Foreign Aid and Economic Growth in Ethiopia

Tadesse, Tasew

Dilla university

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FOREIGN AID AND ECONOMIC GROWTH IN ETHIOPIA[1]

Tasew Tadesse[2]

Abstract

The study has examined the impact of foreign aid on investment and economic growth in Ethiopia over the period 1970 to 2009 using multivariate cointegration analysis. The empirical result from the investment equation shows that aid has a significant positive impact on investment in the long run. On the other hand, volatility of aid by creating uncertainty in the flow of aid has a negative influence on domestic capital formation activity. Foreign aid is effective in enhancing growth. However, the aid-policy interaction term has produced a significant negative effect on growth implying that bad policies can constrain aid effectiveness. The growth equation further revealed that rainfall variability has a significant negative impact on economic growth as the economy. This study indicated also that the country has no problem of capacity constraint as to the flow of foreign aid.

Key words: foreign aid, policy, economic growth, cointegration, VECM, Ethiopia

[1] Department of Economics,School of Business and Economics, Dilla Univesity, Ethiopia.
E-mail: tasewecono@yahoo.com

[2] The study is conducted when the author was an postgraduate (MSc) student at the department of development economics of Adama University in Ethiopia.

1 INTRODUCTION

1.1 Background

Ethiopia is the second largest populous country in Africa, with an estimated population of nearly 79 million (in 2007) and a growth rate of 2.6 percent per year. Ethiopia is a predominantly rural and young society with 84% living mainly in densely populated highland settlements. It is also one of the poorest countries in the world (with 38.7% of the population being below the poverty line in the year 2004). The Ethiopian economy is a subsistence one that is highly dependent on agriculture, which in turn depends on vagaries of nature. Over 85 percent of the population depends on this sector for earning the means of its livelihood. Agriculture accounts for almost half of the GDP and more than 90 percent of the export earnings. However, the share of agriculture is declining steadily whereas the share of the service sector in GDP is rising recently. On the other hand, the share of the manufacturing sector is relatively static which is between 13 and 14 percent only.

Despite the fact that the history of the growth performance was poor in the past; the country has experienced strong economic growth in the current time (especially, since 2003/04). According to Ncube, Lufumpa and Ndikumana (2010) real GDP averaged 11.2 % per annum during the 2003/04 and 2008/09 period, placing Ethiopia among the top performing economies in sub Saharan Africa. This growth performance is well in excess of the population growth rate and the 7 percent rate required for attaining the MDG goal of halving poverty by 2015. However, there are a number of challenges to sustain the current trend of economic growth. The high dependency of economic growth on timely and adequate rainfall and the country's vulnerability to terms of trade and similar external shocks are structural constraints facing the economy. There is a strong correlation between weather condition and economic performance in Ethiopia. Alemayehu (2001) argued that in explaining growth in Ethiopia it will be necessary to examine the agricultural sector, its linkage with the other sectors and household behavior in rural Ethiopia.

The other important factor in explaining growth in Ethiopia is the external environment. The high dependence on imported inputs such as fertilizers, raw materials and the like which are highly sensitive to the availability of foreign exchange has an important implication for the functioning of the economy. The country is dependent on coffee as the main means of foreign exchange earnings while non-coffee export's contribution to the foreign exchange earnings is quite weak. As a result, the country remains victim of foreign exchange constraint and adverse terms of trade. Moreover, if exogenous shocks are supported by poor policies (institutional, economic and political)-which remained detrimental to Ethiopia's growth-they have the tendency to deteriorate economic growth.

The other most important permanent feature of the Ethiopian economy is the presence of resource (financial) gap. The resource gap can be explained as the presence of savings-investment gap, foreign exchange gap and fiscal gap. In recent years the savings-investment gap has been widening from an average of 1.1% of GDP during the Imperial period (1960-74) to 6% of the GDP during the Derg period (1974-91) to 11.7% of the GDP in the EPRDF (1991/92-2007/08). The presence of resource gap (gross domestic investment-gross domestic savings) forces the country to rely on an inflow of foreign finance (specifically foreign aid) to bridge the gap.

The dependence on exports of primary agricultural commodities (notably coffee) makes the country to be a victim of foreign exchange constraints or foreign exchange gap. For instance, in 2001/02 the exports of goods and non factor services amounted to 15.5% of GDP while the imports of goods and non factor services amounted to 35.2% of GDP and resulted in 19.7% foreign exchange gap. While this has an important bearing for diversification and promotion of exports, it also calls for foreign finance to supplement the limited foreign exchange earnings to import capital goods along with other commodities.

In Ethiopia the government is the main source of the budget deficit. The inadequacy of the domestic economy to expand domestic revenue sources to finance the deficit by itself also makes inflows of foreign capital an important source to mitigate the challenge. Thus, the presence of

these resource gaps in one way or another shows that the domestic economy is not capable of generating enough finance to close these gaps and make the country's reliance on foreign capital inflow compulsory.

1.2 Statement of the problem

Foreign capital inflows are receiving due attention because of their potential to finance investment and perceived to promote economic growth in the recipient country. The growing divergence in saving and investment rates, export-import gap (foreign exchange constraints to import capital goods) and budget deficits in developing countries make them to depend highly on inflow of foreign capital.

Poor countries lack sufficient domestic resources to finance investment and the foreign exchange to import capital goods and technology. Aid to finance investment can directly fill the savings-investment gap and, as it is in the form of hard currency, aid can indirectly fill the foreign exchange gap. As official aid is issued to government, it can also fund government spending and compensate for a small domestic tax base (Girma, Gomannee and Morrissey, 2005).

The scenario in Ethiopia is not different from the other developing countries. The performance of Ethiopia in improving the level of investment and promotion of economic growth through domestic capital sources and private capital inflow alone is far from adequate as explained in the introduction above. This makes the importance of foreign aid indisputable to the performance of the economy.

Alemu (2007) explained that foreign aid has played a major role in Ethiopia's development effort since the end of World War II. It has been instrumental in bridging the country's savings-investment and foreign exchange gaps. Its importance as a source of financing for the development of capacity building (human capital, administrative capacity, institutional building and policy reform) is also unquestionable. Thus increasing efforts were made to mobilize foreign aid in the last two regimes.

Despite massive inflow of aid to developing countries and extensive empirical work for decades on the aid-growth link, the aid effectiveness literature remains controversial. An important objective of much Official Development Assistance ('foreign aid') to developing countries is the promotion of economic development and welfare, usually measured by its impact on economic growth. Yet, after decades of capital transfers to these countries, and numerous studies of the empirical relationship between aid and growth, the effectiveness of foreign aid in achieving these objectives remains questionable (Durbarry, Gemmel and Greenway, 1998).

An empirical investigation on the relationship between aid and growth by Gomannee, Girma and Morrissey(2005) on 25 sub-Saharan Africa countries from 1970 to 1997 show that aid appears to be ineffective. According to this study, despite large aid inflows, SSA countries on average experienced only 0.6 per cent growth in real per capita GDP per annum over the period. On the face of it, this may appear to be a case of aid ineffectiveness. However, this does not imply that aid is ineffective in promoting growth at all.

However, other studies reject the aid ineffectiveness claim and prove that aid is effective in promoting development in recipient countries. Tarp (2009) argues that aid has been and remains an important tool for enhancing the development prospect of poor nations. A similar conclusion has been reached by Arndt, Jones and Tarp (2009) which showed that the average effect of aid on growth is positive. Both studies show that there emerges a consistent case for aid effectiveness.

Many empirical studies (most of them being cross-country) have used econometric analysis to test the aid-growth relationship at the macro level, complemented by case-study evidence at the project level. While micro-based(project level) evaluations have found that in most cases 'aid works' (e.g. Cassen *et al.*, 1986), those at the macro level have yielded more ambiguous results, often failing to find significant growth effects. This conflict is what Mosley (1987) refers to as the 'micro-macro paradox'. The reasons for it remain unclear but the econometric aid-growth literature has been criticized on several grounds: sample size and composition, data quality, econometric technique and model specification. A particularly telling criticism of most of these studies concerns the underlying model of growth, which is typically poorly specified.

In an extensive review of literature, Hansen and Tarp (2001) concluded that existing literature supports the proposition that aid improves economic performance. There is no micro-macro paradox to resolve, not even in countries hampered by an unfavorable policy environment.

In less developed countries, foreign aid was perceived only as an exogenous net increment to the capital stock of the recipient country. Most of the earlier aid–economic growth relationship was based on the Harrod-Domar growth model with the causal chain running from aid to savings to investment and hence growth. It further assumes that aid is linked to investment in a one to one correspondence. In other words, there is no fungibility of aid i.e. aid is not used for consumption. Papanek (1972) (cited by Hansen and Tarp) characterized the highly optimistic aid-impact approach embedded in the Harrod- Domar theoretical growth model as "curiously naive".

For many years, the standard model used to justify aid was the "two-gap" model of Chenery and Strout (1966). In this model, the first gap is between the amount of investment necessary to attain a certain rate of growth and the available domestic saving, while the second gap is the one between import requirements for a given level of production and foreign exchange earnings. At any moment in time, one gap is binding and foreign aid fills that gap to achieve a certain growth rate. The Harrod-Domar growth model is the first and most well known of the gap models. The gap models assume the causal chain is running from aid to savings to investment to growth. However, Easterly (2001) failed to find a strong evidence of the one to one correspondence between aid and investment. Rather his findings support for the existence of fungibility of aid other than investment.

Among the recent cross country aid-growth studies the most influential and controversial finding was the one by Burnside and Dollar which emphasizes that aid effectiveness is conditional on good macroeconomic policy environment. In other words, aid is ineffective in the absence of sound policy environment. Burnside and Dollar (1997 and 2000) found that aid has a positive effect on growth in an environment of good fiscal, monetary, and trade policies. Equally important is that aid is ineffective in promoting growth. Their findings have attracted public attention and have an important implication both for donors and recipients' .i.e., aid has to be allocated to the place where it is most effective. This intriguing result, which is broadly in line with Washington consensus view of development, is appealing to many.

However, their finding was criticized by many researchers in the area and the findings by others didn't support that aid effectiveness is conditional on good policy environment. Given the differences in samples and estimation techniques, the results in terms of the effectiveness of aid are strikingly similar in the three studies by Hadjimichael et al., Durbarry et al. and Hansen and Tarp-which reject the findings of Burnside-Dollar.

As most of the aid-growth study is dominated by cross country regression analysis, country specific studies are relatively few in number and studies on the area are also not the exception in Ethiopia. A study by Wondwesen (2003) on the impact of foreign aid on growth on annual data covering the period 1962/63 to 2000/01 found that aid has significant contribution to investment both in the short run and long run. Aid is found to be ineffective in enhancing growth. However, when aid is interacted with policy, the growth impact of aid appeared significant. His finding is in line with the argument of Burnside and Dollar (1997) i.e. aid effectiveness is conditional on good policy environment. The result cast doubt since the country is known for its weak macroeconomic policy environment. However, the few empirical studies on the impact of aid on growth in Ethiopia remained weak in incorporating the recent advances in the aid-growth literature. In this study attempt is made to improve such weaknesses and also a broader policy index (accounting both economic and infrastructure policy) is constructed to test the conditional effectiveness of aid.

1.3 Objectives of the study

The main objective of this study is to explore the macroeconomic impact of foreign aid in Ethiopia. Specifically the study aims to identify factors that affect the effectiveness of foreign aid in enhancing investment and growth. Thus the specific objectives of the study are analyzing:

1. The impact of foreign aid on investment and economic growth in the long run,
2. The conditional effectiveness of aid on good policy environment,
3. The impact of volatility of foreign aid on investment,
4. The causal relationship between saving and investment, and aid and policy environment,
5. The absorptive capacity of the economy as to the flow of foreign aid,

6. The impact of rainfall variability on economic growth as foreign aid flows increases in response to dry seasons.

CHAPTER TWO

REVIEW OF THE LITERATURE

The macroeconomic impact of foreign aid has long been a hotly contested subject. Aid's impact on growth in developing countries is arguably the most contested topic. It is also an important topic given its implications for poverty reduction, the other key criterion against which aid ought to be assessed. Despite massive flow of foreign aid to developing countries, economic growth and living condition which are assumed to be highly affected by inflow of foreign aid remained poor. According to McGillivray et al (2005) there was much optimism associated with foreign aid to developing countries in the early years of its provision. This was shortly after the Marshal plan. The perceived success of this plan could be revisited with developing countries. Poor countries remained poor because the levels of investment were too low. This was due to low levels of domestic savings, insufficient amounts of foreign exchange required to purchase foreign capital goods or both. Foreign aid could fix this, by supplementing domestic savings or foreign exchange reserves. This would increase investment and in turn growth.

A fundamental argument for aid, at least on economic grounds, is that it contributes to economic growth in recipient countries. Although there are some stories of success in the aid effectiveness literature, sub Saharan Africa remained the greatest challenge. As it was argued by Gomannee, Girma and Morrissey (2005) Sub-Saharan Africa (SSA) represents a challenge to the aid effectiveness argument: the region has been a major recipient of aid for decades, yet has exhibited very poor economic growth performance over that period.

However, the Commission for Africa (2005)(cited by Gomannee, Girma and Morrissey (2005) argues for a substantial increase in resources for SSA, especially to finance needed investment, estimated as requiring an additional US$25 billion per annum in aid to Africa to be achieved by 2010, with a further US$25 billion per annum increase by 2015.

In the following section, the literature survey considered three generations of both theoretical and empirical work on aid effectiveness. Even though the literature is dominated by cross-country aid effectiveness, effort is made to present the available country level aid effectiveness literature especially for Ethiopia.

2.1 Aid, Savings and Growth

The provision of foreign aid began after the Second World War. The US marshal plan was announced in 1947 and involved the provision of funds for the reconstruction of war torn Europe. The Marshal plan was widely considered as a great success with many European countries undergoing a period of rapid industrialization during the late 1940s and early 1950s. In 1949, following the success of the Marshal plan, US president Truman announced a major programme of increased foreign assistance to the developing world.

In the early literature of aid-growth link in less developed countries, foreign aid was perceived only as an exogenous net increment to the capital stock of the recipient country. Further it was based on the assumption that there exists a one to one correspondence between aid and savings and investment. Hansen and Tarp (2001) criticized the claim that each dollar of foreign resources in the form of aid would result in an increase of one dollar in total savings and investment. In other words, aid was not treated as a component of national income adding to both consumption and investment. Hence, fungibility of aid resources was not allowed for, and aid for consumption purposes was skipped over in this type of macroeconomic aid impact analysis.

The first empirical studies undertaken in the 1960s were motivated by what are termed 'gap' models. Basic gap models assert that the rate of economic growth is constrained by inadequate levels of savings and foreign exchange and that foreign aid is required to fill these gaps in order to achieve a target rate of growth. The Harrod-Domar growth model is the first and most well known of the gap models.
The theoretical workhorse underlying the earlier empirical work is the Harrod-Domar growth model with the causal chain running from aid to savings to investment to growth; which further implies that the main objective of aid is investment. However, aid was also given for humanitarian purpose.

The model assumes that there is an excess supply of labor and that growth is constrained only by the availability and productivity of capital. The availability of capital, or the level of investment,

is determined by the level of savings. To achieve a target growth rate, a government must increase the level of savings or increase the productivity of capital. Often savings in developing countries are too low to achieve a target growth rate. Foreign aid can relieve the savings constraint, increasing investment and leading to a higher rate of growth (McGillivray et al, 2005).

In addition to a savings gap, Chenery and Bruno (1962) and Chenery and Strout (1966) identified a foreign exchange gap, noting that developing countries are unlikely to have the export earnings required to import capital goods for investment. Again, foreign aid can help fill this gap. They developed a 'dual gap' model. A third gap is identified by Bacha (1990) and Taylor (1990). They recognize that some developing country governments simply do not have the revenue raising capacity to cover a desired level of investment. Foreign aid provided directly to the government can potentially relax this fiscal gap as long as it is used for investment purposes (i.e. public investment). In summary, gap models assert that foreign aid can supplement savings, foreign exchange, and domestic revenues. This allows for a greater level of savings and investment which will lead to a higher growth rate. Despite the existence of three gaps which aid can potentially fill, the earliest aid effectiveness studies focused on the first of these gaps and therefore the relationships between foreign aid and savings. The theoretical base underlying the earlier empirical work is the Harrod-Domar growth model with the causal chain running from aid to savings to investment to growth.

Hansen and Tarp (2001) argued that the core of the Harrod-Domar model is the Leontief production function and the assumption of excess supply of labor, no substitution among production inputs is possible, and output is linearly related to capital, i.e., the scarce factor of production. Capital accumulation is then the key to development. The only way in which savings, domestic and foreign (including aid), can impact on growth in this model is through the accumulation of physical capital, i.e., investment. Assuming the capital-output ratio, v is constant, the change in potential output, is given as

$\Delta Y = 1/v\ (\Delta K)$ ..... (1)

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

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

$\Delta Y/Y = (1/v).(I/Y) — \delta$ ..... (2)

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

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

In an open economy the relation between savings and investment is defined as

$I_t = S_t + F_t = S_t + A_t + Fp_t + Fo_t$, ...(3)

where *Ft* is the total inflow of foreign resources, including aid, *At*, as well as private and other foreign inflows, respectively *Fpt* and *Fot*. Expressing domestic savings, St , and foreign inflows as fractions of *Yt*, the following identity appears:

$i_t = s_t + a_t + fp_t + fo_t$ .....(4)

Assuming that $\partial fpt/\partial at = \partial fot/\partial at = 0$, i.e., aid has no impact on private and other foreign inflows, the marginal effect of aid on investment reduces to

$\partial i_t/\partial a_t = \partial s_t/\partial a_t + 1$.....(5)

Going back to the early empirical literature, the following simple equation was often used in analyzing the aid-savings relation:

$S_t = \alpha_0 + \alpha_1 a_t$…….. (6)

Where α_0 is the marginal savings rate and α_1 captures the impact of aid inflows (as a share of income) on the savings rate. Moreover, *ft* was regularly used as a proxy for *at* due to lack of appropriate data on aid flows.

The above equation is a crucial relationship in the aid-growth debate. For example, White (1992), in his survey, argued that there is no agreement as to the positive or negative relationship between aid and savings and, with no empirical basis, suggests that the relationship may be positive. The sign and magnitude of the aid-saving parameter has as already been given the focus of much empirical debate, rather than the amount of resources available for investment.

An extensive and interesting survey on earlier studies of the aid-savings relationship was conducted by Hansen and Tarp, and McGillivray et.al. Most importantly Hansen and Tarp's survey is based on a comprehensive inventory, including 131 cross-country regressions, where aid is treated as an exogenous variable, identified in the literature published from the late 1960s to 1998. Studies in which aid is an endogenous variable are few, mostly of recent date, and merit special attention in the discussion made in the subsequent sections.

Regarding the explanatory variables the main focus is aid inflows. However, in many of the early aid effectiveness studies aid flows are not identified separately from other foreign capital inflows. They have classified the 131 regression results in two groups. In the first group, with a total of 104 regressions, the explanatory variables include a clearly identified measure of aid (A), roughly equivalent to the DAC (Development Assistant Committee) concept of official development assistance (ODA). The remaining 27 studies, in which aid cannot be separated from the various aggregate foreign inflow measures (F), were placed in a second group. The number of regressions in which the impact of either A or F on respectively S, I, and G is analyzed adds up to respectively 41, 18, and 72. Finally, they have recorded the number of significantly positive, insignificant, and significantly negative relations between the dependent and the explanatory variables.

Table 1: Summary of the empirical findings of savings, investment and growth (Hansen and Tarp, 2000)

Explanatory variable	A				F			
Dependent variable	-	0	+	total	-	0	+	total
savings	14	10	0	24	11	5	1	17
Savings*	1	13	8	22	0	7	10	17
Investment	0	1	15	16	0	0	2	2
Growth	1	25	38	64	0	6	2	8

Note: in the first row (savings row) the null hypothesis is $\alpha_1=0$ and are tested at 5% significance level. The null hypothesis in the second row (savings*) is $\alpha_1=-1$. Hence the (-), (0), (+) cells represent $\alpha_1 < -1$, $\alpha_1=-1$ and $\alpha_1> -1$.

