New York.

Taylor L. (1989) 'Gap Disequilibrium, Inflation, Investment, Saving and Foreign Exchange', Mimeo, MIT.

Thomas, R.L (1993). Introductory Econometrics: Theory and Applications 2nd ed,London and New York: Longman publishers.

Wikens, Herbert (1983) 'External Debts of Developing Countries' International Finance, German Institute of Economic Research.

Williamson, John (1983). The open Economy and the WorldEconomy, New York

Workie M.(1997) 'Determinants and constraints of private investment in Ethiopia'(Unpublished MSc Thesis) Addis Ababa University, May, 1997.

World Bank. Trends in Developing Economies, sub-Saharan Africa, World Bank, 1994,1995.

World Bank. World Debt Tables, Various Issues, Washington D.C.

The World Bank (1993) 'The East Asian Miracle: Economic growth and Public Policy' Oxford University Press, pp. 42-77.

APPENDIX I

ANNEX 1.1: THE HARROD-DOMAR MODEL AND THE ICOR DETERMINATION

The Harrod-Domar Model (Harrod, 1939, and Domar, 1947) was one of the earliest models to attempt to take into account the effect of investment on productive capacity and the requirement that labour and capital be fully employed as the economy grows. This models assumes that:

(1) the labour force grows at a constant rate over time;

(2) there is no technological change

(3) capita-output ratio remains constant

(4) in the absence of lags, planned investment (I) is equal to planned savings (S).

According to this model, the full capacity use of the capital stock (K) is defined as a multiple of output, expressed as:

$$K = VY \quad \ldots\ldots\ldots\ldots \quad (1)$$

where V is a fixed coefficient denoting the capital-output ratio.

The flow equilibrium between planned investment and savings is defined as the change in the capital stock over time, represented as:

$$\frac{dk}{dt} = V\frac{dy}{dt} \quad \ldots\ldots\ldots (5)$$

where S represents the average and marginal propensity to save. Based on the assumption that the labour force grows at a constant proportional rate n, we can write

$$N = N_o e^{nt} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

Where:

N_o = initial labour force

N = the labour force

t = index of time

e = an exponential

Denoting U as the labour-output ratio, then UY represents the demand for labour (Ott et al, 1975). Labour market equilibrium can then be written as the supply of labour is equal to the

demand for labour, thus;

$$N_o e^{nt} = UY \quad \ldots\ldots\ldots\ldots\ldots \quad (4)$$

Taking the time derivative of equation (1) gives

$$\frac{dk}{dt} = SY \ldots\ldots\ldots\ldots (2)$$

From equation (2), $\frac{dk}{dt} = SY$ and from equation

$$\frac{dk}{dt} = V\frac{dy}{dt}SY \ldots\ldots\ldots (6)$$

Hence we can rewrite equation (6) as

$$\frac{1}{Y}\frac{dy}{dt} = \dot{Y} = \frac{S}{V} \ldots\ldots\ldots (7) \text{ where:}$$

where:

$$\dot{Y}\ \frac{1}{Y}\frac{dy}{dt} = \text{output growth rate.}$$

Equation (6) gives the equilibrium growth rate consistent with the full capacity utilization of capital.

It is assumed that for the labour force to be fully employed its growth rate n must be the same as the output growth rate, so that:

$$n = \dot{Y} = \frac{S}{V} \ldots\ldots\ldots\ldots\ldots (8)$$

but from equation (6) $\frac{dk}{dt} = \frac{1}{Y}\frac{dy}{dt} = \frac{S}{V} \ldots\ldots (9)$

Thus the Harrod Domar equilibrium is written as:

$$\dot{K} = \dot{Y} = \dot{N}$$

Where:

$\dot{K}$ = *Growth in the capital stock*

$\dot{Y}$ = *Output Growth*

$\dot{N}$ = *Growth rate of the labour force*

5.2.1 THE ICOR DETERMINATION

From chapter IV, equation (4-2) the **ICOR** was defined as:

$$g=\frac{\dot{X}}{X}=\frac{\dot{K}}{K}=\frac{I}{K}=\left(\frac{1}{\sigma}\right)\left(\frac{1}{X}\right)$$

Thus we can write

$$\frac{\dot{X}}{X}=\left(\frac{1}{\sigma}\right)\left(\frac{I}{X}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}1)$$

