THE IMPACT OF EXTERNAL DEBT ON ECONOMIC GROWTH AND PRIVATE INVESTMENT IN ETHIOPIA: A Vector Auto Regressive Approach

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Abstract

Ethiopia, one of the highly indebted poor countries, has continued to experience difficulties in managing and servicing its huge stocks of external debt. Consequently, there have been significant net outflow of resources to meet the debt obligations. Hence, the main focus of the study is to examine the impact of external debt on economic growth and private investment of Ethiopia using a cointegrated VAR model over the period 1960/61 to 2008/09. The result of cointegration test, using Johansen Maximum likelihood approach, indicates the existence of long run relationship among the variables entered in both growth and private investment models.

The estimated short run models points out the current level of external debt flow has a positive while the past debt accumulation has a negative impact on economic growth and private investment of Ethiopia. This confirms the existence of debt overhang hypothesis in the Ethiopian economy. However, in the long run both external debt stock as well as debt servicing ratio have a negative and significant impact on economic growth and private sector capital accumulation activity. On the other hand, debt cancellation appears to have a positive contribution to economic growth and private investment of Ethiopia. Hence, mitigate the problems of external finance, external borrowing decisions must be linked to a general policy frame work that will guarantee profitability of invested funds and generation of sufficient foreign exchange earnings for external debt servicing. Besides, creating credibility including political determination to reforms is required to spur investors' confidence for both local and foreign investments.

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1. Introduction

In the last several decades, many developing countries around the world, especially those in Sub-Saharan Africa experienced large and persistent budget deficits that promoted massive borrowing from external sources to fill the resource gap. This situation is even worse for the non-oil exporting Sub-Saharan African countries, particularly those affected by civil conflicts, large external debt burden, declining terms of trade, un-diversified export bases, and cumbersome trade policies (Salisu, M, 2005). However, inflow of foreign money in different ways has resulted to the accumulation of large external debt stocks and outflow of resources in the form of capital flight in developing countries.

There has been growing concern about the extent to which accumulated large stocks of external debt by less developed countries (LCDs) 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 were external to the debtor countries, while others were the direct results of economic policies pursued with in particular indebted countries (Sachs and Larrian, 1994). Ethiopia as a developing nation has not been spared either.

Ethiopia's external debt is not simply unsustainable; even the most generous debt relief would not bring the country in meeting its responsibility within the context of global poverty-reduction goals (Melese, 2005). In line with this, according to the World Bank classification of Highly Indebted Economies, the country is one of the severely indebted low-income countries. Ethiopia's external debt has changed significantly in magnitude, structure and composition over the last three and half decades. In 1975, it stood at about USD 343.7 million, equivalent to 14% of the GDP, and USD 9.1 billion (214% of GDP) in 1991. As at June 30, 1999 this figure had increased to an equivalent of USD 10.2 billion and recently, in 2008/09, following the debt relief granted in accordance with development initiatives designed to benefit the Heavily Indebted Poor Countries (HIPCs), it had declined to USD 4.15 billion. Thus, high growth of debt and indebtedness, indicated by accumulation of interest and principal arrears, has changed the ability of the country to meet its obligation. Since most of the studies undertaken in this area failed to examine the crowding out impact of external debt on private investment, the study aims to fulfill this research gap by examining the impact of external debt on economic growth and private investment in Ethiopia.

The paper is organized as follows. The next section summarizes in brief the overview of external debt in Ethiopia. Section three reviews the relevant empirical literatures. The methodology and estimation results are dealt in section four while concluding remarks and recommendations are presented in section five.

2. Overview of External Debt in Ethiopia

2.1 Trends of External Debt

The poor performance of the Ethiopian economy has made external assistance a prominent feature of the country's economic structure. Since 1974, at which Ethiopia applied for loan from the IMF, the country has shown more and more dependent on external assistance and has reached a stage where it cannot function without it (Befekadu and Birhanu, 1999/2000).

Ethiopia's external debt has changed significantly in its magnitude, structure and composition over the last four decades. In the last four years of the Imperial regime (1970/71 – 1973/74) the country's external debt stock and debt service grew at an average of 13.18 and 3.11 percent per annum respectively. In 1974/75, when the Imperial regime was overthrown by the Derg government, the total debt stock stood at 372 million USD or 14 percent of GDP at current market price. On May 28, 1991, the military government was in turn overthrown by the Ethiopian Peoples' Revolutionary Democratic Front (EPRDF), whose budget was issued June 30, 1992. At the time the country's external debt was 8.8 billion USD, equivalently 95 percent of GDP at market price. Thus, during its 17 year tenure, the military government increased the country's total external debt by 24 – fold, at annual average growth rate of 21 percent (see the table below). The following table summarizes the external public debt of Ethiopia in different policy regimes.

As can be seen from Table 1, the yearly total debt stock between 1999/00 to 2003/04 was increased by 37 percent. That is, from 5,394.0 million USD in 1999/00 to 7,367.00 million USD in 2003/04. Between the 1999/00 to 2000/01, the debt stock increased marginally from 5,394.00 million USD to 5,479.00 million USD. But, during the rest of the period from 2001/01 to 2003/04, debt stock rose from 5, 479.00 million USD to 7, 367.00 million USD registering 34 percent increase.

Table 1: Summary of External Public Debt (in million USD)

Period	Total External Debt	GDP (Nominal)	Ratio of External Debt to GDP	Total Export
1974/75	372.00	2,657.14	14	249.12
1991/92	8,843.00	9,308.42	95	389.16
1999/00	5, 394.10	6,526.36	82.65	983.75
2000/01	5,479.00	6,507.89	84.19	958.16
2001/02	6,211.00	6,081.12	102.14	939.98
2002/03	6,784.00	6,652.36	101.98	1,139.63
2003/04	7,367.00	8,027.35	91.77	1,346.00
2004/05	5,917.00	12,526.22	47.24	847.20
2005/06	5,988.00	15,487.24	38.67	1000.30
2006/07	2,314.60	20,234.06	11.44	1,185.10
2007/08	2,767.10	29,525.58	9.37	1,465.90
2008/09	4,151.80	33,610.63	12.35	1,447.90

Source: Various years MoFED data and author's calculation

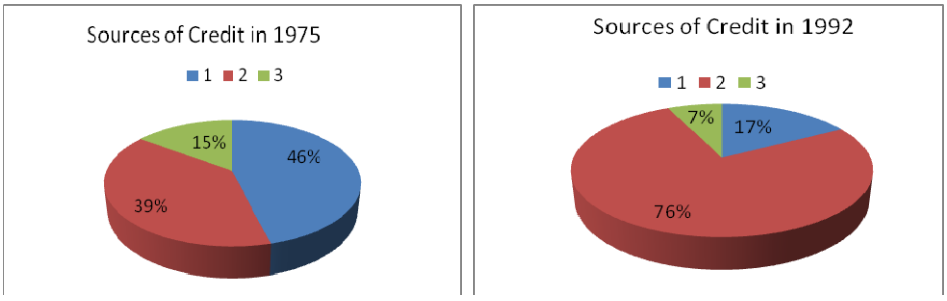
The increase in total debt between 1999/00 to 2003/04 was attributed to two factors. First, positive transfers from external creditors facilitated Sustainable Development and Poverty Reduction Program (SDPRP) implementation. Second, currency depreciation, especially USD against EURO, influenced the total debt stock to increase over the reference period. It is also noted that, although debt from bilateral and commercial creditors remained steady, the increasing trend in multilateral credit was the main reason for increasing the total debt stock by 1,973.0 million USD from 1999/00 to 2003/04. After 2003/04, the total debt stock of the nation had decreased from 7, 367.00 million USD in 2003/04 to 4.15 million USD in 2008/09. This huge decline in debt stock was associated with debt relief obtained as per the Enhanced – Highly Indebted Poor Countries (HIPIC) initiative.

2.2 Sources of Credit

Although the country's indebtedness increased in magnitude during the last three and half decades, the changes in the sources of long term credit are particularly conspicuous. The total debt outstanding can be categorized in to multilateral, official bilateral and commercial creditors. According to MoFED (2009), in 1975 the shares of multilateral, bilateral and commercial debt were 46, 39 and 15 percent respectively. While in 1992,

the shares of these sources of credit were 17, 76 and 7 percent respectively. The change in the relative share in favour of bilateral at the cost of multilateral and commercial was mainly due to military credit from the former Soviet Union, which accounted nearly 60 percent of the total external debt stock. For comparative purpose, the following charts show sources of credit at two critical periods[2] in the country's history over the last 36 years.