From Table 1, it is clear that there is only one study reporting an estimate of α_1 which is significantly greater than zero. Hence, arguments suggesting that the impact of aid on domestic savings is positive are speculative. Moreover the positive impact is not explicitly identified as its effect is not distinguished from the other flows of foreign capital. More than 60% of the observations in Table 1 (row 1) show a significant negative coefficient from aid to savings. This suggests that aid cannot be assumed to increase total savings on a one-to-one basis, or at best aid crowds out domestic savings.

The empirical results rather show the pitfalls of the Harrod-Domar model in capturing the expected positive relationship between foreign capital flows and savings. In fact, these studies generally find a negative association between the two. An explanation for these findings is provided by Griffin (1970) and Griffin and Enos (1970). They contested the assertion of gap models that foreign aid leads to a one-to-one increase in savings, arguing that unless an aid recipient's marginal propensity to save is equal to one, a part of foreign aid will be allocated to consumption rather than savings. In his empirical analysis using cross-country data Griffin (1970) found support for this argument, reporting a negative association between capital inflows and domestic savings. The result was supported by Rahman(1968) and Weisskpof(1972)(cited by McGillivray et al,2005), although Gupta(1970) finds no relationship between foreign capital inflows and domestic savings.

The negative results in table 1(row 1) can be interpreted as foreign aid is harmful to growth, or equally aid retards growth. However, Papanek (1972) gave a number of reasons for expecting a negative link between aid and savings. The issue is not, however, whether the coefficient is negative, but whether it is between 0 and -1. A negative α_1 parameter in the aid-savings relation is consistent with a positive aid-impact on total investment as long as $\alpha_1>-1$. When $\alpha_{1=}$ -1, aid has no impact on investment, and only when $\alpha_1<-1$ can it be concluded that the impact of aid on investment, and therefore growth, is harmful.

Papanek's argument is supported by the literature survey of Hansen and Tarp (2001) which is presented in row 2 of table 1 using $\alpha_{1=}$ -1 as a null hypothesis. As it is already presented in the table the number of studies with α_1 estimates significantly less than -1 is limited to one observation. In contrast, there are a total of 18 analyses where the aid impact is significantly greater than -1, leaving 20 regressions where α_1 is not significantly different from -1.

From the first-generation studies some important conclusions can be drawn. Neither extreme view of the aid-savings-growth link is valid. There is no evidence for a positive impact, and in only one study does aid lead to lower total savings. The overwhelming evidence from these studies is that aid leads to an increase in total savings; although not by as much as the aid flow (i.e. the one to one aid-saving relation is however not supported.) Given the underlying Harrod-Domar model, the implication is that aid spurs growth.

2.2 Aid, Investment and Growth

In the preceding section the discussion focused on the indirect effect of aid on economic growth through its effect on savings and then investment based on the Harrod-Domar growth model. In the second generation of empirical work, focus turned to estimating the link between aid and growth. Some estimated the link via investment and some directly in reduced form equations.

Regardless of the choice of growth model, the view is that investment is the major direct determinant of growth. However, not all aid is intended for investment, and not all investment is financed by aid. However, most of the aid effectiveness literatures are deficient in this aspect as investment is omitted from the growth equation and as a result no room is given for the transmission mechanism.

Papanek (1973) provides the first study to disaggregate foreign capital flows into foreign aid, foreign investment, and other flows. Although the study investigated the impact of foreign aid on domestic savings, it was also influential in turning the focus of aid effectiveness studies to

examining the impact of aid on investment and growth. The model, and most models in subsequent studies, takes the form:

$$I_i = \alpha_0 + \alpha_1 Si + \alpha_2 Ai + \alpha_3 Pi + \alpha_4 Oi + \mu i, \quad \ldots\ldots(7)$$

where I is investment in recipient i,S is domestic savings, A represents foreign aid flows, P represents private capital flows, O represents other foreign capital inflows and μ_i is an error term. He found strong evidence that foreign aid flows are positively associated with higher growth rates in recipient countries. A number of aid effectiveness studies followed Papanek (1973), often augmenting his model with other explanatory variables.

Table 1(row 3) supports the view that aid positively associates with investment. Levy (1987, 1988) found a similar result which confirmed that aid has a positive and statistically significant association with investment. However, a cross country study on 88 countries aimed at investigating the impact of aid on investment and growth for the period 1965-1995 by Easterly (1999) did not support Levy's result. Out of 88 countries only 6 of them pass the test of positive and significant coefficient when investment is regressed on ODA. Boone (1996) also failed to confirm Levy's finding. However, no overall consensus emerged regarding aid effectiveness.

A second strand of the second-generation literature explores the link between aid and growth in reduced form equations. Over the past 30 years no less than 72 cross-country studies have tested whether or not a direct impact of aid on growth can be identified (Hansen and Tarp, 2001). Accordingly, the typical second-generation aid-growth regression is:

$$Gi = \alpha_0 + \alpha_1 Si + \alpha_2 Ai + \alpha_3 Pi + \alpha_4 Oi + \mu i \quad \ldots\ldots(8)$$

This reduced form equation is consistent with a variety of alternative structural models.

As shown in Table 1 (row 4), there is only one result in Hansen and Tarp (2001) survey that indicates a directly harmful effect of aid on growth. On the other hand, among the remaining 71 analyses, 40 show a positive impact of aid on growth, while 31 show no statistically significant impact. It is important to note that even though the majority of the aid-growth studies were modeled like the above equation, there are also others who used a different approach of specification and additional variables being incorporated. Mosley (1980) made an important contribution to the literature by incorporating lagged aid variables into his model and by

accounting for the potential endogeneity of aid. Mosley estimated his model using a two stage least squares and data for 83 developing countries covering the period 1970-77. On average, he finds a negative association between aid and growth although the coefficient on the aid variable is not statistically significant. However, a positive and statistically significant impact of foreign aid was found when the sample is restricted to the poorest 30 countries in the sample and aid is lagged five years.

Mosley et al. (1987) provide one the most-cited studies of aid effectiveness during the 1980s. They used different estimation techniques to investigate the impact of aid on growth for 63 countries over the period 1970-80. Results using OLS are compared with those from estimating a simultaneous equation system using 3SLS (three stage least squares). They found no statistically significant relationship between aid and growth using various sub periods and samples of developing countries.

However, findings from other studies do provide support for Papanek (1973). Gupta and Islam (1983) study find that aid did not supplement domestic savings, however they find a positive and statistically significant association between aid and growth at the 10 percent level in the 1960s and at 1 percent during the 1970s. Dowling and Heimenz(1982) also account for the endogeneity of foreign aid and confirm a positive and statistically significant relationship between foreign aid and economic growth in Asia.

Boone (1996) provides the stimulus for the aid effectiveness debate from the mid 1990s. Using panel data for 91 countries covering the period 1971-90, Boone investigated the impact of foreign aid on investment, consumption, and measures of well-being. He also examined whether aid effectiveness was conditional on political regime. Results indicate that foreign aid leads to increases in government consumption rather than increasing investment or benefiting the poor. Although aid effectiveness is not contingent on the level of democracy, Boone finds that liberal political regimes and democracies, ceteris paribus, have on average 30 percent lower infant mortality than the least free regimes.

Up to the late 1990s the macroeconmic impact of foreign aid on recipient country remains controversial. Despite differences in the methodology (especially model specification), time period covered, variables included and number of countries investigated in the studies, and there are literatures of both with success and failure stories of development aid. They produced mixed and sometimes controversial results. In line with this McGillivray et al. (2005) pointed out that there was no consensus regarding the impact of foreign aid on economic growth. Results from empirical studies were ambiguous with no conclusive evidence that foreign aid was effective at increasing economic growth in recipient countries. Others (notably White (1992)) argue that such controversial and inconclusive findings were due to the combination of weak theory with poor econometric methodology.

2.3 Aid, Policies, Growth and Beyond

The aid effectiveness study in the third generation is very much distinct from the earlier studies and relatively answered some of the challenges faced by the earlier studies. The publication of the *Assessing Aid* report by the World Bank in 1998 provided a new stimulus to the discussion and empirical works on the macroeconomic effectiveness of development aid. Hansen and Tarp (2000) indicated that the study by the third generation break novel grounds in four areas. First, they work with panel data for a number of years and a large number of countries. The data cover a large share of developing country trade and other economic activity. Second, new growth theory has inspired the analysis in distinct ways, providing a different analytical basis compared to previous work. Measures of economic policy and the institutional environment are included directly in the reduced form growth regressions alongside traditional macroeconomic variables. Third, endogenity of aid and other variables is addressed explicitly in some studies. Finally, the aid-growth relationship is explicitly seen as non-linear. Generally, the majority of the studies were based on a model specification similar to the model below or with minor adjustment:

$$Gi = \beta_0 + \beta_1 Ai + \beta_2 A^2 i + \beta_3 Pi + \beta_4 (Ai*Pi) + \beta_5 Zi + \varepsilon i \quad \text{.........} (9)$$

where G is the per capita growth rate, A is foreign aid flows, P is a measure of the domestic macroeconomic policy and institutional environment, Z is a vector of variables that are normally included in models explaining per capita growth and εi is an error term, and i relates to recipient

country i. The squared aid term(A^2) takes into account the non linearity of aid; the variable(A*P) deals with explicitly linking the impact of aid to economic policies and the institutional environment in the recipient countries and/or to external conditions these countries are confronted with.

The Assessing Aid report states that aid does help to increase growth, but only in countries with sound economic management, or 'good governance'. In the language of the report this is generally translated into 'good' economic policies and building 'strong' institutions. The main conclusion of the report is therefore that aid should be allocated based on selecting recipient countries according to their policy environment. The report is based on an influential paper by Burnside and Dollar (1997, 2000) and Collier and Dollar (2002). These papers have received a wide public attention and discussed extensively by a number of researchers in the area. Burnside and Dollar used a new database on foreign aid to examine the relationships among foreign aid, policies, growth of per capita GDP and a number of explanatory variables that are normally included in growth models. In a panel growth regression for 56 developing countries(40 low income countries and 16 middle-income countries) and six four year periods(1970-93), they find that policies that have a great effect on growth are those related to fiscal surplus, inflation and, and trade openness. They have constructed an index for those three policies and have that index interact with foreign aid. The policy index is a weighted index of the budget surplus to GDP ratio, the inflation rate and an index reflecting trade openness as constructed by Sachs and Warner (1995). These variables are seen as proxies for fiscal, monetary and trade policy, respectively. The weights are obtained from a growth equation, which includes these three measures, along with a measure of other variables. Their finding indicated that aid has a positive impact on growth in developing countries with good fiscal, monetary and trade policies. In the presence of poor policies, aid has no positive impact on growth. Their finding has important implications: If aid is given to countries without these good policies the aid flows can be considered wasted, since they will not stimulate higher economic growth. As a result donors may respond to macroeconomic policy environment. However, they examined the determinants of policy and find no evidence that aid has systematically affected policies, either for good or for ill. Moreover, their finding is robust whether policies are treated as exogenous or endogenous.

Collier and Dollar (2002) determine the poverty-efficient allocation of aid. They estimated that with the present allocation, aid lifts around 30 million people permanently out of poverty each year. According to them reallocating aid to poor countries with a good policy i.e. with a poverty-efficient allocation this would increase to around 80 million per year.

Assessing aid report has provoked a huge reaction in the research community. Several researchers have tried to replicate the econometric methodology used most importantly by Burnside and Dollar. However, it is difficult to find a result which confirms Burnside and Dollar's finding. Among the most important researches in response to the report was those conducted by Dalgaard and Hansen (2001), Hansen and Tarp (2001), Lensink and White (2001), Jensen and Paldam(2003) and Islam(2002). All of them tried to analyze the aid-growth relationship by using the aid-policy interaction term as suggested by Burnside and Dollar. Although these studies use different data sets, a bit different model specification like the consideration of the squared aid term, different time periods and differences in the inclusion of explanatory variables, it is surprising that none of them find a statistically significant aid-policy interaction.

Dalgaard and Hansen (2000) using the same data set used by Burnside and Dollar argued that the finding of a more positive impact of aid on growth in good policy environments is not a robust result. It depends crucially on deletion of a few influential observations (Burnside and Dollar have deleted five influential observations) and has an influence on the final finding. They have obtained a positive effect of aid on growth in any policy environment. Guillaumont and Chauvet (2001) also fail to find significance for aid-policy interaction term, and instead offer evidence that aid works best in countries with difficult economic environments, characterized by volatile and declining terms of trade, low population, and natural disasters. The strongest critics against BD'S finding come from Easterly et.al(2004).They use the same data set, model specification, and econometric technique as Burnside and Dollar(BD) and extend the data set using four more years until 1997.And they conclude that the interactive term is no longer statistically significant. Roodman (2004) also finds little empirical evidence to support the aid-policy interaction.

To date three studies find support for the Burnside-Dollar result on the importance of a good economic policy environment in determining the effectiveness of aid: Collier and Dehn(2001), Collier and Hoeffler (2002) and Collier and Dollar(2002) (cited by McGillivray,2005)

Therefore, the importance given for good policy for aid effectiveness by BD is not secured by other empirical works and it seems that their conclusion is incredible. Also there is a claim for a broader definition of policy to incorporate other institutional and climatic variables. BD's work is also criticized on the selection of variables in the policy index (see McGillivray).

2.4 Alternative Perspectives on the Aid-Growth Debate

In response to the explanation of the World Bank's Aid Assessing report, a large number of researchers have devoted their time and effort in looking for an alternative explanation for aid effectiveness. Basically, five main alternative views can be traced: aid has decreasing returns, volatility of aid flows causing uncertainty, aid effectiveness is influenced by external and climatic conditions , aid effectiveness is influenced by political conditions and aid effectiveness depends on institutional quality.

2.4.1 Decreasing Returns to Aid

This is based on the suggestion made by several authors that aid has a deceasing return after a certain threshold level i.e. there is a threshold value of aid below which aid tends to have a positive effect on economic growth and beyond which diminishing returns to aid may generate a non-positive impact on growth. To investigate the decreasing returns to aid hypothesis a squared aid (A^2) term is included in the growth model. Most studies using the specification find support for a negative effect of aid after a certain threshold level (Dalgaard and Hansen 2001; Hansen and Tarp 2004; Durbarry, Gemmel and Greenway 1998; Lensink and White 2001). The decreasing returns to aid are explained by the limited absorptive capacity of the recipient country for a large inflow of capital. Chauvet and Guillamont (2003) indicated that the main factors identified as limiting absorptive capacity are related both to the level of human capital and to the

quality of infrastructure. The threshold level of aid to GDP varies between 15 to 45 percent (Feeny, 2003).

Similarly Denkabe(2003) supports the existence of a threshold value of aid, defined by macroeconomic policy, below which aid tends to have a positive effect on economic growth and beyond which diminishing returns to aid may generate a non-positive impact on growth. He further indicated that as compared to a relatively 'good policy environment', a relatively 'bad' policy environment experiences diminishing returns to aid relatively more quickly. This could be attributed to the inability to effectively absorb aid.

There are also studies that don't support the decreasing returns to aid hypothesis. Gomanee et al. (2003) show that aid only becomes effective after the aid to GDP ratio has reached a threshold of 2 per cent. However, they don't find evidence for having decreasing returns after this threshold level. Another study by Jensen and Paldam(2003) investigates the claim that giving aid has a decreasing returns and find that the quadratic aid term is no longer significant.

2.4.2 Aid Uncertainty

The other explanation of recent studies for aid effectiveness is explained by the volatility of aid inflow. Lensink and Morrissey (2000) investigate the effect of the instability of aid on economic growth. They argued that what matters is not the level of aid flow but the stability of aid that determines the effectiveness of aid. In their analysis, the volatility of aid is seen as a measure of the uncertainty of aid flows of a recipient country. The uncertainty of aid flows is measured as the deviation of actual aid flows from the expected level, where expected flows are on a simple auto-regressive process either with a trend or without a trend. The reasons for aid uncertainty may be due to donor country policies, or external shocks. Whatever the case may be aid uncertainty has an impact on investment(especially public investment) ,government fiscal behavior and on economic growth .Uncertainty of aid flows has an adverse effect on the level of investment(especially public investment) and thus on growth. It also increases the budget deficit since aid is an important source of revenue for the government. This implies that aid volatility has an adverse effect on fiscal policy.

Lensink and Morissey(2000) incorporate measure of aid uncertainty to a growth equation with other explanatory variables including aid flows. They find that aid uncertainty is consistently and

significantly negatively related to growth and it is robust. Investment appeared to be the principal determinant of growth and, when included with investment, foreign aid does not have a robust effect on growth. The results suggest that aid, controlling for uncertainty, has a robust effect on economic growth via the level of investment. This suggests inflow of aid promotes economic growth but its effectiveness is constrained by volatility of aid. They suggest that stability in donor-recipient relationships should enhance the effectiveness of aid, by making it easier for recipients to predict future aid inflows that may permit more investment and better fiscal planning.

A more recent study by Chervin and Wijnbergen(2009) confirms the findings of Lensink and Morrissey. They examine the impact of the *volatility* of aid on economic growth. A four-year panel analysis was conducted encompassing 155 countries over the period 1966-2001. They find that once the volatility of aid is controlled for, aid has a positive impact on economic growth. Correspondingly, volatility of aid flows is found to be negatively related to growth. However, in contrary to the above finding their results show that no significant link between investment and foreign aid exists. Rather they found a positive correlation between aid and consumption and a negative link between aid volatility and consumption.

2.4.3 External and Climatic condition

As a reaction to the Assessing Aid report and also the motive to find factors which can better explain aid effectiveness in a wider context, some researchers attributed aid effectiveness to external and climatic factors, rather than on the economic policy environment. Aid effects on growth are not necessarily positive and that they depend on specific conditions in each recipient country. McGillivray et al (2005) pointed out that such factors are the trends in the terms of trade, short term export instability and natural disasters like floods, droughts, and earthquakes.

Guillaumont and Chauvet (1999) find that the effectiveness of aid is the entire more positive a country faces a bad environment: aid seems to have accelerated growth only in the more vulnerable countries. In other words, aid has decreased the negative effects of a bad environment. But they do not find that aid effectiveness (in growth terms) has been increased by a better policy. They argued that a better policy is an important factor of growth, but the impact

of which, it seems, is not increased by aid. Their finding also show that aid allocation has been influenced by the environment (aid reacts positively to the vulnerability), but not by policy. The authors used both aid interacted with external environment and aid interacted with policy as suggested by Burnside and Dollar. The result of the analysis show that aid interacted with an external environment indicator has a statistically positive impact on growth. However, the aid-policy index interaction doesn't produce a statistically significant result. Therefore, their finding fails to support the claim that aid is more effective in good policy environment. Guillaumont and Chauvet suggest that aid should be allocated based on a country's performance of economic policies, taking into account the impact of external and climatic factors on the country's growth performance.

Dalgaard, Hansen and Tarp(2003) augment the Burnside-Dollar models by including climate related variables: the fraction of land in the tropics and an interaction term involving aid. The result is that aid interacted policy becomes statistically insignificant; while aid and aid interacted with the fraction of land in the tropics are both highly significant. Their finding also pointed out that aid is more effective outside the tropics. Aid has a strong positive impact on growth outside the tropical region, while the impact is much smaller9poor) in tropics. Despite massive flows of aid to the tropics foreign aid remained less effective in promoting growth and the living standards of the poor. However, rather than finding the real cause of aid ineffectiveness, attributing all for location seems irrelevant and unacceptable.

2.4.4 Political Instability

Political instability has an important implication for the effectiveness of aid: for aid to be effective needs not only good macroeconomic policy environment that fosters savings, investment and growth but political stability also matters. Political instability refers to irregular changes in the political system. It is caused by change in the political system either due to frequent elections or political violence such as assassinations, strikes, riots, etc. Political instability lead to unpredictable political and economic environment which may act as a disincentive for investment, consumption and lower economic growth.