Cancelling the Xs of the denominator, gives:

$$\dot{X}_t=\frac{1}{\sigma}\left(I_t\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots (2\text{-}2)$$

Allowing for one period investment gestation lag, equation (2-2) can be rewritten as:

$$X_t-X_{t-1}=\left(\frac{1}{\sigma}\right)I_{t-1} \quad \ldots\ldots\ldots (2\text{-}3)$$

Hence solving for X_t gives:

$$X_t=X_{t-1}+\left(\frac{1}{\sigma}\right)I_{t-1} \quad \ldots\ldots\ldots\ldots (2\text{-}4)$$

The estimated equation is

$$X_t=\alpha+\left(\frac{1}{\sigma}\right)I_{t-1}+\epsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (2-5)$$

Where:

α is the constant of solution to the difference equation and ϵ_t is a residual term.

The ICOR(σ) is determined by taking the reciprocal of the coefficient of I_{t-1} from the estimated equation.

APPENDIX II

ANNEX 1.2: THE TECHNICAL APPENDIX

4.3(a) STATIONARY AND NON-STATIONARY SERIES

(1) Stationarity

A Series is said to be stationary if its first and second moments are time invariant. Such series are said to be integrated of order zero denoted by I(0) (Granger, 1986). Regression with stationary series does not pose any spurious regression problems in time series econometrics.

(2) Non-Stationarity

A Series is non-stationary if its first and second moments are not time invariant. A non-stationary time series can be reduced to a stationary series by applying a suitable degree of differencing. In such a case, we say the original series is *homogenously non-stationary* (Montgomery and Cliff, 1976; cited in Sjoo, 1997). One typical class of non-stationary series that is usually encountered in macroeconomics is integrated series. According to granger (1980) " a series with no deterministic component and which has a stationary and invertible autoregressive moving average (ARMA) representation after differencing d times but non-stationary after differencing d-1 times is said to be integrated of order d, denoted by $X_t \sim I(d)$". Also integrated series have permanent memory and unbounded variance.

4.3(b) UNIT ROOTS TESTS: DETERMINING THE ORDER OF INTEGRATION OF THE VARIABLES

There are several tests used to test for unit root but the widely accepted and reliable are the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) tests.

(1) The DF test Unit Root

The assumed Data Generating Process (DGP) is $Y_t = Y_{t-1} + \mu_t$ with $\mu_t \sim$ NID $(0,\sigma^2)$. The DF test versions are:

$$\Delta Y_t = \pi Y_{t-1} + \mu_t \quad \text{.....(1)}$$

or

$$\Delta Y_t = \alpha + \pi Y_{t-1} + \mu_1 \quad \text{.....(2)}$$

or

$$\Delta Y_t = \alpha + \pi Y_{t-1} + \beta t + \mu_1 \quad \text{.....(3)}$$

where t is a time trend. From the above equations, when $\pi = 0$ imply Y_t is an I(1) series (non stationary series or unit root). On the other hand if $\pi < 0$, Y_t is an I(0) series (stationary). The associated 't-statistic' of π is tabulated in Fuller (1976). The critical values of the tests depend on whether a constant term/or a time trend is included in the equation.

(2) The ADF test

The DF-test, like all tests of I(1) versus I(0), is sensitive to deviations from the assumption $\mu_t \sim \text{NID}(0,\sigma^2)$. The assumption of NID errors is critical to the simulated distributions in Fuller (1976). If there is autocorrelation in the residual process the OLS estimated residual will be inappropriate, the residual variance estimate will be biased and inconsistent[14]. The ADF-test seeks to solve the problem by augmenting the equations with lagged Δy_t shown as

$$\Delta Y_t = \pi Y_{t-1} + \sum_{i=1}^{k} \sigma i \Delta Y_{t-i} + \mu_t \quad \text{.....(1a)}$$

$$or \quad \Delta Y_t = \alpha + \pi Y_{t-1} + \sum_{i=1}^{k} \sigma i \Delta Y_{t-i} \mu_t \quad \text{.....(2a)}$$

$$or \quad \Delta Y_t = \alpha + \pi Y_{t-1} + \beta t + \sum_{i=1}^{k} \sigma i \Delta Y_{t-i} + \mu_t \quad \text{....(3a)}$$

---

[14].See Cromwell et al. 1994.