Figure 1: Sources of Credit in 1975 and 1992



Source: MoFED Key Multilateral Credit, Bilateral Credit, and Commercial Credit

In 1999/00, the multilateral credit accounted 52 percent of the total debt stock where as bilateral and commercial credit constituted 46 and 21 percent respectively. The increase in the proportion of multilateral debt was associated with loans obtained mainly from the World Bank, the IMF and the African Development Bank. The sharp decline in the share of commercial credits was the result of the commercial debt buyback operation completed in 1996, as well as the significant reduction in the debt contracted by Ethiopian Airlines as a result of regular and timely repayments. The following table summarizes the different sources of external debt of Ethiopia in different time periods.

[2] The two periods are 1975 and 1992 were the Imperial and the Derg governments are over throwen by the socialist (Derg) and EPRDF governments respectively.

Table 2: Sources of External Debt (in million USD)

Year	Multilateral	Bilateral	Commercial	Total debt outstanding
1999/00	2, 795.10	2,483.00	116.00	5,394.10
2000/01	2, 929.00	2,443.00	107.00	5,479.00
2001/02	3, 630.00	2,486.00	95.00	6,211.00
2002/03	4, 247.00	2,450.00	87.00	6,784.00
2003/04	4, 670.00	2,444.00	253.00	7,367.00
2004/05	4,891.40	669.80	355.85	5,917.05
2005/06	4, 865.30	776.26	356.97	5,998.53
2006/07	1, 193.06	806.90	314.60	2,314.56
2007/08	1, 536.86	953.48	275.81	2,766.15
2008/09	2, 033.21	1,041.04	1,077.6	4,151.80

Source: Various years MoFED data and author's calculation

As of June 30, 1999, the debt owed to multilateral creditors totalled 2,795.1 million USD or 51.8% of external debt of the country and 65% excluding the amount owed to Russia. This share had continuously increased to 4,891.4 million USD in 2004/05. The reason for the increment in credit from multilateral sources was due to continuous reduction in bilateral credit from 2,483.00 million USD in 1999/00 to 669.8 million USD in 2004/05. However, after 2004/05 the share of multilateral credit had decreased to 2,033.21 million USD (48.98 percent of the total external debt). This decline was marginally compensated by the rise in credit from bilateral sources 669.8 in 2004/05 million USD to 1041.04 million USD in 2008/09. In 2008/09, out of the total external debt of the country, multilateral credit contributed a lion share of 48.98 percent while bilateral and commercial credit contributed 25.08 and 25.96 percent respectively.

3. An Overview of Literature

A number of studies have dealt with the impact of external debt on economic growth and private investment during the last two decades. The empirical literature has found mixed empirical support for the "debt overhang" hypothesis.[3] For instance, Fosu (1996), by employing the OLS method, attempted to explain the relationship between economic growth and external debt with an empirical study for the sample of Sub-Saharan African

3 Debt overhang hypothesis argues that when foreign debt becomes excessive; actual payment to creditors becomes linked to the economic performance of the debtor country. Therefore potential increases in debt payment depress the return to productive investment and discourage capital formation.

countries over the 1970-1986 periods. Accordingly, debt had a negative impact on economic growth of Sub-Saharan African (SSA) countries.

Afxentiou and Serletis (1996) also investigated the relationship between per capita GNP and debt during the period 1970/71 – 1990/91 for 55 developing countries facing debt servicing difficulties. They found that per capita GNP had a negative and significant relationship with debt. That is, debt overhang happened for severely indebted low income and middle income countries. Similarly, Greene and Villanueva (1991), Serven and Solimano (1993), Elbadawi et al. (1996), Deshpande (1997), Chowdhury (2001), Were (2001) and Karagol (2002) find evidence in support of the debt overhang hypothesis. Fosu (1999), in his empirical study of thirty-five sub-Saharan African countries, also finds support for the debt overhang hypothesis. In contrast, Hansen (2001) finds that in a sample of 54 developing countries (including 14 HIPCs), the inclusion of three additional explanatory variables (the budget balance, inflation, and openness) leads to rejection of any statistically significant negative effect of external debt on growth. In a similar fashion, Savvides (1992) finds that the ratio of debt to GNP has no statistically significant effect on growth. Djikstra and Hermes (2001) review a number of studies on the "debt overhang" hypothesis and conclude that the empirical evidence is inconclusive.

The Ethiopian Case

A number of studies have been undertaken to investigate the origin of Ethiopia's external debt crisis. Most of the general causes are the same as the rest of the African countries. It is a combination of multiple domestic policy orientation and external shocks. Regarding debt sustainability, almost all studies indicated that Ethiopian external debt is unsustainable. For example, Melese (2005), by using a time series data during 1970/71 – 2002/03, concluded that Ethiopia's external debt is unsustainable.

Like other countries, in Ethiopia, there are several studies which examined the relationship between external debt and economic growth. Abenet (2005) investigated the relationship between real GDP growth rate and debt burden indicators during the period1962/63 to 2003/04. He found that the real GDP growth rate had negatively correlated with debt burden indicators (external debt to GDP and debt servicing ratios). Melese (2005), by using a structural macroeconomic model, also found that all debt burden indicators have a negative relationship with economic growth during period 1970 to 2002.

Befekadu (1992), using a simple macroeconomic model, showed that there was positive correlation between external resource inflow and economic growth between 1960 and 1974, but negative correlation between 1975 and 1988. The different outcome was explained by the different policy regimes pursued by two governments, that is, external capital contributed to growth positively in Ethiopia during the Imperial era and negatively during the Derg regime. He emphasized that the negative correlation of external debt during the Derg era was a result of the policies pursued. The policies in that era were diverted resources away from agriculture to other sectors. As a result the share of export earning of coffee, which is the most important export commodity, has declined by 60 percent. In addition to this, Alemayehu and Befekadu (1999), using an Error Correction Model (ECM), concluded that there is a positive long run relationship between aid and growth, although the correction was negative in the short run.

4. Theoretical Frameworks and Model Specification

4.1 Debts Growth Relationship

The growth model, which is used in this study, is based on endogenous growth model. The endogenous growth models developed by Lucas-Romer extend the old neo-classical model by emphasizing the role of endogenous factors (i.e., human capital stock and R&D activities) as the main engines of economic growth. While early neo-classical models assume total factor productivity growth (or technical progress) as exogenously given, the newer endogenous growth models attribute this component of growth to the 'learning by doing' effect occurring between physical and human capital, which result in increasing returns to scale in production technology (Lucas, 1988).

The most distinctive difference between the neo-classical exogenous and endogenous growth theories is that the former assumes constant returns to scale with diminishing marginal productivity of capital per capita (MPK) (Solow, 1956), whereas the latter generally assumes constant or increasing returns to scale with non-diminishing MPK. The assumption of non-diminishing MPK provides a possible way to long-run sustained growth in endogenous growth theories. These theories of endogenous economic growth stress the point that the opening up of the investment opportunities under a liberalised market-friendly economy brings about high economic growth. Besides, the financing gap model of the World Bank which is offered as an alternative policy framework for growth believes that growth of real output is related to total investment, where investment is considered as one of the demand factors in determining growth.

A wide range of endogenous growth models has treated human capital as a critical factor in determining growth rate of output (Lucas, 1988). It is an important source of long-term growth, either because it is a direct input into research (Romer, 1990) or because of its positive externalities (Lucas, 1988). Policies that enhance public and private investment in human capital, therefore, promote long-run economic growth. The inclusion of human capital variables in endogenous growth models are intended to capture quality differences in the labour force, as non-physical capital investment increases the productivity of the existing labour force. They commonly relate to education and are measured by an index of educational attainment, by mean years of schooling, or by school enrolment (Barro and Lee, 1993). Therefore, the production function under endogenous growth theory can be written as:

$$Y_t = f(PK_t, LAB_t, HCD_t) \quad \textbf{(1)}$$

Where Y_t+PK_t,LAB_t and HCD_t are levels of production, gross capital formation as a proxy for stock of physical capital, number of labour and human capital at period t respectively. These variables are known as supply-driven factors.