Islam (2002) considered the aid-political instability-growth linkage for a sample of 21 sub-Saharan African and 11 Asian countries for the period 1968-1997 by using a measure of political index. Islam finds on average that aid has little impact on economic growth but aid promotes growth only in a politically stable environment regardless of the country's economic policies. In other words, aid is ineffective in unstable political environment even the policies are good enough.

Guillaumont and Chauvet (2003) used an augmented Burnside –Dollar type model and growth equation is estimated on 5-year sub periods from 1965 to 1999 for 59 developing countries. They include a political instability measure, which is a composite of the number of coups d'états and a measure of regime changes and find the evidence that aid is more effective in politically stable environment. They used an aid-political instability interaction term and find that it affects economic growth negatively and significantly. The finding supports Islam's idea that aid effectiveness is conditional on a stable political environment. Both studies show that aid's impact on growth is hindered by an unstable and uncertain political environment.

2.5 Time Series Studies

The aid-growth literature is dominated by cross-country studies of growth regression and has also been criticized for methodological short comings. Studies of the relationship between aid and growth of the area produce mixed results. However, country studies also failed to produce any conclusive results. The objective of this section is to examine the possible relationship between aid and growth in time series country-specific growth regression. Unlike the cross-country growth regressions which mix a number of heterogeneous countries with different economic policy environment, institutional setup, natural resource endowment, and so on together, this section analyses the impact of foreign aid on economic growth in the context of a single country.

After more than thirty five years of development assistance, and spending over one trillion dollars for foreign aid, more than one billion people live on less than $US 1 per day(World Bank,1998). This casts doubt about the effectiveness of aid. Early development economists attributed problems of growth to lack of capital (or low saving) and foreign exchange constraints.

In that context foreign aid has been considered vital for breaking the vicious circle of poverty and low growth.

Mallik(2007) argued the significant negative effect of foreign aid on economic growth in sub-Saharan African(SSA) countries. He pointed that for most SSA countries the more foreign aid they have received, the more aid dependent they have become. As growth faltered despite massive aid flows, foreign aid has bound them into a debt trap.

Mallik(2007) examined the effectiveness of foreign aid on economic growth using a cointegration analysis for the period 1965-2005 in the six poorest highly aid dependent African countries: Central African Republic, Malawi, Mali, Niger, Sierra Leone and Togo. He used the following variables in the study: real gross domestic product, aid as percentage of GDP, investment as a share of GDP and openness. The study made a distinction between the long-run and short-run impact of foreign aid on economic growth using country specific data by applying cointegration technique and error correction (ECM) method. The empirical result, estimated for each country, shows that in the five out of the six countries, foreign aid has a significant negative long run effect on economic growth, the only exception was Togo. Foreign has a long run positive impact on growth in Togo. Given that the six selected countries have common characteristics like low income and low human capital, the effectiveness of aid in Togo may be associated to the favorable macroeconomic policy environment. In the short run aid has no significant effect on economic growth per capita for most of the countries except for Niger. The negative effect of foreign aid indicated the long-term deleterious effect of international aid on living standard in these countries. However, the negative impact of aid may not show the reality of aid ineffectiveness in those countries but rather the short comings in the model specification. The problem is that aid and investment are used together as explanatory variables which lead to the problem of double counting as part of foreign aid is used to finance investment(see Girma, Gomanee and Morrissey, 2005).

However, other studies support for the effectiveness of foreign aid in promoting growth. Jayaraman and Choong(2006) analyzed the effectiveness of foreign aid in Fiji using a multivariate cointegration method for the period 1970-2002. They have specified per capita growth using per capita aid and per capita aid squared among other variables. The cointegration result show that aid contributes positively to growth and is subject to diminishing returns.

Contribution of aid to growth is accompanied by diminishing returns of aid to growth and indicates that benefits from aid increase with initial flows but after achieving a certain level, its positive impact begin to decline. As a result the country would actually be better off with less aid due to limited absorptive capacity. They have calculated the break-even point (threshold level) below which aid is effective and ineffective otherwise. Accordingly the turning point of per capita aid is $74.17 Fijian dollar. This means that if Fiji's foreign aid reaches about $74.17, contribution of aid will crawl to zero; and if aid exceeds this value, there would be a negative impact of aid on economic growth, as the law of diminishing returns would operate.

They have further examined the effectiveness of foreign aid by using the interaction term between per capita aid and the ratio of wages and salaries to total expenditure. This is to identify whether aid effectiveness is conditional on controlled government consumption or not. The result showed that aid is effective when government consumption is under control. However, such interaction term should not be taken as a good measure for aid effectiveness. For instance, the government may use aid fund to pay salaries of teachers and health workers, which are part of enhancing human capital and as a result should not be treated as a wasted aid fund.

Another study investigating the impact of foreign aid and fiscal policy on growth using a disaggregated aid was conducted for Kenya and it produces a mixed result. This is indeed a new approach as the majority of the literature did not attempt to disaggregate official development assistance into its loan and grant component. M'amanja, Lyold and Morrissey (2005) examined the effect of fiscal variables (government expenditure and revenue) and aid on growth using annual time series data for Kenya over the period 1964-2002. They have applied and estimated a multivariate cointegration (VAR) and vector error correction models (VECM) to establish both the short- and long-run relationships between foreign aid, fiscal variables and growth of per capita income. Two measures of aid were used; external grants and loan, and both yield different results. Aid loans were found to have a negative impact on long run growth whilst grants have a positive one. The result supported a case for aid effectiveness (especially if the aid is given in the form of grants) and associated with fiscal discipline.

But the result is ambiguous to conclude as the outcome is unknown if an aggregate measure of aid had been used in the study. Further the negative impact of loan can be taken as a signal for the negative effect of debt servicing on investment (crowding out investment) and growth of per

capita GDP because the loans received from donors have its debt servicing component. The fiscal variables are pro growth in the long run. They have found that government spending have a positive long run influence on growth and did not find any evidence that taxes retard growth. The overall result pointed the mixed impact of aid on growth.

Battarai(2005) examined the effectiveness of foreign aid and its link with savings, investment and per capita growth in Nepal using a time series data for the period 1970-2002, and employs cointegration and error correction mechanism as the estimation procedure and method of analysis. The result found supported for the effectiveness of aid as aid has a positive and significant relationship with per capita real GDP, savings and investment in the long run. However, fiscal response analysis indicated that more aid is spent on non-development expenditure than development expenditure and that aid did not have a negative effect on domestic revenue collection. The study also showed that aid effectiveness is conditional on a good macroeconomic policy environment, that is, one characterized by a stable macroeconomy, openness to trade and a liberalized financial sector.

Furthermore the study analyzed effectiveness of aid by its source: bilateral and multilateral, and disaggregated by type: loan and grant component. The result revealed that bilateral and multilateral aid is equally effective in the long run. Off course, both could not have a different effect unless there are differences in the conditionality tied with the aid, in the interest rate charged and volatility of aid flow. However, lending by multilateral lending institutions is at a concessional rate with a maturity periods of longer period unlike the bilateral sources which may be a bit higher. Similar to the case in Kenya, grants has a strong positive association with real per capita GDP in the long run than loans aid in Nepal.

The short run relationship, however, did not support the long run positive association between aid and per capita real GDP. In the short run aid was found to be negatively integrated with growth, both in its aggregated and disaggregated forms. Given the long run result, this may indicate the lack of absorptive capacity in the short run. Even though the study failed to separate investment financed by aid from not, it indicated that investment is the main (even though it is not the only possible way) transmission mechanism that aid can impact on growth. The other important finding was that aid supplements domestic saving and did not serve as a substitute for domestic resource. Moreover investment is more responsive to domestic saving than foreign aid.

2.6 Empirical studies of Aid, Growth and Policies in Ethiopia

As Ethiopia's economy is characterized by a massive inflow of foreign capital (most specifically foreign aid), it is imperative to review studies conducted on similar area. However, the available studies are quite few in number.

Mesfin(2007) examined the fiscal impact of foreign aid(disaggregated in to loan and grant) and its overall relationships with economic growth in Ethiopia covering over the period 1960/61 to 2004/05. He analyzed the data applying a vector autoregressive modeling mechanism. The result obtained shows that the inflow of foreign aid has a strong positive relationship with growth in the long run. The result further indicated that the positive association between foreign aid and economic growth is attributed to the incremental effect that aid has on government expenditure i.e. the transmission mechanism of foreign aid to growth is through the channel of government expenditure. The study also showed that foreign aid has a negative impact on tax revenue but it improves the fiscal position (closing the fiscal gap) unlike government expenditure. Generally, Mesfin's (2007) study show that increases in foreign aid result in higher government expenditure, and has significant positive long term impact on economic growth.

However, the study failed to identify foreign aid financed government expenditure from not. As a result, all the effect may be attributed to aid while the case may be not. He also included both government expenditure and foreign aid in the determination of the growth model. This may resulted in problem of double counting as part of aid finances government expenditure especially through public investment. Despite the mentioned problems, the study indicated that there exists a role for aid effectiveness in Ethiopia in the long run.

Tolessa(2001) examined the relationship between foreign aid(in disaggregated form: loan and grant), domestic savings, investment and economic growth for the period 1964/65 to 1998/99 using Johansen's maximum likelihood estimation procedure. He specified and estimated three equations: saving, investment and growth equations. The result obtained from the investment equation showed that both foreign loan and domestic saving promote domestic capital formation. However, the study found that the grant element of foreign aid has negligible effect on domestic capital formation.

The result obtained from the growth equation also showed that saving and loan have a positive impact on growth while grant has an adverse effect on growth of per capita income. Tolessa also included an index of policy variables to see whether aid effectiveness is conditional on good policy environment. The finding showed that policy affects growth significantly and negatively.

However, the model used in the study is poorly specified. The main weakness of the specification is that the problem associated with double counting: for instance, he used loan and grant as explanatory variables both in the saving, and investment equation, and more over he used saving as an explanatory variable in the investment equation. Therefore, the result obtained may not reflect the true relationship between the variables and it may produce a biased result.

Another study by Wondwesen(2003) analyzing the impact of foreign aid on growth on annual data covering the period 1962/63 to 2000/01 applying Johansen's maximum likelihood technique found that aid has significant contribution to investment both in the short run and long run. Aid is found to be ineffective in enhancing growth. However, he found that when aid is interacted with policy, the growth impact of aid found to be significant-i.e. aid is conditional on quality policy environment. His result further implied that attention should be focused on improving the existing macroeconomic policy environment for an inflow of aid to be used effectively. The study is better than the other study at least in two aspects; the first reason is that he tried to incorporate recent advances in the aid-growth link literature, and the second one is that the models are specified in a good manner. This study is different from the previous studies in the following aspects i.e., it incorporates the recent advances in the literature, construction of a broader policy index, and considering other variables (notably rainfall variability) to the growth equation.

CHAPTER THREE

3 METHODOLOGY

3.1 Data and Data Sources

The study is based on a country level macro-data covering the period from 1970 to 2009.The choice of the period is based on the availability of relevant data for the study. The relevant data was collected from various sources: National Bank of Ethiopia (NBE), Central Statistical Authority (CSA), Ministry of Finance and Economic Development (MoFED), Ethiopian Economic Association (EEA), National Metrology Agency, International Monetary Fund (IMF) database, Penn World Table and other sources which are perceived to be relevant and reliable. The method employed in the study is based on recent advancements in the theoretical and empirical aid-growth relationships. As a result two equations are specified and estimated i.e. investment and growth equations. As the data used is time series, various tests are performed including testing for stationarity (unit root test), cointegration test and weak exogeneity test. The rank of cointegration is determined by using the Johansen maximum likelihood procedure method. And causality test in VECM is also conducted to test the causal relationship between some of the co-integrated variables in the model.

3.2 Description of Variables and Model specification

Before issues related to the specification of the regression models are discussed, a brief description of the variables and relevant issues and concepts used in the investment equation is given below.

The variables included in the investment equation are:

I: the ratio of gross domestic investment to GDP

S: the ratio of gross domestic savings to GDP. Growth theories based on the Harrod-Domar model emphasize the role of savings in fostering investment and growth. Ensuring an adequate level of domestic savings is important as foreign savings can be volatile and is not easily predictable. A theoretical link between saving and investment is less ambiguous for closed economies. However, the relationship is complicated if the economy is an open one. Schmidt-

Hebbel, Serven and Solimano(1994) argued that in an open economy capital inflows introduce a distinction between *ex post* national savings and domestic investment. National savings need not be used for domestic investment; it may be invested abroad where the return from investment is higher.

A: the ratio of Official Development Assistance (ODA) to GDP as defined by the DAC (Development Assistant Committee): ODA is defined as pure grants and concessional flows from bilateral governments and their agencies as well as multilateral financing agencies to the developing countries at low rates of interest with maturity periods of a long-term nature, all of them containing a grant element of at least 25 %. Investment is considered to be the main channel through which aid impacts on growth. A number of theoretical and empirical studies show the presence of a positive association between aid and investment.

UA: the ratio of the deviation of actual aid flow from the expected level to GDP. Uncertainty of aid flow can be measured by two different ways: the deviation of actual flow of ODA from the budgeted level (expected level) which is announced by the government at the beginning of each year. Since such data of expectation is scarce and can't be found for a longer time period, an *alternative method (auto-regressive estimates of expected aid)* to compute the expected volume of aid is used. This is based on auto-regressive estimates to capture deviations from an expected trend. These measures are intended to proxy for *uncertainty* in aid receipts. The auto-regressive result for expected aid trend is given in appendix I.

The expected aid flow is based on auto-regressive estimate of the following regression:

$$(A)_t = a_1 + a_2(A)_{t-1} + a_3(A)_{t-2} + \varepsilon_t \quad \text{...(10)}$$

Where: A is aid as percentage of GDP, the subscripts t-1 and t-2 denote aid lagged one and two period respectively and ε is white noise error term. Then the deviation of the actual aid flow from the expected trend is computed to capture uncertainty (unexpected instability) of aid flow.

The rationale for the generation of uncertainty of aid in such a manner is the implicit assumption that governments (the recipients of aid) have some form of adaptive expectations. Lensink and Morrissey (2001) indicated that aid commitments are generally known some years in advance, and one could expect a degree of continuity in donor-recipient relations. Furthermore, recipients

exercise some control over the disbursement of aid funds. Thus knowing past values of aid inflows, recipients should be able to anticipate some variability in aid. Uncertainty is therefore captured by unanticipated aid.

INF: annual average inflation rate. Inflation as one measure of macroeconomic instability is considered as a determinant of investment i.e. High rate of inflation is harmful because it raises the cost of borrowing and thus lowers the rate of capital investment, but at low, single-digit levels of inflation, the likelihood of such a trade-off between inflation and investment is minimal. Thus in line with this argument, in this paper inflation (regardless of being controlled in the Derg period) is considered to see the potential impact of macroeconomic instability on investment.

DS: the share of debt service to GDP. Debt service includes repayment of the principal (official loan) and its associated interest. As part of the current inflow of ODA (Official Development Assistance) is in the form of loan, the recipient needs to repay some time in the future and this may have an adverse effect on macroeconomic variables. Hjertholm, Laursen and White (1998) presented the adverse effects that debt servicing result, "If resource gaps are closed through debt-creating flows, problems may arise because of the cost difference to the recipient in the form of future repayments. This may have adverse implications for the savings, foreign exchange and fiscal gaps in the longer term and for macroeconomic performance more generally". Debt servicing has an adverse effect on government budget (especially with poor track of export performance) if the country's repayment capacity fails to improve. The government will use the limited foreign exchange to service its debt and as a result this may crowd out investment.

Accordingly, the model to be specified in is:

$$LI_t = \beta_0 + \beta_1 LS_t + \beta_2 LA_t + \beta_3 LUA_t + \beta_4 LDS_t + \beta_5 LINF_t + U_t \quad \ldots\ldots(11)$$

Where β_0 is the constant term, $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 are elasticity coefficients, and U_t is the white noise error term.

Description of variables which are used in the growth regression model:

Y: real GDP

I_{NA}: the ratio of non-aid financed investment to GDP. The variable I_{NA} is developed by using the technique of generated regressor as follows. Using residuals from an aid-investment bi-variate regression (capturing the transmission from aid to investment) i.e. aid is used as the only explanatory variable, a variable is constructed representing that part of investment which is not attributed to aid (I_{NA}): I_{NA} represents that part of investment which is not financed by foreign aid. Thus the level of investment not financed by foreign aid equation has the form:

$I = \alpha_0 + \alpha_1 A$…….. (11a)

From the above equation I_{NA} is the estimate of α_0. Then I_{NA} is used in place of investment in the growth regression. It is worth noting that this transformation affects only the estimated coefficient on the aid variables.

Empirical aid-growth regressions usually omit investment from their equation. Aid is intended to affect growth via its effect on investment. However, not all aid is intended for investment, and not all investment is financed by aid. If investment is omitted from the growth equation, there will be potential omitted variable bias—any effect of investment on growth is attributed to the other variables (especially aid) as argued by Girma, Gomannee and Morrissey (2005). If both aid and investment are included, there will be a problem of double counting (as part of aid is used for investment), and the coefficients are biased. Therefore, to address such problems Girma, Gomannee and Morrissey (2005) propose the technique of generated regressors (the mechanism of residual generated regressor). Using the technique, non-aid financed investment ($I_{NA)}$ is generated as:

$$\boldsymbol{I_{NA}=I-0.58A} \quad \text{……(11b)}$$

A: the ratio of ODA to GDP.

PA: an interaction between policy index (P) and aid (A) which capture whether aid is conditional on good policy environment or not. The policy index is developed based on Burnside and Dollar(1997) out of a regression result obtained from a growth equation. The growth model is comprised of budget surplus/deficit, openness to trade, credit access to the private sector, and telephone lines per 1000 people (covering aspects of fiscal, trade, monetary, and infrastructure policy) as an explanatory variable, and the coefficients of these variables are taken from the growth regression to construct the policy index. To account for openness to trade in the construction of the policy index (OPEN), a standard openness index, (X + M)/GDP is used.

Since the policy index constructed earlier are criticized for their narrowness in scope and failed to encompass a wider perspective of the economy, the policy index is augmented by telephone lines per 1000 people as a proxy for infrastructure policy. The result of the policy index obtained is:

$$P_t=10.98-0.067(BD)_t+0.81(OPEN)_t+0.44(CR)_t+0.55(TELE)_t \text{----------} (12)$$

BS/BD: overall budget surplus/deficit excluding grants

CR: credit access to the private sector-total amount of credit given to the private sector. Unlike the Burnside-Dollar (1997) approach which used inflation as a proxy for monetary policy, this paper instead used financial liberalization to the construction of policy index measured by credit access to the private sector. This is made with the belief that more access to credit to the private sector is a positive factor in motivating investment and growth. Inflation will be excluded from the construction of the policy index because prices remained in control for a long period of time through regulation and as a result it may not reflect the true success or failure of monetary policy in Ethiopia.

X: total value of goods and services exported

M: total value of goods and services imported

Tele: major telephone lines per 1000 people.

A^2: the square of ODA to GDP. This takes into account whether there is diminishing return to aid. The diminishing returns to aid hypothesis assume that an inflow of aid, above a certain level, starts to have negative effects. This happens because of the limited absorptive capacity of recipient countries.

RFV: rainfall variability. In countries like Ethiopia where almost half of the GDP is generated from agriculture, it is imperative to incorporate climatic shocks (most importantly rainfall shocks) into the growth equation. And shocks in fact may have an important implication for aid effectiveness as shocks (rainfall) has the power to offset any positive contribution made by foreign aid. Rainfall shock /variability (the annual deviation of rainfall from the normal pattern) influences the performance of the economy through its effect on the production and performance of the agricultural sector. In line with this argument, Alemayehu and Befekadu (2005) claimed

that the high dependency of economic growth on timely and adequate rainfall is among the structural constraints facing the Ethiopian economy.