The asymptotic test statistic is distributed as the DF-test. The ADF test is better than the DF-test since the augmentation leads to empirical white noise. The only critical factor in the ADF test is the length of the augmentation.

4.3(c) TEST FOR UNIT ROOT IN THE PRESENCE OF STRUCTURAL BREAKS

The cumulative sum of recursive residual (CUSUM) and the cumulative sum of residual square (CUSUM SQ) are used to detect structural breaks when the regression does not contain lagged dependent variables. Otherwise the Chow test is used. Structural breaks can influence the intercept and/or the trend coefficient of the regression at the time of the break[15]. Under this condition, the ADF equation is given as:

$$\Delta Y_t=\alpha+\beta t+\theta DU_t+\lambda DT_t+dD(TB)_t+\pi Y_{t-1}+\sum_{i=1}^{k}\sigma i\Delta Y_{t-i}+\mu_t$$

where TB is the time of the break, and

DT, DU, D(TB) are dummies,

DT_t = t if t>TB and zero otherwise,

DU_t = 1 if t>TB and zero otherwise,

D(TB) = 1 if t = TB+1 and zero otherwise.

Here the null and alternative hypotheses are specified as

Ho: π = 1 (unit root)

Ha: $\pi < 1$ (stationarity).

Other tests [16] for unit root are;

(1) Sargan-Bhargava Durbin-Watson (SBDW) test;

(2) Park's G-test [G(P,q) test];

(3) Philips and perron's Z test;

(4) Schmidt and philips LM (LMSP) test; and

(5) Kwiakowsky, Philips, Schmidt and Shin (Kpss) test;

---

15. See Perron (1989).

16. See Boo Sjoo (1997) for thorough explanation of these tests.

After testing for stationarity, we then determine whether the variables exhibit long-run relationship - they cointegrate.

5.3.1. THE ERROR CORRECTION MODEL

Consider the long-run relationship between Y and X:

$Y_t = \alpha_o + B_1 x_t + \mu_t$

A general representation of an ECM with one period lag and one exogenous variable is written as (see Thomas, 1993:152-156):

$$\Delta Y_t = \alpha_o + B_1 \Delta x_t + (\alpha_1 - 1)[y_{t-1} - kx_{t-1}] + \mu_{1t},$$

where k is the long-run coefficient, and $\Delta Y_t = \alpha_o + B_1 \Delta x_t$, describe the short-run relationship. The error correction model combines both the short-run and long-run dynamics.
The ECM as presented above states that: changes in y depends on changes in x and on the term in the square bracket which is the **disequilibrium error** from the previous period.

4.0 TEST FOR COINTEGRATION

This test examines whether some linear combination of the non-stationary series in the regression produces a white noise process or not. Although there are many tests that can be used, we shall concentrate on the Engle-Granger (EG) Two-Step procedure and the Johansen's Multivariate Auto regressive (VAR) approach.

(A) The Engle-Granger Two Step Procedure

This test is referred to as a two-step procedure because it requires performing a unit root test on the residual form the regression on levels by: (1) saving residuals form he OLS applied to the series on levels, and (2) performing a unit root test on the estimated residuals. The null hypothesis for this test is that the estimated error term has a unit root and the alternative is that the variables are cointegrated.

(B) Johansen test for cointegration

Johansen's test of cointegration in a P-dimension process $\{X_t\}$ ~I(d) builds on a vector Autoregressive (VAR) representation of the process, $A_k(L)X_t = \mu_o + \Psi\Delta_t + \mu_t$, which can be re-written in error correction form as

$$\Delta X_t = \Gamma_1 \Delta X_{t-1} + \ldots + \Gamma_{k-1}\Delta X_{t-K+1} + \pi X_{t-k} + \mu_o + \psi\Delta_t + \varepsilon_t$$

$$where\ \Gamma_i = -(I - \pi i \ldots \pi_{k-1}),\ i = 1; \ldots K$$

I is an identity matrix, X_t is a row vector of macroeconomic variable, D is a vector of seasonal dummies, μ_o is a vector of constants π is a coefficient matrix and $\mu_t \sim N(o,\sigma^2)$. The rank of π determines the number of independent rows in π, and therefore also the number of cointegrating vectors. The test gives us three basic conclusions;