Output growth of a nation, in addition to supply-driven factors, is also affected by foreign capital via effect on the productivity of investment. External finance, particularly foreign borrowing, is ought to accelerate economic growth especially when domestic financial resources are inadequate and need to be supplemented with funds from abroad. Economic theory also postulates that reasonable levels of borrowing promote economic growth through factor accumulation and productivity growth. This is because the countries at the initial stages of their development usually tend to have smaller capital stocks and their investment opportunities are limited, which promise high rates of returns in them.

Obadan (2004), using theory of dual-gap-framework, explains the theoretical foundation associated with foreign borrowing and accumulation. The requirements of foreign borrowing rely greatly on its total expenditure vis-à-vis total domestic product. From the perspective of national income accounting, excess of investment (I) expenditure over domestic savings (S) is adjusted to be equivalent to a surplus of imports (M) over exports (X):

This is represented as:

$$I - S = M - X \quad \textbf{(2)}$$

$$S - I = X - M \quad \textbf{(3)}$$

Export must be restricted to domestic savings to ensure balance payments remain at equilibrium without foreign borrowing. In similar fashion, to increase investment without negative implications on balance of payments, exports should expand simultaneously in the appropriate proportion where savings schedule should shift upward while import schedule shifts downward.

For a country desiring to achieve a particular targeted growth rate, the growth could be restricted by the availability of domestic savings. Where foreign exchange is a severe constraint, dual-gap analysis stresses the additional role of foreign borrowing aimed at supplementing foreign exchange, without which a fraction of domestic savings might not be applied because actual growth is constrained by inability to import essential inputs. If the M-X is larger, then foreign borrowing can be used to fill this gap which will in turn fill the S-I gap. Foreign borrowing to fill it will certainly cover the smaller foreign exchange gap. It is instructive therefore that investments in foreign borrowing finance the variance between investment requirements to sustain the desired target rate of growth. It leads to increase in savings generated by rising income;

$$FB_t - Fb_0 = I - S \quad \textbf{(4)}$$

Similarly, increments in foreign capital requirements finance the difference between increases in imports to sustain the target rate of growth and the increment of exports;

$$FB_t - FB_0 = M - X \quad \textbf{(5)}$$

Where, FB_0 *and* FB_t and represents the required foreign borrowing in base year and year *t* respectively. Following the above theoretical relationship of external debt and foreign borrowing, equation (1) can be augmented with debt indicators as (see Fosu, 1999 and Iyoha, 2000):

$$Y_t = f(PK_t, LAB_t, HCD_t, ED, TDS \quad \textbf{(6)}$$

Where, *DCAN* are stock of external debts and debt service payment in period t respectively. These variables represent external debt indicators of the nation. In addition to the above debt indicators, it is possible to assess the impact of debt forgiveness on economic growth of a nation by incorporating a dummy variable of debt cancellation on the above production functions as:

$$Y_t = f(PK_t, LAB_t, HCD_t, ED, TDS, DCAN) \quad \textbf{(7)}$$

Where, *DCAN* is a dummy variable for debt cancellation. The basic rationale for incorporation of debt cancellation is that it could effectively provide predictable additional resources directly to the budget (via the repayments that no longer have to be made) and could offer a way to force coordination on conditionality among donors. Equally important, debt cancellation could allow a poor country to obtain access to loans from private foreign investors. Private investors may be unwilling to lend to a highly indebted country for fear that the country will be unable to repay, but if official debt is completely forgiven, they will jump in to lend, because even the worst debtor can be trusted to service small amounts of debt. Thus, official creditors may be able to expand a country's access to private resources through debt forgiveness.

Finally, the growth model incorporates trade openness[4] as one variable. It is suggested in literature that the more open is an economy, the more it is likely for the economy to develop financially and hence adds more to economic growth. Besides creating conducive environment for financial sector, the financial openness promotes growth through increased international trade. It is expected that as the ratio of total trade to nominal GDP increases, the financial sector depth improves and leads to economic growth. Hence, following the works of Fosu (1999) and Iyoha (2000), the growth model which is used in this study can be expressed as:

$$Y_t = f(PK_t, LAB_t, HCD_t, ED_t, TDS_t, DCAN, XM_t) \quad \textbf{(8)}$$

Where, XM_t [5] represents trade openness in period t. Moreover, expenditure on education and training is used as a proxy for human capital formation. Expenditure on

[4] Trade openness is the extent and the degree to which one economy is trading with the rest of the world. In this study we are going to use the ratio of the sum of the exports and imports to the nominal GDP to capture the degree to which the economy is open to the rest of the world.

[5] MXt can be calculated as import plus export divided by GDP

education is used because of insufficient data on other variables which can be used as a proxy for human capital.

4.2 Investment – Debt Relationship

To examine the relationship between private investment and the debt overhang, a macroeconomic model is developed. The model follows closely Fitz Gerald et al (1992), and Alemayehu (1997). According to the simple accelerator model, private investment (I_{pt}) is defined as the difference between the desired capital stock (K_{pt}*) and the inherited from the previous period (K_{pt-1}). That is:

$$I_{pt} = \lambda_t(K_{pt}^* - K_{pt-1}) \quad \textbf{(9)}$$

Where, λ_t represents an adjustment coefficient reflecting implementation lags, functional constraints or uncertainty about future conditions.

The desired private capital stock for the current year (K_{pt}*) depends up on the current level of output (Y_t); the shock 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:

$$K_{pt}^* = \alpha_1 Y_t + \alpha_2 K_{gt-1} + \alpha_3 M_t + \alpha_4 J_t + \alpha_5 E_x D_t + \alpha_6 E_x D_{t-1} \ldots\ldots \quad \textbf{(10)}$$

Substituting equation (10) in equation (9), gives:

$$I_{pt} = \lambda_t[(\alpha_1 Y_t + \alpha_2 K_{gt-1} + \alpha_3 M_t + \alpha_4 J_t + \alpha_5 E_x D_t + \alpha_6 E_x D) - K_{pt-1}] \quad \textbf{(11)}$$

To circumvent the capital stock data problem, we take the first difference of equation (4.11). This gives the following result:

$$I_{pt} - I_{pt-1} = \lambda_t\alpha_1\Delta Y_t + \lambda_t\alpha_2\Delta K_{gt-1} + \lambda_t\alpha_3\Delta M_t + \lambda_t\alpha_4\Delta J_t + \lambda_t\alpha_5\Delta E_x D_t + \lambda_t\alpha_6\Delta E_x D_{t-1} - \lambda_t\Delta K_{pt-1} \quad \textbf{(12)}$$

Let, $\beta_i=\alpha_i\lambda_i$ and from the definition $\Delta K_{gt-1} = I_{gt-1}$ **and** $K_{pt-1} = I_{pt-1}$. Hence equation (12) can be written as:

$$I_{pt} = \beta_1\Delta Y_t + \beta_2 I_{gt-1} + \beta_3\Delta M_t + \beta_4\Delta J_t + \beta_5\Delta E_xD_t + \beta_6\Delta E_xD_{t-1} - \lambda_t\Delta I_{pt-1} + I_{pt-1} \quad \textbf{(13)}$$

Replacing ΔE_xD_t by (ΔE_xD_t - ΔE_xD_{t-1}) and ΔE_xD_{t-1} by (ΔE_xD_{t-1} - ΔE_xD_{t-2}) in equation (13) and collecting like terms. Thus it possible to write equation (13) as:

$$I_{pt} = \beta_1\Delta Y_t + \beta_2 I_{gt-1} + \beta_3\Delta M_t + \beta_4\Delta J_t + \beta_5 E_xD_t + (\beta_6 - \beta_5)E_xD_{t-1} + \beta_6 E_xD_{t-2}] + (1-\lambda)I_{pt-1} + u_t \quad \textbf{(14)}$$

We impose the linear restriction that *(β_6 - β_5)* is not equal to zero, so that the variable representing debt overhang (E_xD_{t-1}) is non-zero. This analysis will be tasted in the analysis section. The variables are defined as follows: I_{pt} *and* I_{pt-1} are private investments at time ***t*** and ***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 ΔE_xD_t are as defined earlier. Finally, u_t is assumed a white noise disturbance term.