Rainfall variability/ shock is measured by the annual deviation of rainfall from the long term mean average rainfall i.e. rainfall variability (RFV) =RF_t-$\overline{RF}$, RFt-annual rainfall at period t and $\overline{RF}$ represents the mean average rainfall. This helps us to identify the consequences of dependence on rain fed agriculture on the performance of the overall economy.

L: labor force (age from 15-64 years) as a percent of total population

D_{74} and D_{91}: dummy variable for major political changes (Derg and EPRDF) taken in to account to see the effect of major shifts in political environment on the performance of economic growth in the short run. The dummies are incorporated in to the VECM model for growth equation. For this reason, a dummy variable D_{74}(to capture the impact of major political change from the Imperial regime to Derg) and D_{91}(to capture the impact of major political shift from the Derg to EPRDF) is incorporated in the vector error correction model(VECM) to indicate the immediate impact of major political changes on economic growth. Thus D_{74} took a value of 1 for the year 1974 and 0 otherwise. Similarly, D_{91} took 1 for 1991 and 0 otherwise. Since it was not common to transfer political power in a peaceful manner in Ethiopia, political unrest and violence resulted consequently and the two dummies are used for this purpose to reflect the immediate impact of such changes on growth.

Once the variables in the growth regression models are described above, the model to be estimated in log-linear form is as follows:

$$\boldsymbol{lnY_t = \alpha_0 + \alpha_1 lnI_{OAt} + \alpha_2 lnA_t + \alpha_3 PA_t + \alpha_4 A_t^2 + \alpha_5 lnL_t + \alpha_6 ln\, RFV_t + U_t} \quad \ldots\ldots\ldots\ldots\ldots\ldots (13)$$

Where $\boldsymbol{\alpha_0}$ is the constant term α_1, α_2 ,α_5 and α_6 are elasticity coefficients, α_3 and α_4 are slope coefficients, and U_t is the white noise error term.

3.3 Order of Integration and Cointegration

3.3.1 Identification of Order of Integration: Testing for Unit Root

Since the study uses time series economic data, testing the variables for stationarity in econometric analysis is becoming mandatory[3]. If variables entering a regression are not stationary, then the results obtained using ordinary least squares (OLS) techniques would be spurious. That is the fact that the variables share common trends will tend to produce significant relationship between the variables rather than the true causation [(Harris (1995), see also Maddala (1992)].Therefore, inference made using the standard statistical tests like the F-distribution and t-distribution produce misleading result.

Since most economic time series data are unlikely stationary, the first step is to test whether the variables are stationary i.e. checking for the presence of unit roots, to avoid the problem associated with spurious regression. Various mechanisms have been developed to transform non stationary time series variables to attain stationarity. If a variable has deterministic trend, including trend variable in the regression removes the trend component and makes it stationary[4].Such process is called trend stationary since the deviation from the trend is stationary. However, most time series data have a characteristic of stochastic trend. If a variable has a stochastic trend, it needs to be differenced in order to obtain stationarity. Such process is called difference stationary process (Gujarati, 2004). The number of unit roots a given variable possess determines how many times the variable should be differenced in order to make it stationary. In this paper unit root test will be conducted using Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests.

The Dickey-Fuller test starts with the following first order autoregressive model:

$Y_t = \Phi Y_{t-1} + U_t$ ---------- (14)

[3] *A process is said to be stationary (weakly or covariance stationary) if the mean variance and auto-covariance i.e. the first two moments of distribution are time invariant. That is there exists stationary process if it generates constant mean and variance and if the covariance depends only on the time lag used in the calculation(Enders,1996)*

[4] *A trend is said to be deterministic if it can be perfectly predictable rather than being variable (stochastic).*

Subtracting Y_{t-1} from both sides gives

$\Delta Y_t = \gamma Y_{t-1} + U_t$ ---------- (15)

Where $\gamma = (\Phi - 1)$, $U_t \sim IID(0, \delta^2)$

Then the test for stationarity is conducted on the parameter γ. If $\gamma=0$ or $\Phi=1$ it implies that the variable Y is not stationary. The hypothesis to be tested is formulated as follows:

H_0: $\gamma=0$ or $\Phi=1$

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

The use of equation (15) is appropriate only when the series Yt has a zero mean and no trend term (Harris, 1995). If a variable has a zero mean, it implies that $Y_t=0$ when t=0-implying no constant term. A constant (drift) is included to the regression since it is difficult to know whether the true value of Y_0 is zero or not. Including a constant (α) to equation (15) gives:

$\Delta Y_t = \alpha + \gamma Y_{t-1} + U_t$ ---------- (16)

Also testing for stationarity using equation (16) is invalid if a series contains a deterministic trend. Because if $\gamma=0$, the null hypothesis will be accepted that the series contains a stochastic trend when there exists deterministic trend. Thus to avoid such results, it is important to incorporate time trend in the equation above:

$\Delta Y_t = \alpha + \gamma Y_{t-1} + \beta T + U_t$ ---------- (17),

where T is the trend element.

For the above equations (equation 16 and 17), the parameter γ is used while testing for stationarity and the decision is made using τ-statistics[5].(see Enders(1996) for details).If the calculated value of τ is less than the critical value the null hypothesis is accepted and not if otherwise.

Accepting the null hypothesis implies the presence of unit root-i.e. the series is non stationary. If a variable that is not stationary appears to be stationary after n^{th} difference then the variable is said to be integrated of order n-I(n). However, the DF test has a series limitation in that it suffers

[5]There are three τ-statistics:τ,τ_u, and τ_τ .The first one is used for the regression that is without drift and trend. The second one is used for the one that incorporates constant and the third one for both constant and trend.

from residual autocorrelation. To overcome this problem, the DF model is augmented with additional lagged first differences of the dependent variable. This is called Augmented Dickey-Fuller model (ADF). The advantage of using this model is that it avoids the autocorrelation among the residuals. Therefore incorporating lagged first differences of the dependent variable to the above three equations-equations 15, 16 and 17 gives the corresponding ADF model as follows:

$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{k} \theta i \, \Delta Yt - i + U_t$ ---------- (18)

$\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{i=1}^{k} \theta i \, \Delta Yt - i + U_t$ ---------- (19)

$\Delta Y_t = \alpha + \beta T + \gamma Y_{t-1} + \sum_{i=1}^{k} \theta i \Delta Yt - i + U_t$ ---------- (20), where α is a constant (drift), T is a trend element, k is the lag length and U_t is white noise.

3.3.2 Cointegration Analysis

Cointegration means that despite being individually non stationary, a linear combination of two or more time series can be stationary. Cointegration among the variables reflects the presence of long run relationship among non stationary variables in the system. Testing for cointegration is important because differencing the variables to attain stationarity generates a model that does not show long run behavior of the variables. Thus testing for cointegration is the same as testing for long run relationship. In general, if variables that are integrated of order 'd' produce a linear combination which is integrated of order less than 'd'-say 'b' then the variables are co-integrated and hence have long run relationship(Gujarati,2004).

To conduct a test for co-integration, the study applied the Johansen's (1988) maximum likelihood procedure. This method allows for testing the presence of more than one co-integrating vector. To conduct a test for co-integration in a multivariate framework using Johansen's maximum likelihood procedure, first the general VAR (Vector Autoregressive) model of relationship between the variables should have to be formulated. Thus a general VAR (p) of the following form is formulated:

$X_t = \Phi_1 X_{t-1} + \Phi_2 X_{t-2} + \ldots + \Phi_p X_{t-p} + \Psi W_t + \varepsilon_t$ ---------- (21)

Where X_t is a (mx1) vector of stochastic I(1) variables, Wt is a (qx1) vector of deterministic variables (for instance trend and dummy variables) and each Φi(i=1….p) and Ψ are (mxm) and (mxq) matrices of parameters.εt is a a (mx1) vector of normally and independently distributed disturbances with zero mean and non-diagonal covariance matrix(vector of white noise disturbance terms) ,and t=1….T(T is the number of observation).

A VAR (p) formulation for investment:

$I_t=\Phi_1 I_{t-1}+\Phi_2 I_{t-2}+\ldots+\Phi_p I_{t-p}+\Phi_{1s} S_{t-1}+\Phi_{2s} S_{t-2}+\ldots+\Phi_{ps} S_{t-p}+\Phi_{1a} A_{t-1}+\Phi_{2a} A_{t-2}+\Phi_{pa} A_{t-p}+\Phi_{1ua} UA_{t-1}+\Phi_{2ua} UA_{t-2}+\Phi_{pua} UA_{t-p}+\Phi_{1ds} DS_{t-1}+\Phi_{2ds} DS_{t-2}+\ldots+\Phi_{pds} DSt\text{-}p+\Phi_{1inf} INF_{t-1}+\Phi_{2inf} INF_{t-2}+\ldots+\Phi_{pinf} INF_{t-p}+\Psi D_t+\varepsilon_t$, ---------- (22)

Where: the subscript under each coefficient is to identify the coefficient of one variable from the other.

Similarly, a VAR formulation for investment model specified earlier in section 3.1 can be represented in a matrix form as follows:

$$\begin{bmatrix} It \\ St \\ At \\ UAt \\ DSt \\ INFt \end{bmatrix} =$$

$$\begin{bmatrix} \Phi 1 & \Phi 2 & . & . & . \Phi p \\ \Phi 1s & \Phi 2s & . & . & . \Phi ps \\ \Phi 1a & \Phi 2a & . & . & . \Phi pa \end{bmatrix} \begin{bmatrix} It-1 & St-1 & At-1 & UA\,t-1 & DSt-1 & INFt-1 \\ It-2 & St-2 & At-2 & UA\,t-2 & DS\,t-2 & INF\,t-2 \\ . & . & & & . & \end{bmatrix}$$

+

$$\begin{bmatrix} \Phi 1ua & \Phi 2ua & . & . & . & \Phi pua \\ \Phi 1ds & \Phi 2ds & . & . & . & \Phi pds \\ \Phi 1inf & \Phi 2inf & . & . & . & \Phi pinf \end{bmatrix} \begin{bmatrix} . & & . & & . \\ \vdots & & . & & \vdots \\ It-p & St-p & At-p & UAt-p & DSt-p & \cdots & INFt- \end{bmatrix}$$

$$\begin{bmatrix} \Psi 1 & \Psi 2 & \Psi 3 & \dots & \Psi t \end{bmatrix} \begin{bmatrix} D1 \\ D2 \\ D3 \\ . \\ . \\ . \\ Dt \end{bmatrix} + \begin{bmatrix} \varepsilon 1 \\ \varepsilon 2 \\ \varepsilon 3 \\ . \\ . \\ . \\ \varepsilon t \end{bmatrix}$$ ---------- (23)

Note: the same representation can be made for the growth model specified by substituting the variables in the matrix above.

Providing the variables are (at most) integrated of order one i.e. I(1) and co-integrated also has an equilibrium error correction representation that is observationally equivalent but which facilitates estimation and hypothesis testing, as all terms are stationary. The vector error correction model (VECM) is:

$\Delta X_t = \pi X_{t-p} + \Gamma_1 \Delta X_{t-1} + \Gamma_2 \Delta X_{t-2} + \ldots + \Gamma_{p-1} \Delta X_{t-p-1} + \Psi W_t + \varepsilon_t$ ---------- (24)

Simplifying equation (14) gives

$\Delta X_t = \sum_{i=1}^{p-1} \Gamma i \Delta Xt - i + \pi Xt - p + \Psi Wt + \varepsilon t$ ---------- (25)

Where i=1…..p-1, $\Gamma_i = -[I - \sum_{j=i+1}^{p} \Phi j]$, and

$\pi = -[I - \sum_{j=1}^{p} \Phi j]$

The long run relationship among the variables is captured by the term πX_{t-p}. The Γi coefficients estimate the short run effects of shocks on ΔX_t and thereby allow the short and long run responses to differ. In the Johansen (1988) procedure, determining the rank of π(i.e. the maximum number of linearly independent stationary columns in π) provides the number of co-integrating vector between the elements in x. In this connection, there are three cases worth mentioning. (i) If the rank of π is zero it points that the matrix is null which means that the variables are not co-integrated. In such case the above model is used in first difference, with no long run information, (ii) If the rank of π equals the number of variables in the system (say n) then π has full rank which implies that the vector process is stationary. Therefore the VAR can

be tested in levels, (iii) If π has a reduced rank-i.e. $1<r(\pi)<n$ it suggests that there exists $r<(n-1)$ co-integrating vector where r is the number of cointegration in the system. The matrix π is given by($\pi=\alpha\beta^T$) where β coefficients show the long run relationship between the variables in the system(cointegration parameters) and α coefficients show the amount of changes in the variables to bring the system back to equilibrium i.e. it shows the speed with which disequilibrium from the long run path is adjusted. To identify the number of cointegrating vectors, the Johansen procedure provides n eigenvalues (λ)-characteristic roots whose magnitude measures the degree of correlation of the cointegration relations with the stationary elements in the model.

Two test statistics (λ_{trace} and λ_{max}) are used to test the number of cointegrating vectors, based on the characteristic roots. The statistics are calculated from the following formula:

$$\lambda_{trace}=-T\sum_{i=r+1}^{n} ln\,(1-\hat{\lambda}_i),\ r=0,1,\ldots n-1 \quad \text{----------(26)}$$

$$\lambda_{max}=-Tln(1-\hat{\lambda}_{r+1}) \quad \text{----------(27)}$$

Where T is the sample size,λi is the estimated eigen values.

λtrace tests the null that the number of cointegrating vectors is less than or equal to r against an alternative of (r+1). The λmax statistics, on the other hand, tests the null that the number of cointegrating vectors is r against an alternative of (r+1). The distribution of both test statistics follows chi-square distribution.

As the VAR approach assumes that all variables in the system are potentially endogenous, it is important to identify the endogenous and exogenous variables in the system. Hendry and Juselius(2000)(cited by M'Amanja and Morrissey 2003) pointed that the weak exogeneity test gives an indication of the variables in the system with feedback effects on the long run levels of other variables but themselves are not influenced by these long run variables. This implies that if a variable is weakly exogenous its error correction term doesn't enter the error correction model. As a result the dynamic equation for that variable depicts no information concerning the long run relationship in the system. Thus such variables should appear in the right hand side of the

VECM. Test for weak exogeneity is conducted by imposing zero restriction on the relevant adjustment parameters.

3.3.3 Vector Error Correction Model (VECM)

VECM enables to capture the short run dynamics of the model and formulated based on the identified long run relationships. The VECM has cointegration relation built into the specification so that it restricts the long run behavior of the endogenous variable to converge to their cointegrating relationships while allowing for short run adjustment dynamics. The cointegrating term is known as the error correction term since the deviation from long run equilibrium is corrected gradually through a series of partial short run adjustments. Thus cointegration implies the presence of error correcting representation and any deviation from equilibrium will revert back to its long run path.

Existence of cointegration allows for the analysis of the short run dynamic model that identifies adjustment to the long run equilibrium relationship through the error correction model (ECM) representation. If the number of cointegrating vector(s) is/are determined and once the endogenous and exogenous variables are identified in the system, it is possible to formulate a VECM. Using the variables of our interest in the model a system of equations is developed that portray the VECM. Hence, assuming that Y_t is endogenous variable(s) and X_{jt} representing weakly exogenous variables in the model, we can model Y_t. Y_t is modeled using the lagged first difference of Y_t itself, the lagged first differences of the explanatory variables and the error correcting term-which is designed to capture the speed of adjustment to the long run equilibrium. The equation is represented as:

$$\Delta Y_t=\sum_{i=0}^{p} \theta i \Delta Yt - i +\sum_{i=1}^{p} \alpha i \Delta Xjt - i +\delta ECT_{t-1} +\lambda_i D \text{---------- (28)}$$

Where ECT_{t-1} is the error correcting term, ΔX_{jt-1} is a vector of first differences of explanatory variables, ΔY_t is a vector of first differences of endogenous variable(s) and D is a dummy variable for major political changes. The general VECM model for investment and growth is represented below using the respective variables used in the estimation of the long run equilibrium equation.

The general VECM model for investment equation is specified as:

$$\Delta lI = \sum_{i=1}^{2} \Delta lI + \sum_{I=0}^{2} \Delta lA + \sum_{I=0}^{2} \Delta lDS + \sum_{I=0}^{2} \Delta lINF + \sum_{I=0}^{2} \Delta lS + \sum_{I=0}^{2} \Delta lUA + ECT_{t-1} \quad \ldots(29)$$

where lag length of two is determined by Akakie Information Criteria(AIC) [6]and ECT stands for the error correction term.

Similarly, the dynamic model for growth conditional on the other variables which are weakly exogenous is given below.

$$\Delta lY = \sum_{i=1}^{2} \Delta lY + \sum_{i=0}^{2} \Delta l\,\text{INA} + \sum_{i=0}^{2} \Delta A^2 + \sum_{i=0}^{2} \Delta lPA + \sum_{i=0}^{2} \Delta lLF + \sum_{i=0}^{2} \Delta RFV + \sum_{i=0}^{2} \Delta lA + ECT_{t-1} + \text{D} \quad \ldots(30)$$

,where lag length of two is determined by Akakie Information Criterion, D and ECT represents a dummy for major political changes and error correction term respectively.

Using the above VECM specifications, a short run dynamic equation is estimated for growth and investment. Dropping insignificant regressors from the specification (i.e. step-by-step elimination of insignificant regressors and lags from the general VECM model) following the general to specific modeling strategy, a parsimonious result for investment and growth is estimated.

In the estimation of the dynamic equation for growth, a dummy variable is incorporated to capture the influence of major political (government) changes on growth in the short run. In other words, dummy is used to see the immediate impact of major shifts in government on economic growth.

3.4 Causality Test in VECM

A test for causality is performed on variables of interest to detect the presence and direction of causality between pairs of variables. The variables of interest are to test causality between saving and investment, and aid and policy by estimating a VECM for each pairs of variables. Following the VECM, causality test is made to identify the presence and direction of causality.

[6] It is a model selection guide, and the lag length which minimizes the mean square error is selected.

The VECM to analyze the causal relationship between investment and saving is specified as follows:

$\Delta LIt = \sum_{i=1}^{k} \beta ivi \Delta LIt - i + \sum_{i=0}^{l} \beta si \Delta LSt - i + \alpha X_{t-1} + \varepsilon_t$……. (31a)

$\Delta LSt = \sum_{i=0}^{m} \theta si \Delta LSt - i + \sum_{i=0}^{n} \theta ivi \Delta LIt - i + \lambda Y_{t-1} + \mu_t$…….. ... (31b)

Where (βivi,θivi) and (βsi,θsi) are coefficients of the differenced(lagged) terms of investment and saving respectively, (X_{t-1},, Y_{t-1}) is the one period lagged error correcting term for investment and saving respectively. And (ε_t, , μ_t) are white noise error terms.

Causality inferences among the pairs of variables in the above models are based upon estimating the parameters of the model, subject to the predetermined number of cointegrating vectors in the system. Then hypothesis are formulated: for the investment equation (19a) the null hypothesis is "saving does not cause investment" whereas "investment does not cause saving" is the null for the saving equation (19b). Rejection of the null of the investment equation indicates the presence of causality from saving to investment, or alternatively saving causes investment. Similarly, rejection of the null for the saving equation points that it is investment which causes saving. Furthermore, the short run and long run causality can be discriminated for each equation. Absence of causality in the short run implies that the lagged coefficient values of the first difference terms of the relevant causal variable in the VECM are jointly insignificant. Whereas long run causality test is made by imposing zero restriction on the respective adjustment parameters of each equation.

Similarly, the VECM used to examine the causal relation between aid and policy is specified as follows:

$\Delta Pt = \sum_{i=1}^{p} ai \Delta Pt - i + \sum_{i=0}^{p} bi \Delta LAt - i + \Phi W_{t-1} + \varepsilon_t$…….. *(32a)*

$\Delta LAt = \sum_{i=1}^{k} ci \Delta LAt - i + \sum_{i=0}^{k} di \Delta Pt - i + \Psi S_{t-1} + U_t$…….. *(32b)*

Where (a_i,d_i) and (b_i,c_i) are coefficients of the difference(lagged) terms of policy and aid respectively, (W_{t-1},, S_{t-1}) is the one period lagged error correcting term for policy and aid respectively, and p and k are optimal lag lengths determined by information criteria. And (ε_t, μ_t) are white noise error terms.