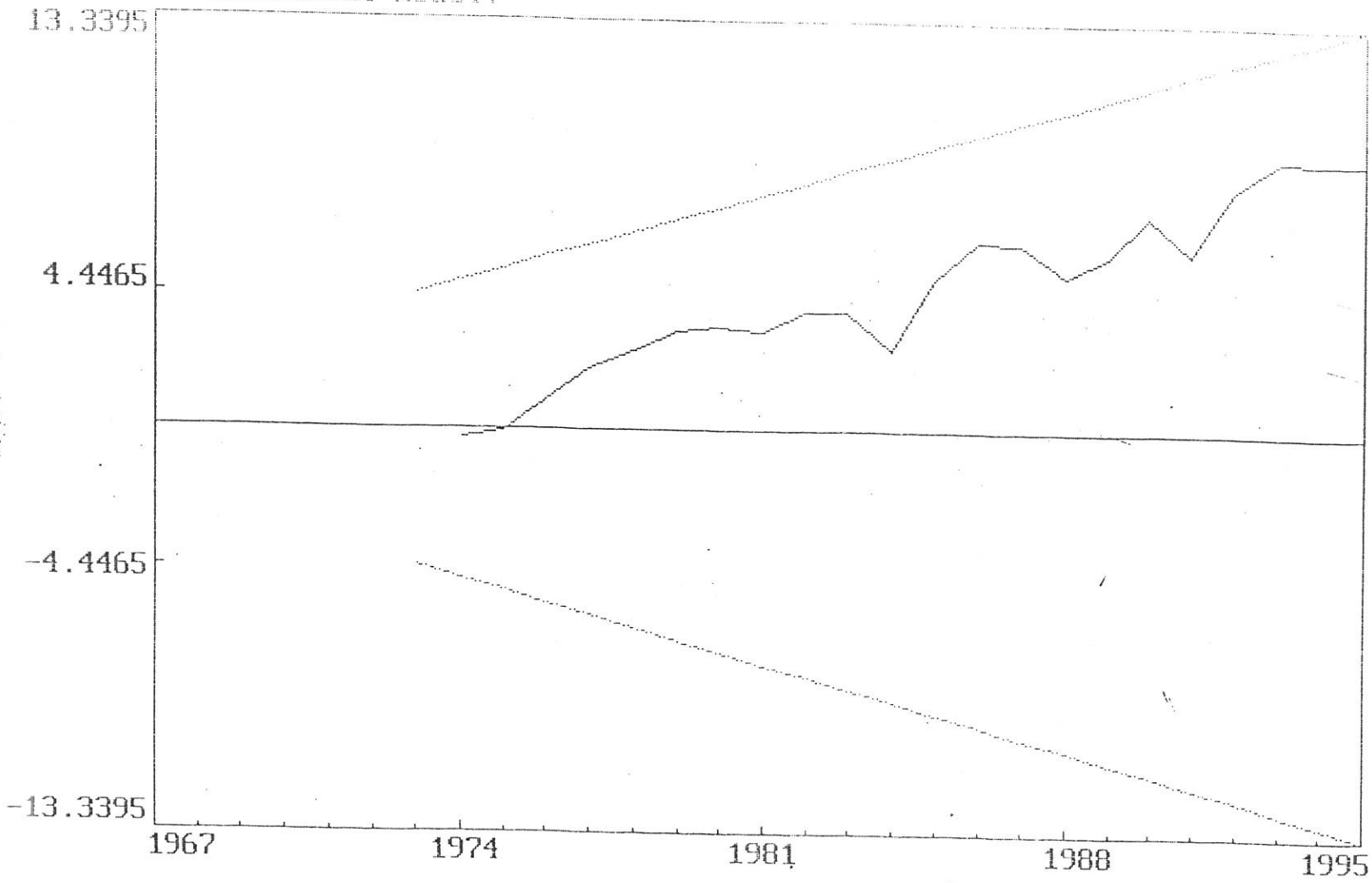
(I) if rank (π) = 0, implies that all X's are stationary;

(II) if rank (π) = P, so π has full rank, then the π-matrix consists of zeros only, There is no cointegration and the equation can be estimated in first differences only, since there will not be any long-run information in π.