Equation (14) is our main equation of focus in this study. Then it possible to write the reduced form of private investment as:

$$PINV_t = f(RGDP_t, GINV_t, IMTGDP_t, CFTGDP_t, EDTGDP_t, DCAN_t) \quad \textbf{(15)}$$

Where;

RGDP$_t$ = Real GDP growth rate in year t.

PINV$_t$ = Current real private investment in year t (captures the accelerator principle).

IMPT$_t$ = Level of Import in year t.

CFTGDP$_t$ = Capital flight to GDP ratio in year t.

ED$_t$ = Stock of external of country i in year t.

DCAN$_t$ = Dummy variable for debt cancellation.

GINV$_t$ = Public investment in year t.[6]

[6] All variables in the model are measured in real terms and they are not expressed as a ratio of GDP, except CFTGDPt. Due to lack of sufficient data of capital flight, equation (4.16) did not incorporate it.

4.3 Model Specification

The econometric model of both growth equation used in this study is based on Fosu (1999) and Iyoha (2000). The model is rewritten by converting all macro variables (in equation 8) in to natural logarithmic form as follows.

$$LRGDP_t = \alpha_0 + \alpha_1 LPK_t + \alpha_2 LLAB_t + \alpha_3 LHCD_t + \alpha_4 LED_t + \alpha_5 LTDS_t + \alpha_7 DCAN_t + \varepsilon_t \quad (16)$$

Where ***LRGDP, LPK, LLAB, LHCD, LED, LTDS*** and ***LXM*** represents the logarithm of real gross domestic, physical capital, labour force, human capital, external debt stock, total payment for debt serving and trade openness at time t. Besides, ***DCAN*** refers to the dummy variable for debt cancellation. Similarly taking the natural logarithm of equation (15), it is possible to rewrite the private investment equation as:

$$LPINV_t = \beta_0 + \beta_1 LRGDP_t + \beta_2 LGINV_t + \beta_3 LIMPT_t + \beta_4 LED_t + \beta_5 DCAN + \varepsilon \quad (17)$$

Where ***LPINV, LGINV*** and ***LIMPT*** refer to the logarithms of private investment, public investment and import respectively.

4.4 Data Type, Source and Description

The study examined the impact of external debt on economic growth and private investment of Ethiopia by using annual data covering the period from 1960/61 to 2008/09. The major data sources for the problem under investigation were publications of National Bank of Ethiopia (NBE), Ministry of Finance and Economic Development (MOFED) and Central Statistics Authority (CSA) of Ethiopia. Besides, IMF CD-ROM, WB CD-ROM, and UNCTAD-CD-Rom were used.

5. Estimation Procedure and Results

5.1 Unit Root and Structural Break Tests

Non-stationarity of time series data has often been regarded as a problem in empirical analysis. Working with non-stationary variables lead to spurious regression results, from which further inference is meaningless. Hence, the first step in time series econometric

analysis is to carry out unit root test on the variables of interest. The test examines whether the data series is stationary or not. To conduct the test, the conventional Dickey-Fuller (DF) and Augmented Dickey – Fuller (ADF) test were used with and without a trend. The null hypothesis in these tests claims that the series under investigation has unit root. On the other hand, the alternative hypothesis claims that the series is stationary. The results of the test for the variables at level and first difference are presented in Appendix A.

The ADF test statistics[7], as depicted in Annex A, illustrates that all variables are non - stationary at levels. That is, it is not possible to reject the null hypothesis of unit root both with and without trend in the auxiliary regression of unit root. But, the ADF test applied to the same variables in their first difference becomes stationary at the conventional 1% and 5% level of significance. However, according to Alemayehu et al. (2009), the Dickey – Fuller type tests of unit root are sensitive to structural breaks in the data. A truly structural variable with some structural breaks may be labelled to be non - stationary. Thus, Chows structural break test is conducted for all variables entered in both growth and private investment equations. The result confirmed that the null hypothesis of no breaks at specified breakpoints is not rejected at the conventional 1% and 5% levels of significance (see Appendix B). Hence, the variables are integrated of order one (I ~I(1)).

5.2 Estimation of the Reduced form VAR and Test for Cointegration

The first step in estimating a VAR model is to determine the optimal lag length of the VAR (Alemayehu et al, 2009). Hence, the optimal lag length for this study has been determined using the AIC and HQ as these methods have been proven in most empirical papers to be superior to other tests. According to these criterions, the VAR estimate with the lowest AIC and HQ in absolute value is the most efficient one. In addition, the optimal lag length that is obtained from the AIC and HQ are also confirmed by the model reduction test. The VAR estimates were conducted successively from lag length four to one. Based on AIC and HQ criterion, the first and second lags were found to be optimal for private investment and growth equations respectively (see Appendix C).

[7] If the estimated Augmented Dickey-Fuller statistic is greater than the critical value we reject the null hypothesis that the series is non-stationary in favour of stationarity.

5.3 Long Run Growth and Private Investment Equations

Having found that all variables in the models are non-stationary at level, the next step is to check whether any linear combination of the variables is stationary (cointegrated) or not. The result of cointegration test using the Johansen's framework indicates that the variables both in the growth and private investment models are cointegrated with a maximum of one cointegrating vector (see Appendix D). Once the long run relationship is defined, the next task is to formulate the long run growth and private investment equations with the corresponding signs and significance is presented as follows:

A. Long Run Growth Equation

$$LRGDP = 1.4972\,LLAB + 0.082783\,LPK + 0.46923\,LHCD - 0.18894\,LED$$
[0.0001]** [0.0000] ** [0.1130] [0.0003] **

$$-0.31473\,ITDS + 0.71693\,LXM + 0.21505\,DCA \quad \textbf{(18)}$$
[0.0035]** [0.0125]* [0.0001] **

Multivariate Diagnostic Test

Vector AR 1-2 test: F(98,78) = 0.90557 [0.6808]
Vector Normality test: Chi^2(14)= 83.369 [0.0000]**
Vector hetero test: Chi^2(812)= 829.23 [0.3296]
Where **denotes rejection at 1% level of significance

The result of the diagnostic test confirms the adequacy of the model. That is, the null of no serial correlation and homoscedasticity[8] are not rejected at any conventional significant level. The null hypothesis of normality, however, is rejected at 1% level of significance. Nonetheless, the Johansen result still holds. In line with the standard growth theory, the regression result shows that, both labour force and physical capital variables produced significant and positive influence on growth. The result implies that these variables (LLAB and LPK) play major role in inducing growth. The long run elasticity of LRGDP with respect to LPK is 0.082783, implying one percent increase in stock of physical capital produces 0.082783 percent increment in output. The result coincides with the findings of Abenet (2005) for the case of Ethiopia, Were (2001) for the case of Kenya and Iyoha (1999) for the case of SSA countries. However, human capital (LHCD) is insignificant. Probably the reason is due to high level of illiteracy rate in the Country.

[8] Tasted by Vector AR 1-2 and Vector hetero tests respectively

That is, almost 50% of the annual production of the nation is produced in the rural areas by illiterate labour force.

Referring to the growth equation, we see that external debt to GDP has had a negative contribution on the economic growth of Ethiopia. In fact, the coefficient of -0.188894 connotes that a one percent increases in the external debt ratio accounted for 0.188894 percent decrease in the real GDP of Ethiopia and is the direct effect. This finding is consistent with the literature, particularly with Abenet (2005) for Ethiopia, Javed and Sahinoz (2005) for Turkey, Mohamed (2005) for Sudan, Iyoha (1999) and Fosu (1999) for Sub Saharan African countries. Elbadawi, et al. (1996) and Clements, Bhattacharya, and Nguyen (2003) also reported elasticities in the same range for developing countries.

Total debt servicing has also a significant negative effect on economic growth implying that debt overhang occurs in the long run period. The long run elasticity of real GDP with respect to external debt servicing is -0.31473. It means that when one percent increases in debt service, real GDP will reduce by 0.31473 percent. The result confirms the existence of debt overhang in Ethiopian economy. It is also consistent with the findings of Karagol's (2002) for Turkey and Were (2001) for Kenya for Nigeria. They proved that debt overhang hypothesis exists for afore mentioned countries. On the other hand, trade openness and debt cancelation have a positive and significant contribution to the growth of the Ethiopian economy. The positive contribution of debt cancellation may be due to the fact that the amount which is forgiven is directed to public investment which in turn facilitates economic growth. This finding is consistent with the findings of Bigsten et al (2001) for Zambia and Tanzania.