The null hypothesis to be tested is that there is no causality between the variables in each equation whereas rejecting the null implies the presence of causality between the variables. Absence of short run causality requires that b_i to be insignificant for aid not to cause policy and similarly, d_i to be insignificant for policy not to cause aid for equations (20a) and (20b) respectively. On the other hand, absence of long run causality necessitates the coefficients (Φ *and* Ψ*) of the error correcting term to* be zero for the respective equations.

In the section followed, the results of the model specification and test statistics are presented. All the estimation of the empirical results is made by the use of **STATA 10** software packages.

CHAPTER FOUR

4 RESULTS AND DISCUSSION

4.1 Overview of the Ethiopian Economy: Description of the trends of the Major Variables considered

The performance of an economy is highly explained by the soundness of the macroeconomic policy environment, the political framework, the various institutional setup of a country, and indeed the design of the macroeconomic policy is a reflection of the political process. Economic performance in Ethiopia is highly correlated with the political framework. Before 1974, the macroeconomic policy was largely informed by a market-oriented economic system. The period 1974-1991(the Derg period) witnessed a centralized economic system, where the state played a major role in all spheres of economic activity. The post-Derg (EPRDF) period (since 1991) is again taking us back to the market-oriented system of the Imperial regime. Frequent macroeconomic policy changes followed by a change in regime may sometimes have a deleterious effect on the overall performance of the economy.

In political terms, three main regimes in the recent history of the country can be identified: the Imperial regime (1960-1974), the Derg regime (1975-1991), and the Ethiopian People's Revolutionary Democratic Front (EPRDF) (1992-present). Economic performance in the Imperial regime was respectable, with real GDP growing by four percent annually, while average growth of per capita GDP was 1.5 percent (Alemayehu, 2007). The Derg took power in 1975 and embarked highly on the nationalization of almost all types of property: land, private property, large-scale manufacturing firms and financial institutions. The period was characterized by a huge role of the state in all aspects of economic activity. The regime was characterized by a centrally planned economic system with a strong military power and discrimination against private property ownership and entrepreneurship. Eshetu(2004) (cited by Martins,2007) showed that economic performance under the regime was poorer than the past , with GDP growing at 1.9 % per year, while growth was negative in per capita terms(-0.8

percent). The policy environment, erratic performance of the agricultural sector (e.g. severe drought in 1984-85) and a lengthy civil war were the main contributors to this sluggish economic record.

Another major change in the Ethiopian economic and political context occurred in 1991, when a coalition of rebel forces (EPRDF) succeeded in overthrowing the military regime. In terms of macroeconomic policy, 1991 witnessed a marked departure from the previous socialist system-the Derg regime-in openly adopting a market-oriented economic policy.

Growth during the post-Derg period is quite good where total and per capita GDP on average grew by 3.7 percent and 0.7 percent per annum, respectively. This figure rises to 5.6 percent (and to 2.6 percent in per capita terms) if one excludes the abnormal years 1990-1992.

In this section the macroeconomic performance and development of key economic indicators are presented at glance. That is, GDP & its growth trend, sector wise contribution of agriculture, industry and service to the GDP, trends of gross domestic investment and saving, trends in government expenditure and revenue, the flow of Official Development Assistance (ODA), and the trends in external market (export-import) is presented.

4.1.1 Gross Domestic product and Growth Trends

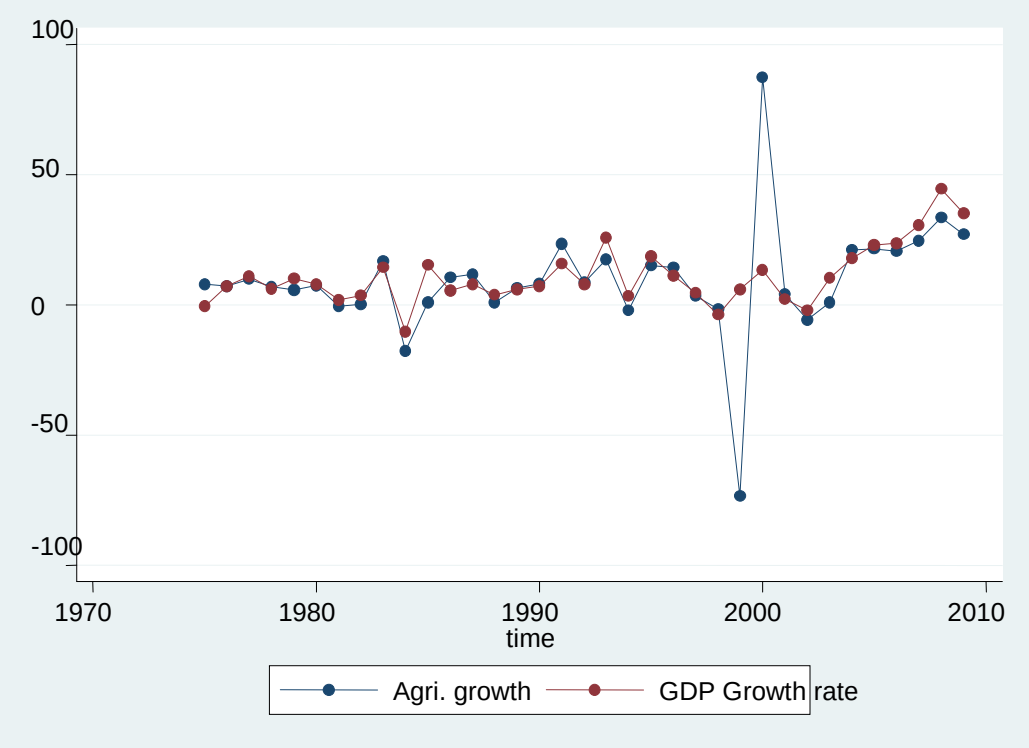
Despite the dismal growth records and poor economic performance in the Derg regime and early periods of EPRDF, the country started to make improvement in the performance of the economy. The track of progress in economic growth is strong especially after the year 2003/04(i.e. immediately after the country emerges from conflict with Eritrea). Real GDP in 2000/01 maintained an upward growth of 8.3 percent from a 6.1 percent growth in 1999/00 and the yearly average of 3.6 percent from 1991/92-1998/1999. However, the consequence of the war was significant in reducing the progress of economic growth especially in the years 2001/02 and 2002/03 with a growth record of 1.5 and -2.2 percent, which is far below the average of 3.6 percent. However, the growth record was relatively good as compared to the period before where the average growth rate was 1.9 percent. The average growth rate of real GDP in the present regime is 5.042 percent.

In Ethiopia as agriculture is the mainstay of the economy growth performance is significantly (if not totally) determined by the performance of agriculture, which in turn is influenced highly by the vagaries of nature. Strong performance in the agricultural sector is reflected by a record of high economic growth. A case in point is the year 2001 according to the African Economic Outlook (2003) which states that the strong growth in total output in 2000/01 was reflected in all sectors of the economy. Agriculture remained the mainstay of the economy, increasing its share to 45.1 percent in the year from 43.6 percent of GDP in 1999/00. The agricultural sector expanded strongly in 2000/01 with a real growth rate of 11.5 percent, compared with 2.9 percent in 1999/00. The strong growth in agricultural production in the year was due largely to improved weather conditions. The strong linkage between agricultural performance and economic growth is presented by the graph below.

Figure 1 strengthens the above argument and further shows the co-movement of growth of agricultural output and growth of GDP. This implies that economic growth is highly volatile and its performance is constrained by natural calamities. Whenever there is a good agricultural harvest which indeed is a result of good climate mainly adequate rainfall, there will also be a good record of economic growth. This co-movement of growth in GDP and growth in agriculture further shows not only the rain-fed nature of agriculture but also the sensitivity of the whole economy to climatic shocks. The strong correlation between growth in GDP and agricultural growth is supported both by upward and downward co-movement; for instance, in the year 2007/08 growth in GDP and agricultural output was 44.6 and 33.53 percent respectively.

Whereas the poor growth performance of agriculture in the years 1984/85(-17.7 percent) and 1997/98 (-1.62 percent) is reflected by the poor growth figure of -10.4 and -3.9 percent in the respective years. In general the figure shows that GDP growth attains the highest figure whenever there is a good climate(most importantly adequate and timely rainfall) and a dismal GDP growth is recorded owing to the poor performance of agriculture when a shortage of rainfall(dry season) is experienced in the country.

Figure 1 Trends of agricultural and GDP growth rates (in nominal terms)



Source: Own computation based on the data from NBE (National Bank of Ethiopia)

The extreme dependence of the economy on the rain-fed agriculture can be solved (or at least minimized) if an alternative scheme of irrigation agriculture is practiced widely to enable farmers produce more than once in a year.

Alemayehu (2005) argues that dependence on rain-fed agriculture has a far reaching consequence on the overall performance of the economy. According to him dependence on rain-fed agriculture has a negative multiplier effect on production levels in subsequent years; that is, the shock in one period is carried over into the next as the early years of the drought deprive peasants not only of current income but also of wealth(e.g., they may sell or otherwise lose assets, in particular oxen). Further he explained that more promising weather during the next agricultural season may not see an increase in harvest due to the perpetuation of the effect in terms of lack of capital or the farmers may be forced to migrate in search of food.

Despite the fact that agriculture takes the lion's share of the GDP, the industrial and service sectors also play their own role in the economy. Agriculture remained the main engine of economic growth with almost 50 percent of the GDP even though its share declined slightly below 50 percent 1999/00 onwards due to the increasing role of the service sector, where the industrial sector constitutes still a meager share of the GDP. On average the agricultural, service and industrial sector constitutes 51.7, 35.6 and 11.6 percent of the GDP.

Table ii. Structure of the economy

Sectors	Share of GDP(period average)	
	1974/75-1990/91	1991/92-2008/09
Agriculture	55.57	47.7
Industry	11.44	11.8
Service	32.97	38.06

Source: Own computation based on the data from the National Bank of Ethiopia (NBE).

As it is displayed on the table agriculture remained the dominant sector constituting nearly 48 percent in the EPRDF regime (1991/92-2008/09) and more than half of the GDP (55.57) in the Derg regime (1974/75-1990/91). The dominance of the sector also in the present regime implies the failure of the ADLI (Agriculture Development –led Industrialization) policy from being materialized, the inadequacy of the agricultural sector to put the industrial sector in progress and also shows the weak linkage among the sectors. Evidences also show that the agricultural sector is at a very backward development stage to strengthen its linkage with the manufacturing sector (let alone feeding the mass growing population). The other sectors contribution is almost similar despite the change in regime and policy, notably industry's share is nearly equal in the two periods while the service sector showed a slight improvement in the post-Derg regime.

4.1.2 Trends and performance of Gross Domestic Investment and Gross Domestic Saving

Positive and sustainable macroeconomic performance depends on investment and its financing. Neoclassical growth theories claim that capital formation activity is a key to economic growth. According to this theory developing countries' growth is constrained by a serious lack of capital. The situation in Ethiopia is not distinct from the other developing countries and the figure of both investment and saving remained low relative to GDP. Given the poor performance of savings and investment, and also the persistence of saving-investment gap made the country to be dependent on foreign capital, and prone to external shocks.

Table iii. Average savings and Investment (% of GDP) in Ethiopia

	1980-89	1990-99	2000-08
Gross Domestic Savings	10.41	9.7	6.4
SSA	22.17	14.49	24.72
Gross Domestic Investment	15.71	16.4	22.88
SSA	19.3	17.85	17.81

Source: Own computation based on data from IMF database.

The table reflects the deteriorating condition of savings on average whereas the trend in investment is promising and it is well above the SSA (sub-Saharan Africa) average for the period 2000-08. The increase in investment in the post-Derg period (1991/92 onwards) show that the increasing importance of private sector investment, since a market-oriented economy is launched in the present regime. However, the question is that given the declining trend of saving and the widening saving-investment gap as time proceeds, whether the finance required for the growing investment demand is meet from domestic sources or external. The average saving figure from the table above forces us to conclude that the balance is financed by foreign capital notably foreign aid. The widening saving-investment gap also shows that the poor saving culture in Ethiopia and the extreme reliance on external capital to finance the growing demand for investment which the country needs to sustain the current pace of economic growth. Such

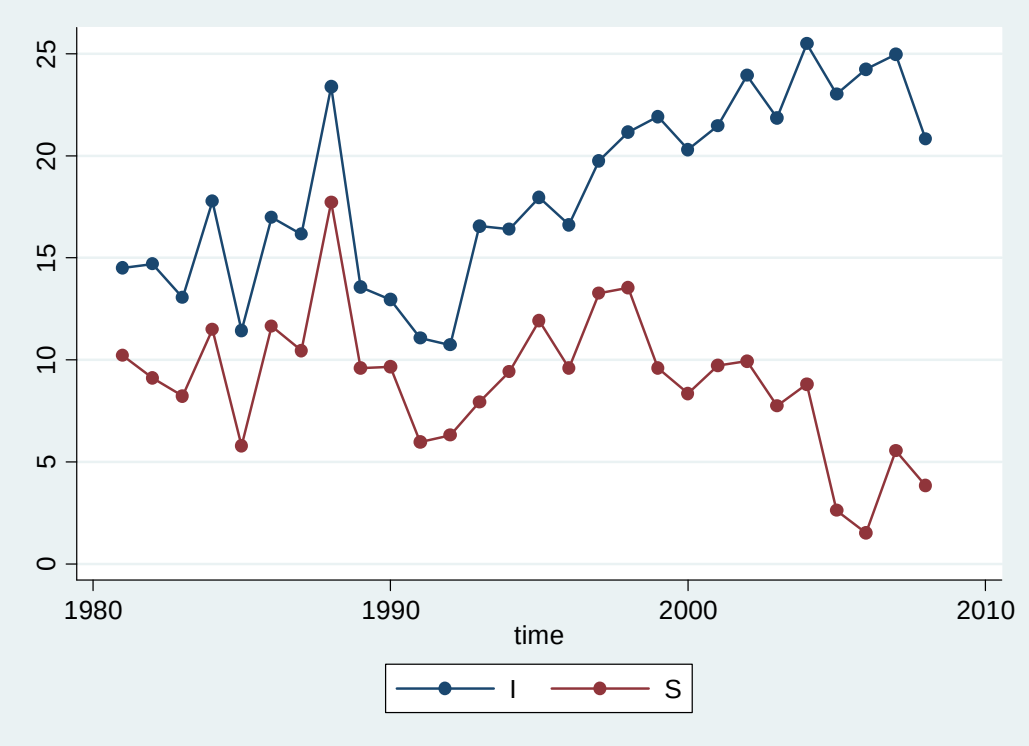
extreme dependence on foreign capital has the tendency to make the economy susceptible to shocks. While foreign capital(-foreign aid) has its own place in financing economic growth this should be a supplement to domestic resources but it should not be relied upon as a means for sustained long term financing because it rather deepens the dependency of the economy on donor countries. This strengthens the fact that domestic resource mobilization is a key to sustained economic growth.

The increasing divergence between gross domestic saving and gross domestic investment (both as percent of GDP) can be observed from the figure below which shows that the saving-investment gap is widening more than ever in the history of the country.

Gross domestic saving is the lowest even by SSA standards and the problem become serious through regime changes, for instance, the period average in the 1980-1989 was 10.41 whereas the figure declines to 6.4 percent in post-Derg period of 2000-08 with lowest ever figure recorded in 2006 which is 1.5 percent. Even though the economy continues to grow at a double-digit rate after 2004, the average saving was quite below 5 percent which shows that the boost in the GDP growth was not matched by an upward trend in saving rather economic growth is dominantly financed by foreign capital or some other source. The graph also revealed that saving and investment are moving in opposite direction in the long run which may imply the negative association between the two.

Further the decline in saving may imply the deleterious long run effect of foreign capital on domestic savings and the fact that foreign capital is not used as a supplement rather as a substitute for domestic savings. Given the importance of foreign aid and the growing demand for capital at the early stages of development an effort has to be made to increase domestic saving.

Figure 2 Investment-saving (% of GDP)



Source: Own computation based on IMF data.

4.1.3 Government Accounts

The government has made some gains in fiscal management and efforts are being made to increase revenue (both domestic tax revenue and foreign aid) to support its budget. However, according to African Economic Outlook(2003) the progress in fiscal management is hampered by a relatively weak expenditure management system, mainly as a result of the degree of decentralization to the regions ; insufficient management capacity, particularly at the regional level; and lack of computerization. The recent fiscal development is presented in terms of the following major fiscal variables.

With the Derg regime in power, revenues had a strongly significant positive trend where the total revenue was growing at 8.03 percent on average and total revenue (excluding grants) was growing almost at a similar trend of 8.4 percent on average. However, the strong growth trend in

total revenue came in to a halt in the years 1989/90 and 1990/91 with a worst growth tax revenue of -16.43 and -19.67 percent respectively.

Table iv Government Revenue (in million Birr)

	Total revenue(including grants)	Total revenue(excluding grants)	Tax revenue	Tax revenue(% of GDP)
1974/75-1990/91	2433.5	2118.4	1533.9	8.32
1991/92-2008/09	16152.1	12837	9374.4	9.36

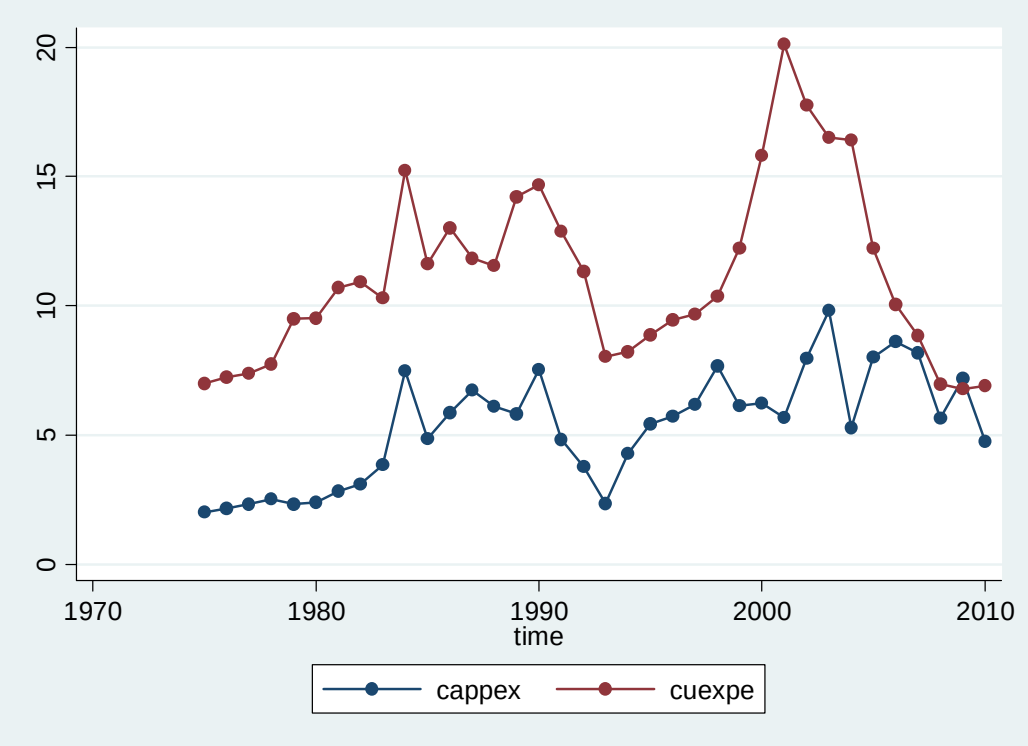
Source: own computation based on NBE data

This shows the unfavorable effect of political instability (as the country was in a state of war) which led to security and administrative problems on collection of tax revenue. From 1991/92 onwards, however, government revenues managed to recover beyond their previous level. As it is evident from the table, the mean figure for total revenue without grants raised to 12837 from an average of 2118.4 birr. Also the growth in total government revenue and tax (% of GDP) are doubled in the post-Derg period. This is reflected in the growth figure where the growth of total revenue (including grants) and tax (% of GDP) was 8.03 and 1.08 respectively while the figure raised on average to 17.58 and 3.19 in the post –Derg period (1991/92-2008/09). The relative significant growth performance of government revenue in the post-Derg period showed the importance of active participation of the private sector in the economy which is an important source of government revenue. The growth in tax revenue relative to GDP is promising but it is even far below the SSA average of 16.1 percent. Thus the government should strengthen the current effort of raising domestic tax revenue. Now in order to present the position of the budget (surplus/deficit), the components of the government expenditure is presented.