(III) if π has reduced rank i.e. rank (π) $<$P, the cointegrating vector is given as $\pi=\alpha\beta$' where β represent the ith cointegration vector and α, represent the effect of each cointegrating vector on the $\Delta X_{p,t}$ variables in the model.

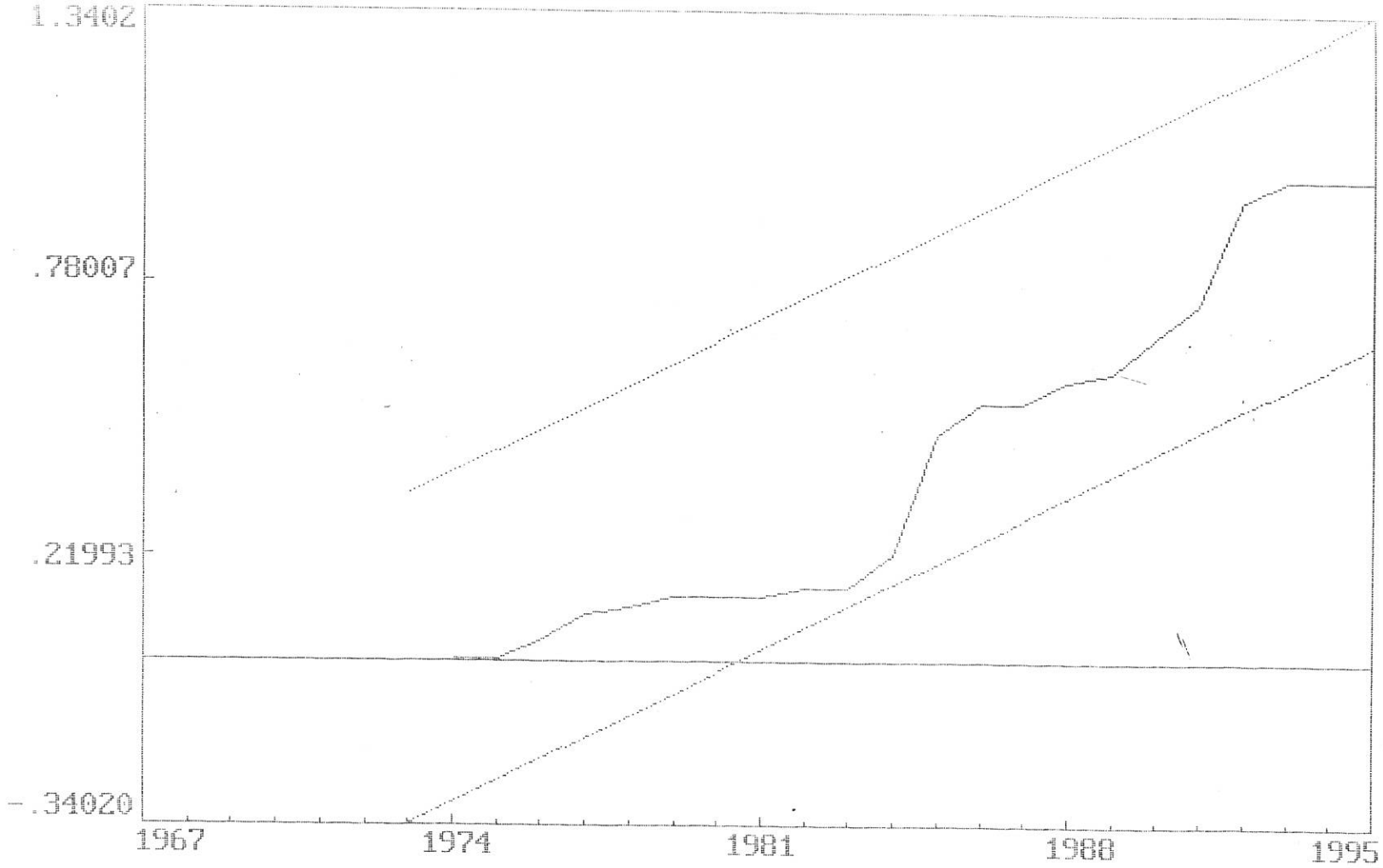
The Johansen's test will help us to determine variables that exhibit long-run equilibrium.

Fig.3a: Plot of Cumulative Sum of Recursive Residuals of the private investment model.