B. Private Investment Equation

$$LPINV = \underset{[0.6626]}{0.029566\ LRGDP} + \underset{[0.8310]}{0.011667\ LGINV} + \underset{[0.0313]*}{0.57726\ LIMTGDP}$$

$$\underset{[0.0308]*}{-0.062490\ LEDTGDP} + \underset{[0.0280]*}{0.11174\ DCAN} \ldots\ldots\ldots\ldots \quad (19)$$

Multivariate Diagnostic Test

Vector Normality test: Chi^2(10)= 86.571 [0.0000]**

Vector hetero test: F(165,146)= 1.1711 [0.1645]

Vector hetero-X test: F(390,40)= 0.58335 [0.9943]

Where * and **denotes rejection of the null hypothesis at 1% and 5% level of significance respectively. Values in parenthesis indicates test of significance.

The test summary reveals that the private investment equation is void of vector heteroscedasticity. That is the null of no homoscedasticity is not rejected at 5% significance level. But, vector normality problem is detected at 1%. However, Gonzalo (1994) (cited in Bigsten et al (2001)) stress that the Johansen procedure is robust even with non normal vectors. Therefore, the investment equation is reasonably acceptable. The figures in the parentheses confirmed, the null hypothesis of no significance is rejected for the import to GDP ratio, external debt to GDP ratio and debt cancellation variables at 5% level of significance. This suggests that the aforementioned variables are statistically significant in influencing private investment.

The result in general point out that real gross domestic product and government investment have insignificant coefficient. This implies that for the period under consideration, the role of real GDP and government investment were negligible in improving private investment. This may be due to the discouraging private investment policy of the Derg regime. Even though the coefficients are statistically insignificant, the positive relationship between real output and private investment provides evidence for the existence of accelerator principle hypothesis. This finding is similar with the findings of Badawi (2003) and (2005) for Sudan, Ouattara (2005) for Senegal, and Green and Villanueva (1991) for developing countries.

Level import, on the other hand, has positive and statistically significant contribution to private investment. This may be due to the fact that in 0.06249 most of the time developing countries, including Ethiopia, imported capital goods which are scarce in the domestic economy. These imported capital goods are served as a basic input to undertake private investment. Similarly, external debt cancellation has a positive and significant effect on private investment of Ethiopia. The rationale behind may be the resources obtained from the debt cancellation could be targeted at a productive public investment with the resultant crowding in effect on private investment. This result is consistent with the findings of Were (2001) for Kenya. Finally, external debt stock has a significant and negative effect on private investment. That is a one percent increase in external debt stock in relative to gross domestic product accounted for percent decrease in private investment. This is similar with the findings of Green and Villanueva (1997), Serven and Solimano (1993), Elbadawi et al. (1996), Fosu (1999), Deshpande (1997) and Chowdhury (2001).

5.4 The Short Run Dynamic Modelling (Vector Error Correction Model)

Having obtained the long run model and estimated coefficients, the next step is to estimate Vector Error Correction Model (***VECM***), which captures both the long run and short run relationship. The change in the variables represent variation in the short run, while the coefficients obtained for the error correction term represents the speed of adjustment towards the long run relationship. A ***VECM*** was estimated starting with the general over parameterized model. Then, the ***VECM*** is subjected to a systematic reduction and testing process until a robust parsimonious model is obtained. In each round, all statistically insignificant regressors were dropped until further model reduction was rejected by the likelihood ratio test.

The estimated ***VECM*** of both growth and private investment equations depicted that the correlation of the residuals of the unrestricted reduced form is very low (see Appendix E). Thus, according Alemayehu et al (2009), there is no problem of simultaneity. Hence, it is possible to resort to single equation error correction model because Ordinary Least Square (OLS) will be efficient.

In modelling short-run dynamics, all weakly exogenous variables which are considered in the long run are entered in to the right hand side of the model by differencing once. The main reason for this is due to the fact that there will be high level of correlation between current and lagged values of a variable, which will therefore result in problems of multi-collinearity[9]. In addition, ***ECT,*** which is derived $t-1$ from the long run coefficients, enters in to the model by lagging one year. The rationality for lagging a year is to show how the time path matter to correct errors. According to Hendry and Juselius (2002), economic agents taking all available information at period, they rationally undertake actions at period t, which helps to minimize errors.

A procedure adopted for estimating the single equation Error Correction Model (ECM) is the Hendry's approach of general to specific modelling. In this approach a large model is estimated first which includes as many explanatory variables and their lags as possible. Then all insignificant explanatory variables are continuously dropped until a parsimonious model with fewer explanatory variables but acceptable in terms of significance, economic interpretation and diagnostic validity is obtained. To check whether the reduction is justified an F test for model reduction is conducted at every

[9] Multi-collineiarity is a situation where there is high R2 but imprecise parameter estimates and low t-valves, even though the model may be correctly specified.

step of the reduction process. The null hypothesis in the model reduction process is that the coefficient of the excluded variables are zero and thus irrelevant to the model. If the null is not rejected, the reduction is valid and the reduced model is justified (see Dornik and Hendry, 1994). After step- by step elimination of elimination of insignificant variables from the estimate, the parsimonious Error Correction Model (***ECM***) for growth and private investment equation is summarized in Table 3 and 4 respectively.

A. Growth Equation

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

$$\Delta LRGDP = \sum_{i=1}^{k} \Delta LRGDP + \sum_{i=0}^{k} \Delta LLAB + \sum_{i=0}^{k} \Delta LPK + \sum_{i=0}^{k} \Delta LHCD + \sum_{i=0}^{k} \Delta LED + \sum_{i=0}^{k} \Delta LTDS + \sum_{i=0}^{k} \Delta LXM + DCAN - ECT_{-1} \quad \textbf{(20)}$$

Where k represents the lag length and ECTt-1 denotes the error correcting term. Following the above specification, a dynamic equation for growth function is reported in the Table below.

The result reveals that, the estimated coefficients are significant with the theoretical expected sign. In line with the postulates of both modern and traditional growth theories, labour, physical and human capital have a positive effect on real gross domestic product of Ethiopia. The estimated short run growth equation also shows that the current flow of external debt has a positive contribution while; the past external debt accumulation has a negative impact on economic growth. This assures the existence of debt overhang hypothesis in the Ethiopian economy. However, the long run growth equation reveals the negative and significant relationship between external debt and economic growth. This finding is in line with the findings Javed and Sahinoz (2005), Mohamed (2005), Iyoha (1999), Fosu (1999), Bhattacharya and Nguyen (2003) and Elbadawi et al. (1996). Finally, the dummy variables for debt cancellation and trade openness have a positive contribution to economic growth. The positive contribution of debt cancellation may be due to a simple reason that the amount that is forgiven would be used to relax the saving gap which is the usual problem of the country. This is also consistent with the results obtained by Bigsten et al (2001) for Zambia and Tanzania.

Table 3: Result for the Dynamic Growth Equation (Dependent Variable DLGDP)

Variables	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	0.0715529	0.01333	5.37	0.000	0.4589
DLLAB_2	0.404091	0.1149	3.52	0.001	0.2668
DLPK_2	0.0889766	0.01916	4.64	0.000	0.3880
DLHCD_2	0.0593365	0.07438	0.798	0.431	0.0184
DLED	0.0446984	0.02316	1.93	0.062	0.0987
DLED_1	-0.0161036	0.02152	-0.748	0.459	0.0162
DLTDS_1	-0.0432703	0.03105	-1.39	0.172	0.0540
DLXM	-0.274489	0.07970	-3.44	0.002	0.2586
DCAN	0.0266977	0.01619	1.65	0.108	0.0741
ECM_1	-0.387070	0.1940	-2.00	0.054	0.1048

R^2 = 0.601146 DW = 1.73 F(9,34) = 5.694 [0.000]**

Single Equation Diagnostic Tests

AR 1-2 test: F(2,32) = 2.1124 [0.1375]
ARCH 1-1 test: F(1,32) = 0.82054 [0.3718]
Normality test: Chi^2(2) = 0.70360 [0.7034]
hetero test: F(17,16) = 0.56196 [0.8755]
RESET test: F(1,33) = 2.6967 [0.1101]

The lagged error correction term (ECT-1) included in the model to capture the long run dynamics between the cointegrating serious is correctly signed (negative). This coefficient indicates a speed of adjustment 38.7 percent from actual growth in the previous year to equilibrium rate of economic growth. This implies that in one year the real gross domestic product adjusts itself to the equilibrium by 38.7%.