The figure illustrates the trends of current and capital expenditure as a share of GDP. Government current expenditure rose to a maximum of 15 percent while public spending on capital was 7.5 percent in 1984. Since the 1990s there has been some volatility in these variables due to variability in domestic tax revenue, and end of aid mainly from the Soviet bloc. There was

a sharp decline in both variables from 1990-1993, for instance current expenditure declined from 14.7 to 8 percent and also public capital investment was as low as 2.3 percent in 1993. However, both figures recovered after 1994, in this year current expenditures increased mainly due to wages and operating expenses (IMF, 2006) (cited by Martins, 2007) and the doubling of interest payments on internal debt.

Figure 3 Current and capital expenditure (% of GDP)

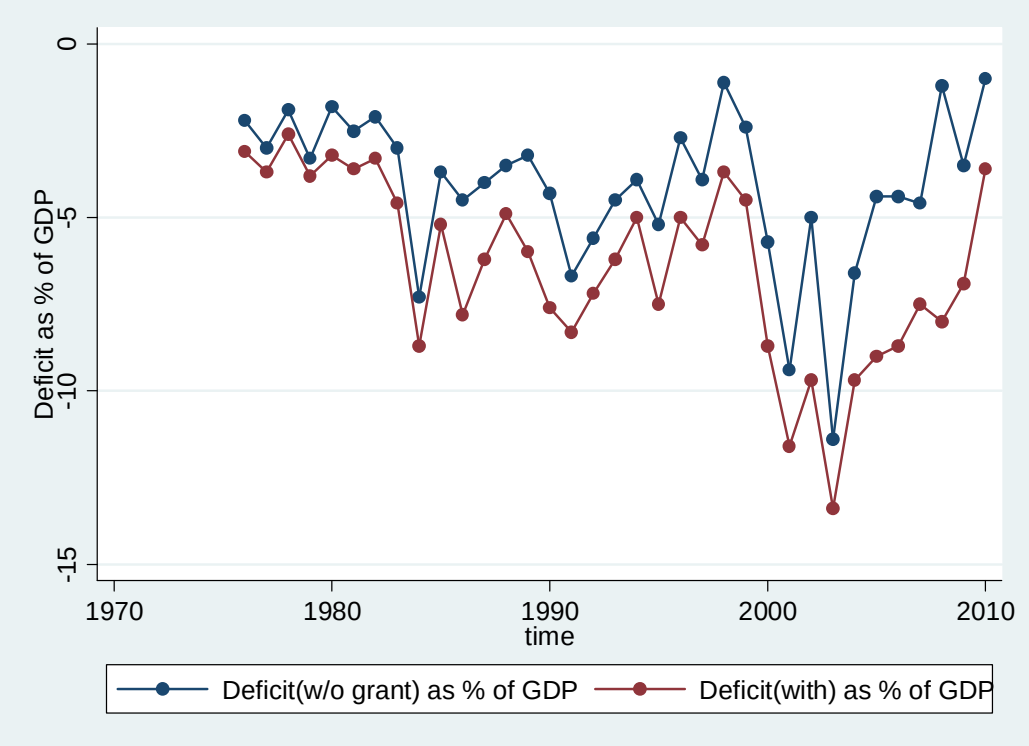


Source: Own computation based on NBE data

In 2003, a similar trend was due to high level of external assistance. The other major factor for the recovery of current expenditure was the increase in military expenditure for the Ethio-Eritrean war of 1998-2000 with an average record of 16.7 percent and a maximum of 20 percent in 2000. The government budget deficit with and without grant is illustrated by the following graph. The role of grant in financing fiscal deficit was negligible as the gap between the two graphs is narrow before the 1990s and the trend continues until 2000. However, as the flow of external assistance increased (grant is one of the components), its role in filling fiscal gap increased which is observed by the widening gap between the two graphs after 2000. As

explained earlier the higher fiscal deficit in 2000/01 was due to increment in military expenditure for the Ethio-Eritrean war.

Figure 4 Deficit as percent of GDP



Source: Own computation based on NBE data

4.1.4 Foreign Aid in Ethiopia

The role of foreign aid in the economic development of a poor country (like Ethiopia) is unquestionable. Foreign aid can be put in to use in the economy where there exists a resource gap. The presence of a resource gap (saving-investment, fiscal and foreign exchange gap) forces the country to look outward for foreign capital in order to fill either of the gaps which are perceived to be the binding constraint for economic growth.

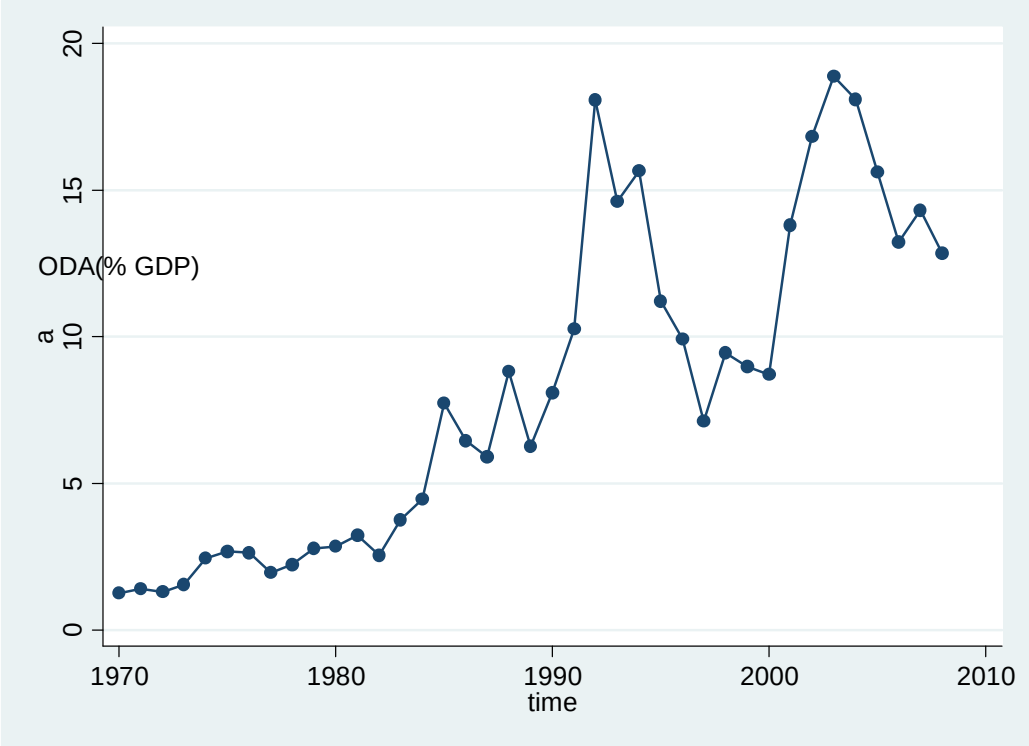
Dejene(1989)-(cited by Fissiha,2006) shows the importance of foreign aid in the development endeavor of the country, in the Imperial and Derg regime, where the majority of investment was financed by external capital. In Ethiopia, an inflow of external resources such as loans and

grants has started in the mid of 1950, the year in which the relationship between the United States and Ethiopia reached a higher level. For instance pre 1975, about 75 % of the required total investment during the series of five year development plan periods (1957-1973) was covered by external capital. The magnitude of loans and grants that Ethiopia received in the years preceding the revolution was considerable. But due to the existing political- economic system it hardly contributed to economic progress. It was characterized by trifling development objectives. Similarly, during the post revolution period too, "37 percent of total investment expenditure of the annual campaign of 1979-1983" was financed by foreign aid.

The magnitude of aid flow to Ethiopia varies depending on the nature and characteristics of the political system, the economic system that the regime follows, and the relationship with donor countries and institutions. During the socialist period, Ethiopia had been receiving development assistance from Eastern Block donors particularly from the Soviet Union and East Germany, as well as from Western bilateral and multilateral donors to some extent. In the Derg period (1974/75-1990/91) the country received Birr 1.1 billion on average terms per year. The average share of aid (ODA) was 4.8 percent in the same period.

Comparatively the total flow of foreign aid has increased under the current economic system due to changes in policies which meet the interests of donors, and adoption of a market-oriented economic system being the major one. Since the policy change by the present regime the magnitude of development aid (both loan and grant) has increased continuously. In this period (1991/92-2008/09) average annual flow of aid has reached to Birr 10.8 billion and its share in the GDP also rose to 13 percent from a 4.8 percent in the Derg period. The period 1996/97-2000/01 witnessed a decline in aid which was below the average share of the GDP, the lowest share of 7 percent being observed in 1997/98. The major factor for the decline in the specified period was the war with Eritrea where the majority of donors were uncomfortable with the war. Despite the huge flow many claim that aid to Ethiopia is ineffective in bringing about the desired changes like poverty reduction. But this does not imply that aid is totally wasted (or, aid is ineffective at all) because there are some improvements in the social indicators like enhancing access to education and health services.

Figure 5 Trends of foreign aid(% of GDP)



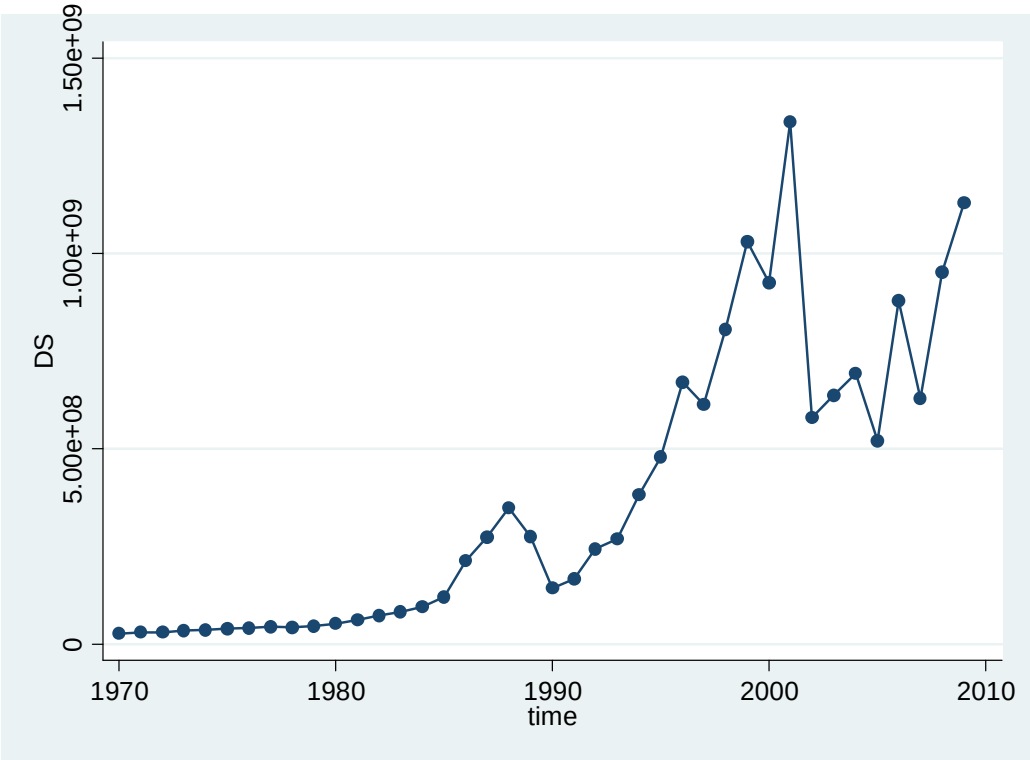
Source: own computation based on IMF data

As the graph illustrates, the overall trend was one of steady decline in aid levels from 1996/97 to 2000/01. Over this period, aid to Ethiopia was cut by half. From 2001 onwards, however, aid flow increased significantly and by 2003/04 the total amount received was 18.8 percent of the GDP which is nearly three times of the aid received in 1996/97.

As aid has a loan component that has to be paid, the debt accumulation and debt service are discussed briefly. According to Ramakrishna the trends in foreign debt across various regimes indicate that Ethiopia has been a severely indebted country and continues to be so even after the economic reforms in the1990s. It has been experiencing a steady increase in its debt/GDP ratio, which became more than its GDP since 1992.The Debt /exports ratio rose to more than 100 percent in the 1980s and remained at a very high level in the 1990s. This has pushed the country into severe debt service difficulties.

Despite debt rescheduling and other policy measures, the country has not been able to meet its debt service. The debt relief and debt rescheduling provided under various donors do not make the country to escape from the debt burden, and debt servicing is increasing from time to time. The debt servicing figure shows that it has increased from an average of 124,992 thousand in the Derg regime to 709,729 thousand in the EPRDF regime. That is, debt servicing has grown at an average of 4.7 percent.

Figure 6 Trends of Debt servicing



Source: own computation based on IMF data

The figure shows that debt servicing remained very low from 1970 to 1990 but it starts rising after 1990 and reached its peak in the year 2000. In addition, the figure displays that debt servicing has started slightly after 1980s. Alemayehu (2001) argued that prior to this period, there had been almost no interest arrears and principal arrears were negligible. Interest and principal arrears that had been 0.3 percent of exports (or 0.02 percent of GNP) reached a peak of 547 percent of exports (or 90 percent of GNP), chiefly owing to debt cancellation, but declined to 66 percent of exports (or 10 percent of GNP) in 2001. This rising level of arrears is due to

resource constraints that hindered timely debt-service payments; that is, meeting the debt service obligation on schedule could only be accomplished by further debt rescheduling. This has worsened the situation, as it resulted in an even larger arrears accumulation in recent years. Recently, this problem has been at least temporarily alleviated following debt cancellation. However, debt cancellation cannot be taken as a long term solution to escape out the debt burden.

4.1.5 Performance of Export and Import

Ethiopia has experienced a chronic balance of payments problem; the major factor was the prevailing deficit in the balance of trade among other things. Close examinations of the trade policy in the recent past decades show that there was frequent change in trade policy whenever there was a change in regime. For instance the country's trade policy has moved from a free trade policy (Imperial era) to a controlled trade policy in the Derg regime, and back to a free trade policy in the present regime. Various efforts have been made by the respective regime to increase the amount of goods exported and to improve the trade position of the country. Alemayehu (2005) explained that in the pre Derg period various measures aimed at improving the quality and quantity of imports and exports as well as facilitating trade both by the public and private sectors were made. Imports of capital goods and raw materials were free of duty, while others were taxed. The period 1974-1991, on the other hand, was characterized by a centralized economic system, where the state was dominant in the external sector. The post-Derg government's trade policy is designed to encourage private participation, manage the sector through foreign exchange and import-export regulation, providing incentives for the export sector and encourage diversification of export items.

The country depends on exports of few commodities to earn foreign exchange, coffee being the dominant one followed by hides and skin. In the recent time chat and oil seeds are also an important source of foreign exchange earnings and becoming the second and third most important commodities one after coffee. The share of coffee in the value of total exports constitutes 69.4 percent in 1988/99 and 67.9 in 1995/96. This can be observed from the table below which shows the recent shares of major export items. The share of coffee is significant in the value of total exports even though there is a declining trend, for instance it declined to 35.4 percent in 2005/06 while it was 39.6 percent in the year before. The share of coffee, oilseeds

chat, and hides and skins are increasing reflecting the declining share of the dominant export commodity-coffee. This implies that there is some effort of diversification relative to the earlier periods which deceases the extreme dependence on coffee exports. However, the export items are all primary commodities which are highly susceptible to the weather condition prevailed in a specific harvest period.

Table v.Major Export Commodities (‘000 birr)

year	coffee	Hides and skin	chat	Oilseeds	Live animals	pulses	flower	Bees wax	Total value of export
2001/02	1393809	474,426	418,674	278,738	7,132	281,409	0	528,768	3,864,320
2002/03	1418324	448,003	497,866	395,565	4,129	171,244	69	585,486	4,142,356
2003/04	1926679	375,044	758,878	712,738	16,454	194,679	19,821	478,442	5,176,644
2004/05	2901327	585,185	866,803	1,082,215	110,875	306,609	67,808	617,002	7,331,258
2005/06	3076694	651,333	773,235	1,835,270	239,240	320,969	189,006	749,752	8,685,376
2006/07	3741745	789,162	816,802	1,654,707	323,066	619,560	561,307	793,595	10,457,615
2007/08	4897344	917,534	1,000,785	2,037,090	376,474	1,333,631	1,037,924	960,115	13,643,332
2008/	3932045	763,681	1,448,036	3,81	539,	946,8	1,374,3	960,115	15,217,279

09				9,332	974	04	15		

Source: Own computation based on data from NBE

The performance of overall export fluctuates in response to the weather condition at home, ups and downs of prices of commodities at the international market, and also due to the change in the political environment. In the period 1974/75-1990/91 the performance of export was poor which makes up only 6 percent of the GDP while its performance was relatively good in the post-Derg period taking 11.4 percent of the GDP on average. The growth of export has an important implication for importing capital goods that the country needs badly for production and for servicing the accumulated debt. The growth of export (% of GDP) in the Derg period was negative 5.2 percent per year on average where as the growth of import was also negative 1.3 percent. In the present regime the share of import is more than two times the share of export which indicates that the balance of trade is becoming worse. Moreover, export can finance only 48.6 percent of the imported goods while it was relatively better in the Derg period with an average share of 56 percent. The gap between export and import shows that the country should fill the foreign exchange gap through alternative ways; notably through foreign capital (loan or grant) which in turn increases the existing debt burden of the country. The table below supports the discussion made here.

Table vi. Performance of export-import (% of GDP) from 1974/75-2007/08

	1974/75-1990/91	191/92-2007/08
Export	6.04	11.36
Import	10.84	23.6
Export(% of import)	56.28	48.6
Growth of export	-5.2	5.25
Growth of import	-1.3	6

Source: own computation based on data from Penn world table

4.2 Econometric Results

4.2.1 Order of Integration of the Variables: Unit Root Test Results

Before proceeding to estimate the long run equation explaining growth and investment in Ethiopia, it is necessary to investigate whether the data series is stationary in level, or stationary in differences in order to apply the correct methodology and at the same time to avoid any spurious inferences. Testing stationary of time series leads to the implementation of the econometric model using the appropriate methodology. Particularly in the context of this paper all the variables of interest must be integrated of the same order (-I (1)) to apply cointegration technique, which shows the long run equilibrium relationship between two or more non-stationary series.

The stationarity of the series is investigated by employing the Augmented Dickey-Fuller (ADF) unit root test. Since unit root tests are sensitive to the presence of deterministic regressors, three models are estimated. The most general model with a drift and time trend is estimated first and restrictive models i.e. with a constant and without either constant and trend, respectively, are estimated. Unit root tests for each variable, is performed on both levels and first differences. The ADF test results show that all the variables for both investment and growth equations (in levels) are non stationary (-contain a unit root) with the three different specification. Furthermore, the first differences of the variables are investigated for a unit root and the test result proved that all of them are stationary (Table vii(A) and (B)).

Since all the variables are non stationary, a regression analysis using ordinary least squares (OLS) may produce spurious results. However, all of the series are stationary after first differencing and can be used in regression analysis. The drawback of this method (differencing) is the possibility of losing long-run information present in the variables (Mallik, 2008). Such problems can be overcome by applying cointegration technique, which shows the long-run relationship among the non stationary series.