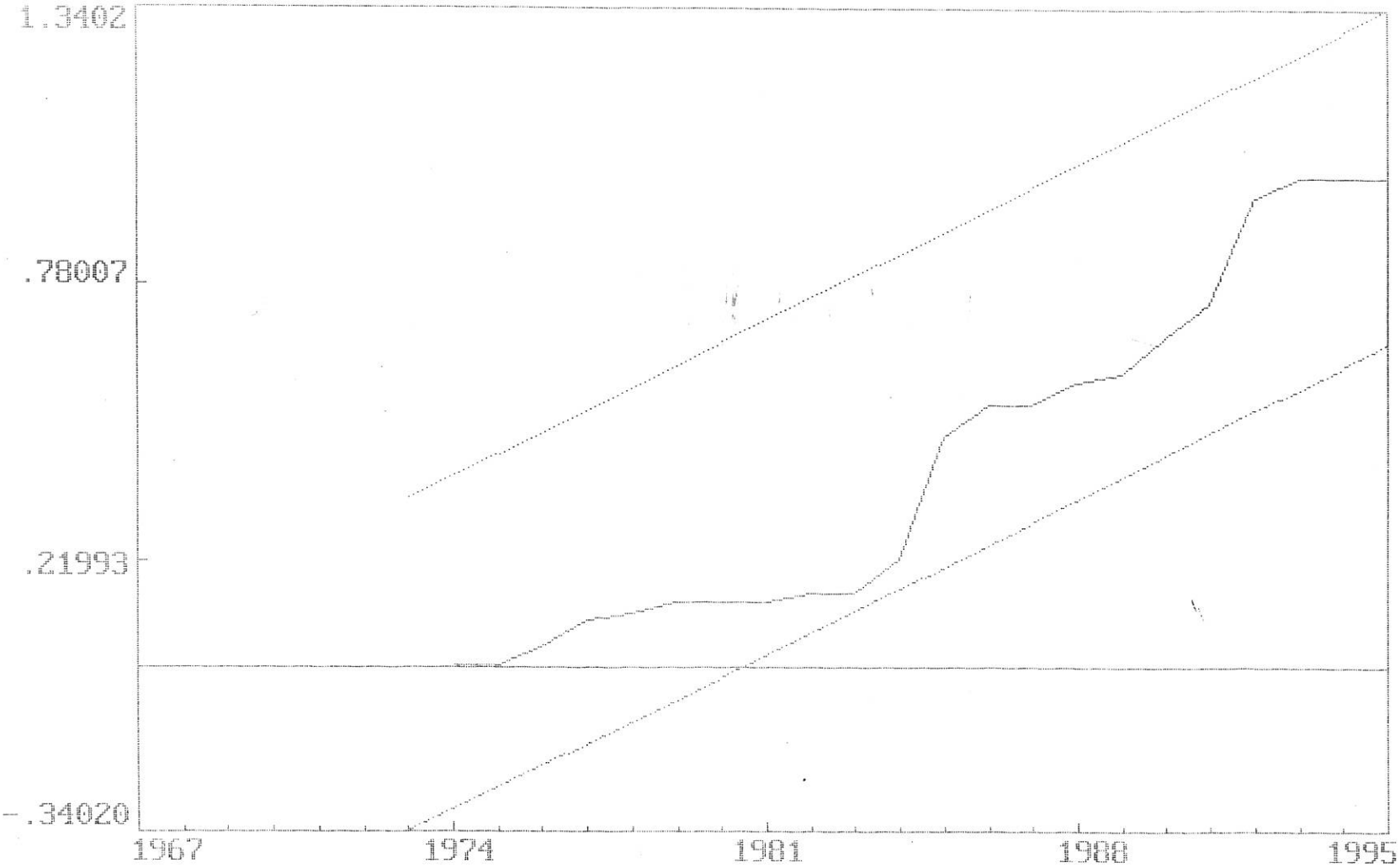
The straight lines represent critical bounds at 5% significance level

Fig.3b: Plot of Cumulative Sum of Squares of Recursive Residuals of the private investment model.



The straight lines represent critical bounds at 5% significance level

Fig.3b: Plot of Cumulative Sum of Squares of Recursive Residuals of the private investment model.



The straight lines represent critical bounds at 5% significance level