The various diagnostic test of the model points no problem regarding the regression analysis. That is, there is no an indication of serial autocorrelation as shown by the Breusch Godfrey LM test for serial correlation. The white test for homoscedasticity also does not reject the null hypothesis of homoscedasticity errors. Moreover, the ARCH test (Engle, 1982) indicates the absence of autoregressive conditional, hetrocedasticity errors. Similarly, the general test for misspecification as provided by Ramsey's (1969) RESET test does not reject the null hypothesis of no functional misspecification in the estimated equations. And finally, the Jarque Bera test for normality indicates that the null hypothesis of normality distributed error terms is not rejected. The goodness of fit of the above models (R2) shows that (60.11%) of the total variation in the dependent variable (LRGDP) is explained by the independent variables in the model. In addition, the

reported F-statistics rejects the null hypothesis that the coefficients of all explanatory variables except the constant term are jointly zero. Thus, overall, the estimated model is statistically satisfactory.

B. Private Investment Equation

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

$$\Delta LPINV = \sum_{i=1}^{k} \Delta LPINV + \sum_{i=0}^{k} \Delta LIMPT + \sum_{i=0}^{k} \Delta LGINV + \sum_{i=0}^{k} \Delta LED + DCAN - ECT_{-1} \ldots\ldots \quad (21)$$

Where, ECT-1 is the error correcting term.
Using the general to specific model for the above equation, the following parsimonious specification is reported.

Table 4: Result for the Dynamic Equation (Dependent Variable LPIV)

Variable	Coefficient	Std.Error	t-value	t-prob	Part.R^2
Constant	-0.0207553	0.03028	-0.685	0.497	0.0119
DLRGDP	0.169972	0.2696	0.630	0.532	0.0101
DLIMTGDP	0.590732	0.1319	4.48	0.000	0.3396
DLGINV_1	0.0776101	0.04390	1.77	0.085	0.0742
DLEDTGDP	0.0729854	0.04517	1.62	0.114	0.0628
DLEDTGDP_1	-0.0275034	0.04474	-0.615	0.542	0.0096
DCAN	0.0296303	0.03640	0.814	0.421	0.0167
ECT_1	-0.516705	0.1746	-2.96	0.005	0.1833

R^2 = 0.508269 DW = 2.04 F(7,39) = 5.759 [0.000]**

Single Equation Diagnostic Tests

AR 1-2 test: F(2,37) = 0.26768 [0.7666]
ARCH 1-1 test: F(1,37) = 1.3278 [0.2566]
Normality test:Chi^2(2) = 2.7405 [0.2540]
hetero test: F(13,25) = 1.6042 [0.1502]
RESET test: F(1,38) = 1.7153 [0.1982]

The above table reveals that the estimated coefficients are in line with the theoretical expected sign. The overall fit of the model is acceptable. The explanatory variables explain about 50.8 percent of the variation in the model. The F statistics rejects the null hypothesis that all the coefficients in the model are jointly insignificant. The Durban Watson (DW) test also suggests that there is no autocorrelation problem. Moreover, the various diagnostic tests do not detect any problem about the regression analysis. That is, the test does not reject the null of white noise error terms suggesting no problem of error autocorrelation. In addition, the test for autoregressive conditional heteroscedasticity (ARCH) points that no ARCH structure in the error term is detected. Failure to reject the null of no ARCH indicates the existence of constant variance. The Jacque Bera test for normality cannot reject the null hypothesis of normality. It points out that the error term is normally distributed. Finally, the Ramsey test for functional form misspecification accepts the regression specification of the dynamic model.

The regression result reveals that, in the short-run, import to gross domestic ratio and public investment produce significant and positive impact. The estimated short run private investment equation points that the current level of external debt flow has a positive impact while; the past external debt accumulation has a negative effect on private sector accumulation. This confirms the existence of debt overhang hypothesis in Ethiopian economy. However, in the long run external debt has a negative and significant impact on private investment. This result is in line with the long run analysis (i.e., section 5.2-B) as well as the findings of different researchers including Elbadawi et al. (1997) and Fosu (1999). On the other hand, debt cancellation holds positive sign as expected.

The above preferred model also confirms that the error correcting term is significant at 1%. It points out that about 51.67% of the disequilibrium from the long run path will be corrected in one year. The speed of adjustment further indicates that it takes almost two years for the deviation to be fully adjusted.

5.5 Impulse Response and Variance Decomposition Analysis

To analyze the impulse response and variance decomposition, the first step is to check the stability of the VAR model. The test statistics, depicted by the companion matrix (presented in appendix: E), shows that both growth and investment models are stable. Hence it is possible to undertake impulse response and variance decomposition analysis.

1. Impulse Response

The impulse response function shows the increment to each variable due to one standard error shock of the other variable taking in to account all interactions between the variables. The impulse responses are eventually expected to converge to a level that is consistent with the estimated long run co-integrating relationship. Thus, the study uses generalized impulse response functions and in each case the shock to each variable is one standard error shock. The graphical representation of impulse responses to a one period shock on the variables are represented in appendix F.

As shown in the appendix the response of real gross domestic product to shocks emanating from the external debt stock is positive in the early periods but it becomes negative in the long run. This is consistent with the results obtained from both the long run co integrating analysis and the short run error correction model. In line with the regression results obtained the response of real gross domestic product to total debt servicing is always negative both in the short and long run. Finally, real gross domestic product responds positively the shocks originated from physical and human capital. However, it responds negatively in the short run and positively for in the long run to the shocks from labour force and trade openness. Similar to the response of real GDP, private investment responds negatively to the shocks emanating from external debt.

2. Variance Decomposition

Variance decomposition depicts the proportion of movements in one variable that are due to errors in own shocks and to each other variables in the system. Basically they give information on how important is each variable in explaining variations in the variable in question in the system. The following table summarizes the variance decomposition of real GDP.

Table 5: Variance Decomposition of LRGDP

1-,5	S.E.	LRGDP	LED	LHCD	LLAB	LPK	LTDS	LXM
1	0.068085	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.086558	94.37243	0.279510	0.005287	0.083219	3.411506	0.208269	1.639778
3	0.102613	89.56882	0.474620	0.018019	0.691197	4.172133	3.880554	1.194650
4	0.120776	83.37153	1.248607	0.319149	2.269582	4.963828	6.912829	0.914472
5	0.137731	78.86633	2.230246	0.909931	3.557395	5.277244	8.313964	0.844893
6	0.153892	75.98074	3.288074	1.466640	4.269286	5.358607	8.590974	1.045674
7	0.168826	74.23386	4.200364	1.817778	4.584308	5.314768	8.473286	1.375633
8	0.182643	73.19620	4.943429	2.035485	4.710503	5.165419	8.282027	1.666936
9	0.195618	72.53376	5.562251	2.212674	4.761753	4.952567	8.111699	1.865294
10	0.208115	72.04132	6.120916	2.390075	4.791277	4.706792	7.968287	1.981328

The variance decomposition of real gross domestic product, which is represented in the above table, shows that in the very early periods the forecast error of this variable in question is attributed to the variable itself. The deviation explained by the real gross domestic product decreases to 72 percent in the tenth period from as much as 100 percent in the first period. The deviation in economic growth explained by the variations in debt servicing (payment) is insignificant explaining zero in the first period and only rises to around 7.97 percent in the tenth period. The variations of real gross domestic product due to variation in external debt stock, although has been increasing, it explains only about 6.1 percent of the deviations in real gross domestic product. In general the contribution of the other variables to the variation in the forecast error of real gross domestic product is of very less (all the variables explain only less than 28 percent of the total variation). Similarly, the variance decomposition of private investment can be presented as follows.