Table viiA. ADF unit root test result for Variables in the Investment Equation

Variables(in levels)		C&T	C	NCT
LI		-2.595	-2.633	-0.139
LA		-1.703	-1.511	-2.43
LDS		1.713	-0.974	0.681
LS		-2.895	-1.988	-0.903
LUA		-2.16	-2.515	0.353
LINF		0.113	0.087	0.982
Critical values	**1%**	***-4.27***	***-3.668***	***-2.641***
	5%	***-3.552***	***-2.966***	***-1.95***
Variables		***In***	***First***	***Difference***
DLI		-4.271	-4.338	-4.392
DLA		-4.342	-4.103	-3.380
DLDS		-6.164	-5.72	-5.674
DLUA		-5.593	-5.447	-5.491
DLS		-5.336	-5.414	-5.412
DINF		-6.740	-6.449	-6.326

Table viiB ADF Unit Root Test Results for Variables in the Growth Equation

Variables(in levels)	C&T	C	NCT
LY	0.144	2.209	2.479
LI_{NA}	-2.285	-1.006	0.734
A2	0.774	2.611	0.003
PA	-3.6	-0.583	0.602
LLF	-2.463	0.056	-1.512

RFV		-3.187	-3.09	-2.484
LA		-3.238	-0.985	-1.879
P		2.766	2.962	2.13
Variables		***In***	***first***	***difference***
DLY		-5	-3.781	-2.643
DLI_{NA}		-4.366	-4.359	-4.246
DA2		-4.811	-4.01	-3.606
DPA		-4.323	-4.298	-4.011
DLLF		-3.597	-3.93	-2.619
DRFV		-5.547	-5.621	-5.695
DLA		-4.491	-4.538	-4.077
Critical values	***1%***	***-4.27***	***-3.668***	***-2.641***
	5%	**-3.552**	**-2.966**	**-1.95**

Note: D represents the first difference of the time series variables. C&T represent for both constant and neither trend, C for constant no trend, and NCT stands for neither constant nor trend is included in the model.

4.2.2 Investment Equation: Long run Equilibrium and VECM

A. Investment (long run equation)

Once all the variables entered the investment equation are integrated of similar order (I (1)), the next step is testing for cointegration. The rank of the cointegrating vector is determined using the Johansen's maximum likelihood method. The test result (both λ trace and λ max statistics) rejects the null hypothesis of no cointegration both at the 5 % and 1 % significance level. In other words, the null of at most one cointegrating vector is not rejected. Hence, there exist single cointegrating vectors which make up the long run relationship among the variables in the system (Table Viii)

Table viii(A) Johansen's cointegration test

Ho(null hyp.)	Ha(alt. hyp)	Eigen value	λ trace	5 % critical	1% crit. value	λ max	5 % crit.	1% crit. value

			stat.	value			value	
r=0	r=1	0.8048	136.24 ***	104.94	114.36	58.81***	42.48	48.17
r≤1	r=2	0.5924 6	77.426	77.74	85.78	32.3141	36.41	41.58
r≤2	r=3	0.4866 2	45.112	56.64	61.21	24.0025	30.33	35.68
r≤3	r=4	0.3205 4	21.1097	34.55	40.49	13.9126	23.78	28.83
r≤4	r=5	0.1604 0	7.1971	18.17	23.46	6.2938	16.87	21.47
r≤5	r=6	0.0247 8	0.9034	3.74	6.4	0.9034	3.4	6.4

Note: *** denotes rejection at 1 % level. And the optimal lag length used to test for cointegration is determined at lag length of two using Akakie Information Criteria (AIC).

The presence of a single cointegrating vector points to estimate the long run equation along with its associated coefficients (β) and adjustment parameters (α) which are important for further analysis. The corresponding β and α coefficient vector are reported below.

Table viii (B) Normalized Long run β Coefficients

variables	LI	LA	LDS	LINF	LUA	LS
Estimated coefficients	1	-0.322	-0.109	0.375	0.597	0.659

Table viii(C) Adjustment (α) Coefficients

variables	Adjustment coefficients
LI	-0.30
LA	-0.14
LDS	-1.27
LINF	-1.002
LUA	-0.102

LS	-0.68

A well known problem with VARs and particularly important in the identification of a VECM is the prohibitively large number of parameters. Each equation involves estimating m x k lag coefficients plus one or more parameters for the deterministic components, where *m* and *k* represents number of variables and number of lags included in the system respectively. Even moderate values of *m* and *k* quickly exhaust typical samples for macro-econometric research.

One way to address the over-parameterization problem is to test and impose weak exogeneity assumptions (Zhou, Bonham and Gangnes, 2007). Thus in order to indentify the variables that are endogenously determined and conditional on the other explanatory variables in the model, a weak exogeneity test is conducted. As a result the likelihood ratio test is made by imposing zero restriction on the relevant α coefficient (first column of α coefficient matrix) given above.

Table viii(D) Result of weak exogeneity test

variable	lnI	lnA	lnDS	lnINF	lnUA	lnS
α	-0.30	-0.14	-1.27	-1.002	-0.102	-0.68
$\chi 2$	7.8	0.53	0.74	0.37	3.64	4.014
p-value	(0.0052)***	(0.467)	(0.3895)	(0.5433)	(0.565)	(0.052)

Note: ***represent rejection of weak exogeneity at 1% level of significance.

The likelihood ratio test result indicated that except for investment, none of the variables reject the null hypothesis that all the variables are weakly exogenous. Therefore investment is endogenously determined in the model while the other explanatory variables are weakly exogenous to the system. Thus it is valid to condition on the weakly exogenous variables. This enables us to analyze a single long run equation for investment conditional on the variables which are not endogenously determined in the model.

Similarly a zero restriction is imposed on long run β coefficients to identify which explanatory variables constituting the investment equation are statistically different from zero

Table viii(E) result of Zero restriction test on β coefficients

variable	lnA	lnDS	lnINF	lnUA	lnS
Coefficients-β	-0.322	-0.109	0.375	0.597	0.659
$\chi 2$	10.06	1.049	23.17	15.54	17.39
p-value	(0.002)***	(0.306)	(0.000)***	(0.000)***	(0.000)***

Note: *** denotes rejection of the null hypothesis at 1% level of significance.

The result of the likelihood ratio test in Table 5.2.2(D) shows the weakly exogenous variables in the system. Similarly, the zero restriction test performed on the long run coefficients of the explanatory variables shows the statistically significant coefficient different from zero, which allows the estimation of the long run investment equation. The estimated long run investment equation is:

LI= 0.32LA + 0.109LDS - 0.375LINF - 0.659LS - 0.597LUA……(33)

[10.06] [1.049] [23.17] [17.39] [15.54]

(0.002) (0.306) (0.000) *** (0.000) *** (0.000) ****

Vector AR 1-2:Chi2 (36) =49.03[0.07237]

Vector Normality: Chi2 (12) =17.421[0.13445]

Two diagnostic tests are performed and the result confirmed the sufficiency of the model. That is, the null of no serial correlation is not rejected both at 1 % significance level. In addition, the test for normality confirmed that the errors are normally distributed and the null is not rejected at any conventional significance level.

As the statistics associated with the investment equation revealed all the explanatory variables, except for debt servicing, are statistically significant i.e. with the exception of debt servicing all the variables entered in the investment equation are significant in influencing investment.

According to the above result, foreign aid is found to have a positive and statistically significant influence on investment, i.e. a one percent increment in log of aid leads to a 30 percent increment in log of investment. The result showed that foreign aid has played an important role in promoting domestic capital formation, and has been used effectively for financing domestic investment projects among other .things. Also the result strengthened the main idea of the gap models in that foreign aid is used in capital scarce countries to bridge the resource gap. A similar result was found by Tolessa(2001), and Wondwossen(2003) for Ethiopia. Also a similar result has been found by Girma, Gomannee and Morrissey (2005) for sub Saharan African countries, and Hansen and Tarp (2000) in a cross country study. The result can be taken as an argument for the view that aid affects growth through its effect on investment.

The result showed that debt servicing in Ethiopia has insignificant but positive effect on investment. It suggests that despite resource gaps are closed through debt creating flows of foreign capital, debt servicing has no adverse effect on domestic capital formation. The result may appear to indicate that the country has benefited a lot from the debt relief that has been provided by donors. Furthermore, the capital gained that otherwise would be paid is used effectively to promote investment. The finding is in contrary to the expectation due to the fact that debt servicing is considered normally as a threat to the economic performance of the country since debt servicing has an important linkage with a number of important macro-variables like foreign exchange, government budget and investment, among others. A similar result has been found by wondwosen(2003), and Melesse(2005) found that debt servicing has insignificant effect.

The other variable considered in the investment equation, which is much associated with the aid flow, is uncertainty of aid flow. Uncertainty of aid has got a significant negative influence on investment. This point that it has significant effect on domestic investment in the long run since volatility in the flow of aid make long run development planning difficult in recipient countries. The finding further indicates that it is not only the volume of aid flows but also the stability of such flows that determines the impact of aid on investment and growth. Lensink and Morrissey (2000) and Chervin and Wijnbergen (2009) found a negative relationship between aid volatility and growth.

Domestic saving also entered in the long run investment equation with a statistically significant and negative sign. The finding is not in line with the theoretical expectation and indicated that domestic capital has not served to promote investment in the country. It is commonly believed that since saving is a source of funding for investment, any policy that is designed to stimulate saving, will also stimulate investment. From the finding it is possible to argue that domestic capital (saving) has not been allocated for productive investment activities, and /or the poor development and policy of the financial sector has constrained saving from fostering investment. This has a far reaching implication for the country in terms of dependency on foreign capital, poverty reduction and promoting growth.

On the other hand, the result may appear to indicate the fact that inflow of foreign capital retarded and created a downward pressure on domestic saving which diminishes the positive effect and leads to a negative relationship between saving and investment. Indeed the correlation between saving and foreign aid is negative (0.47) which confirms the unfavorable effect of foreign aid on saving.

Inflation as an indicator of macroeconomic instability is also used in the long run analysis and the result showed that inflation deters investment significantly. That is, a percent increment in log of inflation deters investment (in log percentage) by nearly forty percent. It suggests that an instable macroeconomic environment is not conducive for investment. This may discourages entrepreneurs from putting their fund in the country so long as the inflation rate is higher (especially double digit inflation and beyond).

B. Vector Error correction Model for Investment

Since the variables in the investment equation are found to be cointegrated, we proceed to estimate the vector error correction model which represents both the long run and short run adjustments among the variables under study. The log changes in the relevant variables represent short run elasticity's (alternatively, short run variation), while the error correction term (ECT) represents the speed of adjustment back to the long run relationship among the variables. A VECM is estimated beginning with the general over parameterized model. Then the VECM is subjected to a systematic reduction and diagnostic testing process until an acceptable

parsimonious model is obtained. In the process, all insignificant explanatory regressors with their corresponding lags are dropped until further reduction is rejected (Hendry, 1997).

In the short run dynamic equation, all weakly exogenous variables identified in the long run investment equation are entered in the right hand side of the model in their appropriate lagged difference form. In addition the error correction term with one period lag is also incorporated in the VECM.

Using the VECM specification (section 3.3.3), a short run dynamic equation is estimated for investment function. Dropping insignificant regressors from the specification (i.e. step-by-step elimination of insignificant regressors from the general VECM model) following the general to specific modeling strategy, a parsimonious result for investment is reported below.

The estimated coefficients of the VECM revealed that the signs of all variables are in line with the theoretical expectation. The result showed that investment is positively associated with both domestic (saving) and foreign (aid) capital. However, domestic saving promoted investment only in the short run; it remained an important source for financing investment and its positive influence is only a short run phenomenon. Foreign aid (lagged one period) also affects domestic investment positively and significantly in the short run.

Volatility of aid flow influenced investment negatively but found insignificant in the short run. The result indicates that volatility of aid has a minimal effect on investment in the short run; however, it has a deleterious effect in the long run since it makes long run development planning difficult and creates uncertain environment on investment activity. This pointed that the deleterious effect of uncertainty of aid on investment is only a long run phenomenon. The estimated short run investment equation also shows that debt servicing has a negative contribution. This indicates that debt servicing seriously affects capital formation activity but its impact is limited to the short run. The other variable used as a proxy for macroeconomic instability is inflation (regardless of the fact that it remained under control in the Derg period). The result revealed that inflation works against investment in the study period in Ethiopia. Such effect is transmitted indirectly through the measures that are taken to put the pressure under

control, which in fact has a wide spread effect not only on investment but also on other macro-variables. Also inflation has a negative effect on investment through discouraging entrepreneurs which works through the increment in the cost of production. Finally, the coefficient of the error correcting term is found to be statistically significant. It points that 36.5 percent of the disequilibrium in the previous period is corrected in one year. Therefore, it takes 2.7 years to adjust for the disequilibrium to the long run path.

Table viii(F) Result for the Dynamic Investment Equation

variable	Coeff.	t-value
constant	-2.249***	-5.8
DlA_1	0.389***	3.68
DlS_1	0.212***	3.46
DlDS	-0.052**	-2.36
DlDS_1	-0.159***	-5.45
DlUA	-0.488	-1.24
DlINF	-0.070***	-3.99
ECT_1	-0.365***	-5.78

Note: *** and **denotes significance at 1 % and5 % level respectively. The optimal lag length is determined at lag length of two using Akakie Information Criteria (AIC).

R^2=0.5634

*F(7,29)= 5.35 [0.0005]****

Diagnostic Tests

DW =1.6765

ARCH(1,2) test: Chi2(2)=0.206 [0.9022]

AR(1,2) test :F(2,27)=0.737[0.4880]

Hettest: F(1,35)=1.68[0.2032]

Normality test: Chi2(2)=0.668[0.716]

RESET test: F(3,26)=0.28[0.8414)

The goodness of fit of the model is quite acceptable-the independent variables explaining 56 percent of the variation in the dependent variable. The null hypothesis of the joint insignificance of the coefficients of all explanatory variables is rejected by the F-statistic. The different kinds of diagnostic tests performed on the model indicated no problem on the subject of regression analysis. All the tests failed to reject the null hypothesis at any conventional significance level. That is, the null of constant variance (homoscedastic errors) is not rejected as given by the Breusch-Pagan test for heteroscedasticity. The Breusch-Godfrey LM test for autocorrelation also shows that there is no serial autocorrelation. Furthermore, the LM test for autoregressive conditional heteroscedasticity indicated that the null of no ARCH effects is not rejected. In addition, the Ramsey's (1969) RESET test for model misspecification does not reject the null of no functional misspecification in the estimated investment equation. Lastly, the Jarque-Bera test for normality indicates that the errors are normally distributed since the null hypothesis of normally distributed error terms is not rejected at any conventional level. Thus, the various diagnostic tests conducted indicate that the overall fit of the model is acceptable enough statistically.

4.2.3 Growth Equation: Long run Equilibrium and VECM

A. Long run Growth Equation

A test for the presence of unit root is conducted both on the level and the first difference of the variables used in the estimation of the growth equation in section 4.2(table 4.2.1(i) and (ii)). The test result proved that all the variables entered in the growth equation (in levels) are non-stationary while the variables in their first differences confirm that the series is stationary. Once the ADF unit root test result revealed that the series is I (1), a cointegration test is performed to determine the rank of the cointegrating vector. The approach used in the determination of rank of the cointegrating vector for the growth equation is similar to that used in the investment

equation. The cointegration test result based on Johansen's maximum likelihood technique is given by table ix(A).

Table IX(A) Johansen cointegration Test for Growth Equation

Ho(null hyp.)	Ha(alt. hyp)	Eigen value	λ trace stat.	5 % critical value	1% crit. value	λ max	5 % crit. value	1% crit. value
r=0	r=1	0.8355	162.48***	124.24	133.57	68.58***	45.28	51.57
r≤1	r=2	0.64255	98.899	94.15	103.18	39.09	39.37	45.1
r≤2	r=3	0.3799	54.8	68.52	76.07	18.16	33.46	38.77
r≤3	r=4	0.34841	36.64	47.21	54.46	16.27	22.07	32.24
r≤4	r=5	0.24054	20.3677	29.68	35.65	10.45	20.97	25.52
r≤5	r=6	0.21983	9.912	15.41	20.04	9.43	14.07	18.63
r≤6	r=7	0.01252	0.4789	3.76	6.65	0.4789	3.76	6.65

Note: *** denotes rejection of the null hypothesis at 1 % significance level respectively. The optimal lag length used to test for cointegration is determined at lag length of two using Akakie Information Criteria (AIC).

As it is evident from the test result, there is one long run relation describing the output growth-equilibrium relationship with the variables in the system. Consequently, we assume one cointegrating relationships for further analysis and an equation with one stationary relationship in the model is estimated. Therefore, the relevant long run cointegrating coefficients along with the adjustment parameters are reported below.

Table IX(B) long run Normalized (β) coefficients

Variable	LY	LI_{NA}	A^2	PA	LLF	RFV	LA

Coefficients(β)	1	-0.036	-2.74e-10	0.678	-2.36	0.0047	-0.436

Table IX(C) Adjustment parameters (α)

Variable	LY	LI_{NA}	A^2	PA	LLF	RFV	LA
Coefficients(α)	-0.50	-0.193	0.325	1.07	0.016	-0.66	0.43

To identify endogenous variables present in the system a test of weak exogeneity is conducted on the adjustment parameters (α coefficient) by imposing zero restriction. The likelihood ratio tests confirmed that only real GDP rejected the null of weak exogeneity. In other words, all the variables included in the system do not reject the weak exogeneity hypothesis and as a result real GDP is conditioned on the other variables as right hand side explanatory variable. Thus a single long run equation for real GDP is analyzed conditioned on the weakly exogenous explanatory variables.

Table IX(D) Weak Exogeneity Test Result for growth equation

Variable	LY	LI_{NA}	A^2	PA	LLF	RFV	LA
α	-0.50	-0.193	0.325	1.07	0.016	-0.66	0.43
X^2	16.69	0.03	1.19	3.73	0.71	1.71	3.39
p-value	[0.000]***	0.872	0.41	0.056	0.39	0.141	0.065

***-denotes rejection of hypothesis at 1 % significance level.

Similarly a zero restriction is imposed on long run β coefficients to identify which explanatory variables constituting the long run growth equation are statistically different from zero. The result of the likelihood ratio test is reported below;

Table IX(E) Test of Beta significance for growth equation

Variable	LI_{NA}	A^2	PA	LLF	RFV	LA
β	-0.036	-2.74e-10	0.678	-2.36	0.0047	-0.436
X^2	2.5	25.57	24.78	23.55	14.83	22.93

p-value	0.084	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***

***-denotes rejection of the null hypothesis at 1 % significance level.

The result of the likelihood ratio test in Table 4.2.3(D) shows the weakly exogenous variables in the system. Similarly, the zero restriction test performed on the long run coefficients of the explanatory variables shows the statistically significant coefficient different from zero, which allows the estimation of the long run growth equation. The estimated long run growth equation is:

$$\boldsymbol{LY} = 0.036\boldsymbol{LI_{NA}} + 2.74e\text{-}10\boldsymbol{A^2} - 0.678\,\boldsymbol{PA} + 2.35\,\boldsymbol{LLF} - 0.0047\boldsymbol{RFV} + 0.436\boldsymbol{LA} \quad \ldots\ldots\ldots\ldots (34)$$

$$\boldsymbol{(2.5)} \quad \boldsymbol{(25.57)^{**}} \quad \boldsymbol{(24.78)^{**}} \quad \boldsymbol{(23.55)^{**}} \quad \boldsymbol{(14.83)^{**}} \quad \boldsymbol{(22.93)^{**}}$$

Vector Normality: Chi2 (14) =19.87[0.13426)

Vector AR (1, 2):Chi2 (49) =39.61[0.828)

The diagnostic tests performed confirmed the adequacy of the model and the long run equation is reasonably acceptable. That is, the null of no serial correlation is not rejected at any conventional significance level. In addition, the test for normality confirmed that the errors are normally distributed and the null is not rejected at any conventional significance level.