The above table depicts that the variance decomposition of private investment. In the very early periods, around 60 percent of the forecast error of this variable in question is attributed to the variable itself. This deviation decreases to around 46 percent in the tenth period. The deviation in private sector capital accumulation due to variations in import and external debt stock in the tenth period is around 25 and 17 percent respectively. In general, the contribution of external debt to the variation in the forecast error of private investment greater as compared to real gross domestic product.

Table 6: Variance Decomposition of LPINV

Period	S.E.	LEDTGDP	LGINV	LIMTGDP	LPINV	LRGDP
1	0.401918	10.30037	7.293022	22.80432	59.60229	0.000000
2	0.536530	16.03605	5.833045	27.94769	47.54578	2.637432
3	0.654149	17.52322	5.464006	27.69792	46.77976	2.535106
4	0.753339	17.39235	5.695229	26.77501	47.69812	2.439288
5	0.838589	17.45682	6.489544	26.23384	47.38661	2.433193
6	0.914006	17.39791	6.960638	25.96122	47.10541	2.574815
7	0.979963	17.30370	7.255290	25.78492	46.86474	2.791346
8	1.037807	17.23541	7.392359	25.66876	46.66699	3.036475
9	1.088643	17.17898	7.408681	25.59391	46.50677	3.311657
10	1.133309	17.12174	7.384449	25.55674	46.34871	3.588356

6. Conclusion and Policy Recommendation

6.1 Conclusion

Most developing countries, like Ethiopia, have been faced a severe shortage of capital to undertake development programs. This in turn necessitates the reliance on external finance, which is something one cannot afford to ignore. However, deficit financing via external borrowing resulted in debt burden problem which is indicated by an increasing level of debt stock and its servicing. The debt burden problem of a country is of a great concern because it imposes a number of constraints on its economic growth. Hence, the central focus of this study is to examine the impact of external debt on economic growth and private investment of Ethiopia by using annual data covering the period from 1960/61 to 2008/09. The paper also assessed the trend, magnitude and composition of Ethiopia's external debt.

In the study both growth and private investment equations have been identified and estimated. The Johansen Maximum Likelihood estimation technique has been used to assess the short and long run dynamics of variables. Before looking in to the cointegration relationships of each function, the variables were tested for their order of integration using ADF test statistics and all the variables were found to be I(1). The λ_{trace} test statistics were employed to assess the number of cointegrating vectors presented for all cases and the result shows that the null hypothesis of zero cointegrating vector is rejected in favour of one cointegrating relationship.

The first investigation is concerned with the relationship between external debt and economic growth. The result points out that all variables have the hypothesized signs. In line with the conventional and modern growth theories labour, physical and human capital have a positive contribution to real GDP both in the short and long run. On the other hand, total debt servicing has a significant and negative impact on economic growth of Ethiopia. The estimated short run growth equation also shows that the current flow of external debt has a positive contribution while; the past external debt accumulation has a negative impact on economic growth. This assures the existence of debt overhang hypothesis in the Ethiopian economy. However, the long run growth equation reveals the negative and significant relationship between external debt and economic growth. Finally, the dummy variables for debt cancellation and trade openness have a positive and significant contribution to economic growth of the nation.

Since investment is one of the channels through which external debt can affect growth, a private investment equation is developed to examine its interaction with external debt and other variables. The main outcome of the empirical assessment confirms that both in the short and long run; real GDP, level of imported capital, public investment and debt cancellation have a positive contribution to private capital formation activity in Ethiopia. The positive relationship between private and public investment assures the complementarity hypothesis of public investment to private sector development. Moreover, the estimated short run private investment equation points that the current level of external debt flow has a positive impact while; the past external debt accumulation has a negative effect on private sector accumulation. This confirms the existence of debt overhang hypothesis in Ethiopian economy. However, in the long run external debt has a negative and significant impact on private investment.

6.2 Policy Implications

The servicing of external debt erodes the meager foreign exchange available for imports. This has to lead import compression problem that adversely affects both public and private investment. Since many of the imports of Ethiopia are essential intermediate inputs for its capital formation activity, cutting these imports has a larger loss on present and future output of the country. Hence, external borrowing decisions must be linked to a general policy frame work that will guarantee profitability of invested funds and generation of sufficient foreign exchange earnings for external debt servicing. This can be done by investing on selective and productive investment areas including basic

infrastructural developments that facilitate the productivity of other sectors of the economy.

The short and long run regression results also confirmed that, debt shock creates a debt overhang which explodes the confidence of both foreign and domestic private investors who are sensitive to uncertainties. These uncertainties are emanated from anticipation of future tax liabilities for debt servicing. This in turn will lead them to invest in any other countries where tax burden is less or believed to be credit worthy. Hence, in order to spur investors' confidence the government should create credibility in policy including political will to reforms.

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Appendices

Appendix A: Unit Root Test

Table A1: Unit Root Tests of the Variables at Level

Variables	Dickey Fuller (DF)		Augmented Dickey Fuller (ADF)			
	Lag Length 0		Lag Length 1		Lag Length 2	
	T_v	T_t	T_v	T_t	T_v	T_t
LRGDP	1.685	-1.143	2.037	-0.8952	1.933	-0.8668
LINV	-1.662	-1.850	-1.491	-2.023	-1.35	-2.634
LLAB	-0.2235	-1.058	-0.2752	-0.6156	-0.4742	-0.09810
LHCD	0.7417	-0.7513	0.3522	-2.389	0.5833	-1.634
LED	-2.243	-1.068	-2.332	-1.150	-2.337	-1.049
LTDS	-1.709	-2.403	-1.493	-1.758	-1.478	-1.846
LXM	-1.721	-3.136	-1.353	-2.569	-1.275	-2.514
LPINV	-1.647	-3.498	-0.9991	-2.600	-0.8398	-2.499
LGINV	-2.629	-2.803	-2.216	-2.396	-2.028	-2.216
LIMPT	-0.8857	-3.479	-0.5141	-2.975	-0.4930	-3.317
Unit Root Tests of the Variables at First Difference						
DLRGDP	-7.307**	-7.963*	-4.434**	-5.095**	-3.719**	-4.554**
DLINV	-7.413**	-7.797**	-5.590**	-6.176**	-3.253*	-3.770*
DLLAB	-6.161**	-6.105**	-3.662**	-3.630*	-3.291*	-3.265
DLHCD	-4.619**	-4.804**	-4.514**	-4.665**	-4.429**	-4.599**
DLED	-6.164**	-6.256**	-4.770**	-4.961**	-3.985**	-4.275**
DLTDS	-8.502**	-8.511**	-5.107**	-5.150**	-4.516**	-4.593**
DLXM	-8.427**	-8.329**	-5.603**	-5.536**	-5.166**	-5.095**
DLPINV	-9.344**	-9.301**	-6.000**	-5.997**	-5.270**	-5.287**
DLGINV	-8.027**	-7.969**	-5.678**	-5.646**	-4.912**	-4.887**
DLIMPT	-8.294**	-8.236**	-5.181**	-5.159**	-4.269**	-4.265**
Critical Value	1%	-4.224 and -3.623 with and without trend, respectively.				
	5%	-3.535 and -2.945 with and without trend, respectively.				

Where; ** and * denotes rejection of the null hypothesis at 1% and 5% significance level respectively.

T_v is estimated value of test statistics when a drift term (constant) is included in the auxiliary regression for unit root test.

T_t is estimated value of test statistics when a drift term (constant) and trend are included in the auxiliary regression for unit root test.

Appendix B: Structural Break Test

Chow Breakpoint Test: 1974 1991
Null Hypothesis: No breaks at specified breakpoints
Equation Sample: 1962 2008

Variable: LRGDP			
F-statistic	1.818444	Prob. F(4,41)	0.1437
Log likelihood ratio	7.675870	Prob. Chi-Square(4)	0.1042
Wald Statistic	7.273775	Prob. Chi-Square(4)	0.1221
Variable LLAB			
F-statistic	0.025628	Prob. F(4,41)	0.9987
Log likelihood ratio	0.117365	Prob. Chi-Square(4)	0.9983
Wald Statistic	0.102510	Prob. Chi-Square(4)	0.9987
Variable: LHCD			
F-statistic	1.020266	Prob. F(4,41)	0.4082
Log likelihood ratio	4.459842	Prob. Chi-Square(4)	0.3473
Wald Statistic	4.081065	Prob. Chi-Square(4)	0.3951
Variable: LPK			
F-statistic	1.856376	Prob. F(4,41)	0.1366
Log likelihood ratio	7.823364	Prob. Chi-Square(4)	0.0983
Wald Statistic	7.425504	Prob. Chi-Square(4)	0.1150
Variable: LED			
F-statistic	1.046891	Prob. F(4,41)	0.3949
Log likelihood ratio	4.570745	Prob. Chi-Square(4)	0.3342
Wald Statistic	4.187566	Prob. Chi-Square(4)	0.3812
Variable: LTDS			
F-statistic	0.998491	Prob. F(4,41)	0.4194
Log likelihood ratio	4.368945	Prob. Chi-Square(4)	0.3584
Wald Statistic	3.993964	Prob. Chi-Square(4)	0.4068
Variable: LXM			
F-statistic	0.068579	Prob. F(4,41)	0.9911
Log likelihood ratio	0.313414	Prob. Chi-Square(4)	0.9889
Wald Statistic	0.274317	Prob. Chi-Square(4)	0.9914
Variable: LPINV			
F-statistic	0.778969	Prob. F(4,41)	0.5453
Log likelihood ratio	3.442642	Prob. Chi-Square(4)	0.4867
Wald Statistic	3.115878	Prob. Chi-Square(4)	0.5386
Variable: LIMTGDP			
F-statistic	0.740563	Prob. F(4,41)	0.5698
Log likelihood ratio	3.278686	Prob. Chi-Square(4)	0.5123
Wald Statistic	2.962251	Prob. Chi-Square(4)	0.5642

Appendix C: Model Reduction Tests

Table A2: Model reduction Test for Growth Equation

Model	T	P	Log-	SC	HQ	AIC
SYS(4)	45	63 OLS	226.20988	-4.7244	-6.3109	7.2538
SYS(3)	45	112 OLS	327.36401	-0.93012	-4.9843	6.7815
SYS(2)	45	161 OLS	264.58360	-5.1052	-7.3940	2.2849
SYS(1)	45	210 OLS	397.22976	0.10977	-5.1783	8.3213

Table A3: Model Reduction Test for Private Investment Equation

Appendix D: Model Reduction Tests

Table A4: Johansen's Cointegration Test for Growth Equation

$H_0: r \leq$	Trace Statistics	Eigen Value	P - value
0	134.95	0.66108	[0.011] *
1	84.096	0.52750	[0.242]
2	48.858	0.30519	[0.687]
3	31.745	0.23504	[0.629]
4	19.152	0.22782	[0.493]
5	7.0011	0.13219	[0.584]
6	0.33730	0.0071510	[0.561]

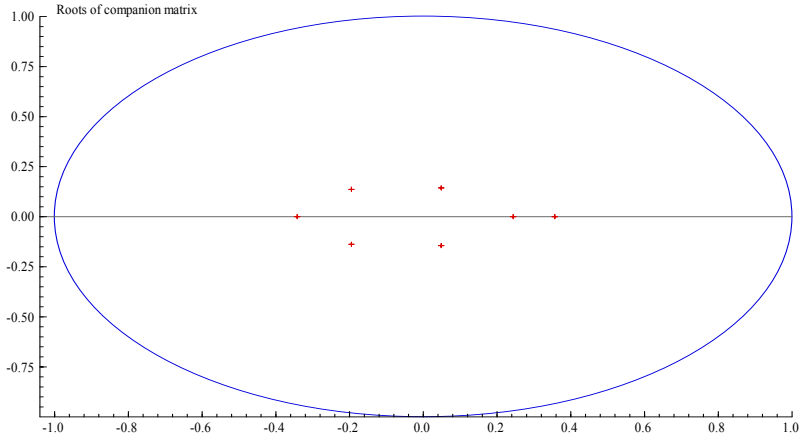
Table A5: Johansen's Cointegration Test for Investment Equation

$H_0: r \leq$	Trace Statistics	Eigen Value	P - value
0	74.667	0.48416	[0.018] *
1	42.893	0.35201	[0.135]
2	22.066	0.27710	[0.304]
3	6.4907	0.12572	[0.642]
4	0.041457	0.00086332	[0.839]

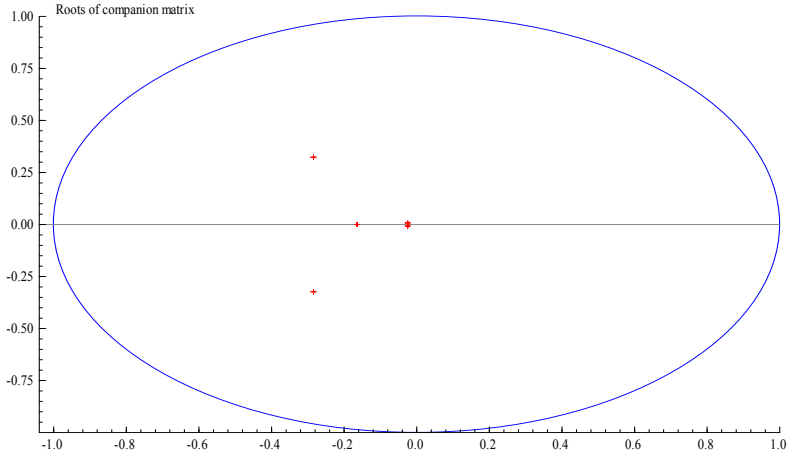
Where * denotes rejection of the null hypothesis at 5% level of significance.

Appendix E: VAR Stability Test

Companion Root Matrix for Growth Model

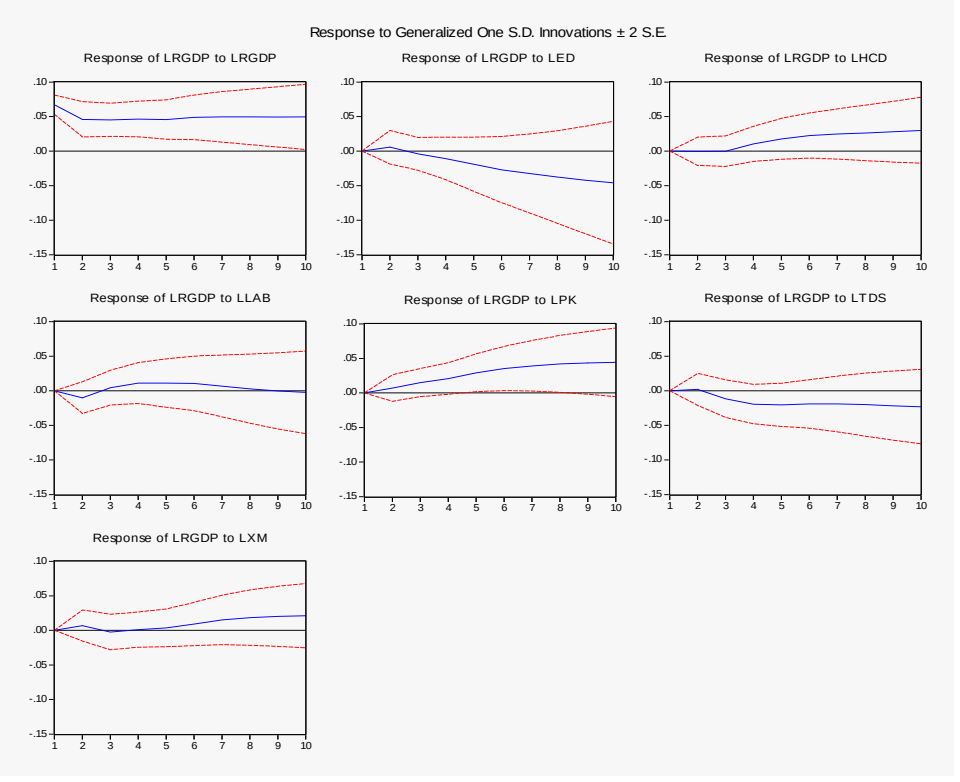


Roots of Companion Matrix for Investment Equation



Appendix F: Graphical Representation of Impulse Response Functions

A. Growth Model



B. Private Investment Model