The long run growth result shows that all the variables (except non-aid financed investment) reject the null at 1 % significance level. The result indicated that investment which is not financed by aid has insignificant effect on growth. The role of domestic capital formation in enhancing growth in the study period was weak at best, which points the inefficiency associated with capital formation activity. However, the contribution of foreign aid was positive and significant, i.e. the elasticity of growth with respect to aid is 0.45. The result confirmed the one found in the investment equation where foreign capital remained an important source of financing domestic investment activity. Thus it can be argued that investment served as a transmission mechanism from aid to growth. The result in general point that aid support growth in Ethiopia. The main mechanism can be either through financing investment (as discussed above) or by increasing worker productivity (for instance, through investments in health and education). Aid also supports growth through facilitating the import of new technology or knowledge. The result is supported by other studies Tarp (2009) and Arndt, Jones and Tarp

(2009) who argued that aid has an average positive effect on growth. Also Malik(2005) found that foreign has a long run positive impact on growth in Togo. A supporting result was found by Tolessa(2001) for Ethiopia.

In contrary, foreign aid interacted with policy (PA) has a significant negative influence on growth. The negative result is associated with the policy environment (macroeconomic and infrastructure) in the country which makes aid less effective than otherwise would be. A comparison of the coefficients of aid and the aid interacted with policy index in absolute terms indicate that aid would be more effective had there been a favorable macroeconomic policy environment. Though the importance of a sound policy environment for growth is not questionable, but the argument of Burnside and Dollar (1997, 2000) that aid is effective only in a good policy environment is not valid in Ethiopia. Rather it can be argued that aid is effective in promoting growth in Ethiopia in the period considered; but its effectiveness would have been higher if it was supported by a sound macroeconomic policy environment. In general, the result may point that aid works, but better in countries with good policies and institutions. Even though the policy environment is bad, aid entered alone has a positive contribution to growth as indicated above. This result corroborates with idea that "aid is generally effective even in bad environment" as argued by Dalgaard, Hansen and Tarp (2003).

Unlike the theoretical expectation the squared aid term, that was used to detect for the presence of capacity constraint, has significant effect on economic growth. The result suggests that there is no capacity constraint in absorbing foreign aid at any level. In other words, the argument that foreign aid tends to have diminishing returns beyond some threshold level do not operate in the Ethiopian situation in the study period considered. Furthermore, the finding may point the huge capital requirement to meet the wide spread development need of the country and the importance of foreign aid flow in order to promote growth. But the coefficient is too small as given by the long run growth equation. Lensink and White (2000) find some evidence for negative returns to aid at high levels of aid inflows. However, they added that the results are sensitive to the countries considered as well as the exact specification. However, the finding may call for further research to be investigated since countries with low level of human capital and poor institutions are expected to have a capacity constraint in absorbing excessive capital from abroad.

Deviation of rainfall from the long term mean has got a negative and significant effect on growth. The result indicates that fluctuation (irregularity) of rainfall has a deleterious influence on growth. This perhaps may be via its direct effect on the performance of agriculture in the long run since agriculture remained the dominant activity practiced at every corner of the country contributing nearly half of the GDP. In other words, the result points that whenever there is a climatic shock (rainfall shock); the effect is ultimately transmitted to the overall economy in the long run since agricultural production in Ethiopia is highly dictated by the availability of rainfall. Thus the finding corroborates with the fact that rain-fed agriculture is not conducive for growth in Ethiopia.

Labor force in line with the theoretical expectation has entered with a positive sign and moreover it is significant. It shows that economically active labor force has played a role in promoting growth in the long run.

B. Vector Error Correction Model (short run dynamic model) for Growth

Since the variables constituting the growth equation are found to be cointegrating, the next step is to estimate a vector error correction model for growth. As it is evident from the long run equilibrium growth equation, all variables except growth is endogenously determined in the system.

Table IX(F) Result for Dynamic Growth Equation

variable	Coeff.	t-value
constant	6.02**	2.55
DlA_1	0.0039	1.13
DPA	-0.152***	-3.8
DA^2	6.43E-11***	3.4
DA^2_1	-4.24E-11*	-1.91
DRFV	-0.0063	-1.00
D91	-0.095**	-2.06
ECT_1	-0.45**	-2.54

Note: ***, **, and* denotes significance at 1 %,5 % and 10 % respectively. The optimal lag length is determined at lag length of two using Akakie Information Criteria (AIC).

R^2=0.5166

*F(7,30)= 4.58 [0.0014]****

Diagnostic Tests

DW =1.91

ARCH(1,2) test: Chi2(2)= 0.370[0.8309]

AR(1,2) test :F(2,28)=0.263[0.7708]

Hettest: F(1,36)=0.00[0.948]

Normality test: Chi2(2)=1.74[0.418]

RESET test: F(18,12)=0.95[0.5487)

The independent variables explain nearly 52 percent of the change in dynamic model. In addition various diagnostic tests are performed; all the tests confirmed that the model is well specified and the regression analysis is adequate. The diagnostic tests show that the null of the various tests are not rejected except for the joint insignificance of the explanatory variables i.e. the coefficients of the explanatory variables are jointly significant. The result shows that there is no serial correlation and the errors are normally distributed with constant variance. A test for autoregressive conditional heteroscedasticity is performed but the result failed to reject. The Ramsey test for model misspecification confirms that the model is well specified and there is no problem in the specification of the model.

The estimated dynamic equation for growth result indicates that official development assistance has insignificant effect on growth. The finding point that foreign aid was used to finance investment which has a longer gestation period and its impact may not be reflected in the short run. The aid-policy interaction term has got a significant and negative influence on growth. It indicates the unfavorable role of poor policies for growth. Furthermore, the result revealed that bad economic policies remained a challenge for economic progress both in the short run and long run.

Aid squared has produced inconclusive and mixed result in the short run. Current aid squared has produced a result which is in line with the long run equation implying that there is no capacity constraint while the one year lagged difference aid squared support the view that aid has a diminishing return beyond some level and hence capacity constraint in the absorption of aid flow though marginally at 10 percent significance level.. Though it is not statistically significant, rainfall variability does have a negative impact on growth. Major political change from the Derg to EPRDF (D91) has an immediate negative impact on growth. However, the long run effects of such change are not analyzed since the objective was to identify the immediate short run effect of political unrest. In addition, as there was no peaceful transfer of power from the Imperial regime to Derg (D74) and from the Derg to EPRDF (D91), the country experienced a political unrest. Thus the result captures the influence of such political unrest on growth in the short run. However, the coefficient of major shifts in government from the Imperial to Derg regime is not statistically significant even though it has a positive sign. The error correcting term is statistically significant. The coefficient indicates that 45 percent of the disequilibrium in the previous period is corrected in one year. Thus it takes slightly above two year for the deviation adjusts to the long run path.

4.2.4 Causality Test in the VECM

The aim of this section is to test the presence and direction of causality between investment and saving, and policy and aid in the Ethiopian context. However, the approach used is different from the standard Granger-causality test which is based on VAR analysis. If cointegration is detected between the variables, then Granger causality must be conducted in vector error-correction model (VECM) in order to avoid problem of misspecification(Granger, 1988)-cited by Boon(2000) and Tanna and Topaiboul(2002). Following the VECM, causality test is performed to identify the presence and direction of causality.

A. Test for Causality between Saving and Investment

The relationship between saving and investment remains one of the great contested areas in macroeconomics. At the heart of the debate lies the question of “causation”, and whether it is “saving that causes investment” or “investment that causes saving”, or whether there exist a bi-directional causality between the two variables.

If investment and saving are cointegrated, the finding of no causality in either direction is unacceptable. Since cointegration says nothing about the direction of causality, it is mandatory to estimate a VECM from the long run cointegrating vectors to detect the direction of causation. In addition, using vector error correction model to detect causality enables to distinguish between short-run and long-run causality. According to Boon (2000) short run causality is reflected through the coefficients of differences of the (lagged) explanatory variables, whereas the long run causality is implied through the coefficient (adjustment parameter) of the lagged error-correction terms which contains the long-run information.

The unit root test performed in section 4.2(table VIIA) indicated that both variables are integrated of order one (I (1)). Hence it is possible to proceed to test for long run relationship using the Johansen's cointegration test approach. The test result revealed that there is one cointegrating vector, and points to estimate a VECM to test for causality[7].

The result indicates that in the investment equation saving causes investment whereas the adjustment parameter failed to cause investment. Similarly investment causes saving but the adjustment parameter (Y_{t-1}) has not produced a causal effect on investment. Therefore, there exist a bi-directional causality between investment and saving in the short run. However, the bi-directional causality is only a short run phenomenon since the adjustment parameters appeared insignificant in both equations. Therefore, in the long run there is no causality in either direction. The result confirms the theoretical views on the saving-investment causation.

Table XA causality test between saving and investment (F-statistics)

variables	Dependent	Investment	Saving

[7] The result must be interpreted with caution since the information criteria opts for a lag length of one, and hence only one lag is used to test for cointegration and in the estimation of VECM.

Causal		
LS	3.95**	4.07**
LI	0.75	3.58**
Adjustment parameter	0.87	0.77

Note: **denotes F-statistics significance at 5 %.

B. Causality Test between Aid and Policy

The most influential but controversial paper by Burnside and Dollar (1997) indicated that aid is effective only in a good policy environment. In addition, they argued that aid appears not to affect policies systematically either for good or for ill. Any tendency for aid to reward good policies has been overwhelmed by donors' pursuit of their own strategic interests. In other words, in determining aid flows, recipient governments' policies are not the most important factor.

This section tests the causality between aid and policy. That is, to test for the presence and direction of causality. Since both variables of interest are I (1), a test for long run relationship is performed and the result shows that there is a single unique cointegrating vector constituting the long run relationship between policy and aid. Accordingly, a VECM is estimated to discriminate the short run and long run causality between the variables.

An F-test is conducted on the coefficients of the lagged difference terms of both equations to identify the presence of short run causality. On the other hand, absence of long run causality necessitates the coefficients *of the error correcting term to* be zero for the respective equations. A zero restriction is made on the adjustment parameters to test the null of no long run causality.

The test result shows that the policy designed by the government of Ethiopia does not cause aid. The result further points not only the absence of short run causality from policy to aid but also the adjustment parameter(S_{t-1}) is not significant even at the 10 percent significance level. Therefore, policy does not cause aid at all. The result may imply that the government's policies

are not the most important factor in determining aid flows to Ethiopia. Rather it points the presence of other factors that determine aid flows. Some argue that strategic importance of the country from donors' perspective; the income of the country (low income countries are perceived to receive a larger aid), political agendas, etc are more important in determining the flow of aid. The causality test result (F-statistics) is reported below.

Table XB causality test between aid and policy

Dependent(eqn.) / Causal variable	Policy	Aid
LA	2.78*	0.17
P	9.28***	0.05
Adjustment parameter	2.98*	2.39

Note:*&***denotes rejection at 10 and 1 % significance level. A lag length of two is used for the estimation of VECM.

On the other hand, the finding for the policy equation has produced the opposite result. Even though the test statistics are not significant at the customary 5 percent level, aid causes policy in the short run at the 10 percent significance level. Also the significance of the adjustment parameter (W_{t-1}) indicates the presence of long run causality from aid to policy. Thus there exists a unidirectional causality from aid to policy but the converse does not hold. The view that aid appears not to cause policy either for good or ill does not hold for Ethiopia.

In addition, the coefficients representing short run causality (b_i) have negative sign pointing that aid cause policy for bad. Such negative causation can be linked with the dependency syndrome that aid creates on the recipient country: The existence of aid to finance imports might reduce the need of economies to liberalize their trade regimes more to encourage exports, and similarly, donors support may increase poor countries' access to capital markets and result in larger borrowings and deficit.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATION

5.1 Conclusion

Foreign aid remained an important source of finance for capital scarce (poor) countries and continued to play a multifaceted role in financing their development needs. Despite the massive literature on the subject, a consensus has not been reached by researchers regarding the growth impact of aid, rather the results are inconclusive. Thus one can find both success and failure stories.

The study has examined the macroeconomic impact of aid in Ethiopia with special emphasis given to the impact of foreign aid on domestic capital formation and economic growth. The study makes an effort to establish whether there exists long run and short run relationship between foreign aid, investment & growth using annual data covering the period 1970 to 2009. For these purpose two equations i.e. investment and growth were estimated. Multivariate cointegration technique is used for the analysis of the long run relation whereas VECM analysis is used to assess the short run relationships and its linkage with the long run equilibrium path.

Since cointegration necessitates the variables to be integrated of the same order, the series is tested for unit root and the result found indicated that all the variables are stationary after first difference i.e. I(1). As a result, we run a test for cointegration on both equations and the result suffice the presence of long run relationship among the variables in the model.

The empirical result from the investment equation estimated shows that aid has a significant positive impact on investment in the long run. Its positive impact is not limited only to the long run but also aid finances investment in the short run. On the other hand, volatility of aid by creating uncertainty in the flow of aid has a negative influence on domestic capital formation activity. In addition, inflation and saving are found to have a negative influence on investment. However, in the short run saving has got a significant positive impact on investment and inflation's effect is similar. The result further shows that debt serving appeared insignificant.

The paper also examined the growth impact of aid, among other variables and its interaction with policy index. The policy index is constructed as a weighted sum of budget deficit, openness and credit access to the private the sector to capture fiscal, trade and monetary policy. Although this index provides a good idea of a country's policy stance, we believe that it is not broad enough for a typical developing country like Ethiopia. Therefore, the policy index is augmented by major telephone lines per 1000 people (tele) and is relatively broad. Tele is used as indicator (proxy) for infrastructure policy.

The result from the growth equation revealed that aid contributed positively to economic growth in the long run, but its short run effect appeared insignificant. In the contrary, when aid is interacted with policy, the growth impact of aid is negative implying the deleterious impact of bad policies on growth in the long run. Aid squared, unlike the theoretical view, has got a positive sign, pointing the absence of capacity constraint in the flow of aid to Ethiopia. Indeed, this call for a deeper investigation and further research on the absorptive capacity of the country regarding aid flow.

In addition, rainfall variation (alternatively, rain-fed agriculture) has unfavorable contribution to growth. Non-aid financed investment is also entered in the growth equation to avoid the problem of double counting but its impact on growth is insignificant.

Causality tests among pairs of variables of interest are addressed both in the investment and growth equation. The presence and direction of causality between saving and investment in the investment equation and aid and policy in the growth equation is conducted based on VECM. A VECM is used to facilitate the discrimination of the short run and long run causality among the variables.

The causality test result between saving and investment indicates the existence of bi-directional causality between saving and investment. The result which is in line dominant theoretical views point that policy which are aimed to facilitate investment also stimulate saving. Similarly, policies designed to stimulate domestic saving also facilitates domestic capital formation activity.

The causality test result performed on aid and policies indicate the presence of a unidirectional causality running from aid to policy whereas the converse does not hold. It indicates that the government's policy is not the sole determinant of aid flow to Ethiopia rather it points the existence of other factors which are more important in the determination of the flow.

5.2 Policy Implications

The empirical results found in this study have some important policy implications. Even though aid appeared to have a significant role in financing investment in the long run, volatility in the inflow of aid affected investment negatively. Some mechanisms have to be designed to increase the flow of aid, and avoid (if possible) or minimize the effect of unexpected instability in the inflow of aid. Enhancing the domestic revenue raising capacity is at the heart of the mechanism to meet the capital required for investment in times of short falls relative to expectations. The other important mechanism is that stability in donor-recipient relationships is crucial in order to promote the effectiveness of aid, which makes prediction of future aid inflows easier. Such stable relationships with donors allow more investment, better fiscal planning and makes long term development planning not difficult.

Since inflation (higher rate) is taken as an indicator of a government that has lost control over the management of the economy, it is capable of transmitting a negative signal for investment. Therefore, emphasis should be given to control inflation towards an acceptable level through the use of appropriate mix of fiscal and monetary policies. Such policies will have the tendency to minimize the unfavorable impact of inflation on entrepreneurs spending behavior and also benefit consumers to relieve the high cost of living associated with higher inflation.

Though the view that aid is ineffective but only in a good policy environment is not supported by this study, the finding points the importance of a good policy environment to make aid more effective. In other words, the negative impact of the aid-policy interaction on growth indicates

the role that inefficient policies can play in diminishing the positive effect of aid on growth. Thus setting a sound policy environment is crucial to use aid more effectively and make domestic investment efficient. Furthermore, the policy index constructed implies that emphasis should be given not only to economic policy setting but to sound infrastructure policies are also crucial for growth.

Therefore, the government is required to set a sound macroeconomic policy environment which stimulates domestic saving that is adequate enough to finance investment and close the saving-investment gap in the long run. In line with this the monetary policy should be designed to create an easy access of credit to the private sector to encourage private investors, among other things. To reduce the long run dependency on foreign aid to cater the increasing demand of development and also to mitigate the exposition of the country to external shocks, some policy alternatives are given below:

1. Expanding the domestic tax base of the economy along with good institutions that can combat fraud and corruption in the process of tax collection. The revenue from an extensive tax base enables the country to finance its expenditure on domestic capital and hence less dependence on foreign aid to meet the development needs. Therefore, the higher tax revenue makes the country to narrow the fiscal gap by its own resource and the gap can no more be binding to growth.
2. In order to minimize the foreign exchange constraints which makes dependence on aid compulsory, diversification along with policies of export promotion are crucial. In addition, the poor track of export in the past decades also points the need to reduce dependence on primary commodities as the dominant way of foreign exchange earnings.

As the variability in rainfall has produced a significant negative influence on the growth of the economy, an alternative mechanism has to be sought to mitigate such unfavorable effects. When the variability in the pattern of rainfall is coupled with the habit of producing only once in a year depending on rainy season, it has a far reaching implication on the performance of the economy. The most important mechanism is practicing irrigation agriculture in the dry seasons in the arid, semi-arid and highland areas of the country. The weak effect of non-aid financed investment on

growth appears on the surface to indicate inefficiency in putting domestic capital for productive activity to promote growth.

The overall result shows the importance of increasing foreign aid flows to Ethiopia to enhance investment and growth. However, in the long run, rather than merely filling gaps, aid should help close gaps in Ethiopia, since reliance on future aid and foreign borrowing is thus diminished.

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ANNEX I

Generated variables used in the investment and growth equation

1. Investment which is not financed by aid is generated from an investment regression where aid is used as the only explanatory variable. Then non-aid financed investment is generated as follows:

$$I_{NA}=INVESTMENT-0.58AID$$

2. To capture deviations of actual aid from the expected trend, an auto-regressive estimate of the trend is made. The expected aid is generated based on auto-regressive estimate of aid up to two lags;

$$(EXPECTED\ AID)_t = 0.0154+0.906(AID)_{t-1}+0.07(AID)_{t-2}$$

3. The result obtained from the growth regression which is used in the construction of the policy index is presented as a weighted sum of openness, credit access to the private sector, budget deficit and tele as follows:

$$LY= 10.98+.81OPENNESS- 0.063BUDGET\ DEFICIT+.44CREDIT+ 0.55TELE$$

ANNEX 2

Cointegration test result for causality tests

Table 4.2.4A Cointegration test (saving-investment causality)

H_o	Eigen value	λtrace	5 % crit. value	1 % crit. value	λmax	5 % crit. value	1 %
r=0		23.89	18.17	23.46	18.4983	16.87	21.47
r=1	0.37769	5.3918***	3.74	6.4	5.3918***	3.74	6.4
r=2	0.12912						

***denotes significance at 1 % significance level.

Note: the optimal lag length is determined at 1 using various information criteria.

Table 4.2.4B Cointegration test for causality between aid-policy

H_o	Eigen value	λtrace	5 % crit. value	1 % crit. value	λmax	5 % crit. value	1 %
r=0		27.9224	15.41	20.04	25.9358	14.07	18.63
r=1	0.49466	1.9866***	3.76	3.76	1.9866	3.76	6.65
r=2	0.05093						

***denotes significance at 1 % significance level.