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The Relative Significance of Foreign Aid and Domestic Saving Mobilization as a Strategy to Boost Economic Growth in Ethiopia

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Abstract:

This study examined the relative importance of aid and domestic savings in boosting economic growth of Ethiopia by using quantitative estimation technique. The econometric analysis is based on annual data from 1970 to 2011. The long-run relationship between economic growth and explanatory variables is tested using Auto Regressive Distributed Lag co-integration model. The study found a statistically significant and positive effect of aid on per-capita output growth in Ethiopia in the long-run but a negative effect in the short-run. The domestic saving rate has much larger and statistically significant positive impact on per-capita output growth in the long-run while its short-run effect is positive, though statistically insignificant. Effect of aid turns negative though statistically insignificant when investment rate is controlled in growth estimation. This highlights the presence of some absorptive capacity constraints associated large aid money. Better management of aid funds and diversification of investment financings, mainly from domestic sources and foreign private investors are needed to grip more benefits. Such initiatives require stronger financial institutions, developments of capital market and incentive mechanisms in domestic saving mobilizations.

Keywords: Foreign aid, domestic resources, economic growth, Ethiopia

1. Background of the Study

Ethiopia has been among the fastest growing economies in Africa since 2003/04, witnessing average annual real GDP growth rate of 10.9% during past decade (2003/4 to 2012/13) (NBE, 2013). Although growth still remains strong through 2014/15, Ethiopia is challenged with many deep socio-economic problems. High poverty rate, growing unemployment and rising inflation are unsolved problems in Ethiopia. According to the report of United Nations Development Assistance framework (UNDAF, 2011), lack of employment opportunities had been provoking an increased migration of youth both within and out of Ethiopia.

Moreover, weak domestic resource mobilizations still remain major challenges amidst the need for government's cautious monetary and fiscal policies to curb rising inflation pressure and boost public revenues (MoFED, 2011).

Ethiopia has long been reliant on foreign borrowings. The country was ranked second as a recipient of net official development assistance (ODA) among the 43 fragile states in 2008 (OECD, 2011). The country received 13.4% of net ODA as proportion of Gross National Product (GNP) in 2009, compared to 9.4% for average low income countries and 4.9% for average Sub-Sahara Africa for the same year (World Bank, 2011).

The importance of foreign aid had long been justified by the premises of 'financing-gap' model where it is expected to fill gap between investment needs and available domestic savings (Were, 2001). However, existing literature have also identified some policy challenges associated with huge flows of official development assistances and management of multiple aid funded projects (Montel, 2003).

The capacity to set aside a large proportion of GDP for investments has been recognized as growth engines to any economy (Azariadis, 2006). Despite the low domestic saving conditions, Ethiopia is implementing the so called 'ambitious' *Growth and Transformation Plans* (GTP I & II) that was aimed at fostering broad-based and sustainable development (World Bank, 2013) since 2010/11. The plan during phase one (GTP I) targeted an annual real GDP growth rate of 11.2 % on a base case scenario to achieve the millennium Development Goals (MDGs) and the long term vision of achieving a middle income status by 2025 (MoFED, 2011). The continued national program of this type is obviously in desperate need of large financings to meet its keen targets.

1.1. Statement of the Problem

Government is major player in influencing economic productivity and output growth through its sizable share in consumption, public capital expenditures and economic policy decisions. These roles affect the efficiency and sizes of investment rates, and economic growth. One main purpose of foreign aid is to bridge investment gaps in financing public capital expenditures. Aid is also provided to

address human development constraints by financing education and health services, which have nowadays become major development goals in growth and poverty reduction efforts (United Nations, 2003; UN Millenium Project, 2005).

Aid is only one part of the resources that need to be mobilized in the development process of low income countries. There are other sources of financing development activities, including foreign direct investment, remittances, domestic saving and public revenues. There is a growing consensus for the need to go beyond aid in fragile and highly aid dependent countries to harness a full range of the sources for development. However, many less developed countries (LDCs) do not effectively mobilize their domestic financial resources. According to Walle (2008), Sub-Saharan African (SSA) countries are still receiving large development assistances exceeding the amount of private capital inflows. It was also found that commercial banks, microfinance institutions (MFIs) and insurance companies are the only dominant deposit mobilizing agents in many of these countries.

Ethiopia was among the seven countries selected in the UN Millennium Project (2005) to develop large investment plans for MDG achievements (UNDAF, 2011). Recently, large infrastructure and other economic development projects were initiated under the successive *Growth and Transformation Plans* (GTP I & II) with massive associated financing requirements.

The plan pointed out the need to increase both household savings and foreign borrowings to match the required investments. However, the flows of foreign finances are often unpredictable and out of the country's control.

Although there are some studies that used short-run analysis to establish links between foreign borrowings, domestic savings and income growth, there are rare studies that have clearly addressed the relative importance of foreign aid and domestic savings in Ethiopia (Engida, *et al*, 2012).

This study is motivated by the fact that Ethiopia's overall economic development effort has been encouraging while the country remained the top aid recipient, where aid on average is more than twice of domestic saving rates (OECD, 2011).

Therefore, given the ongoing large development programs, it is critical to clarify the relative importance of increased reliance on foreign aid compared to domestic resource mobilizations as growth financing strategy in Ethiopia.

This study tried to answer the following main empirical questions:

- What are the compositions, trends and size of recent foreign financial inflows compared to domestic savings in Ethiopia?
- What is the relationship between foreign aid and economic growth in Ethiopia?
- Is there any possible indirect effect of aid on per-capita output growth of Ethiopia?
- What are the relative significances of foreign aid and domestic saving in boosting economic growth of Ethiopia in the long-run?

1.2. Objectives of the Research

The general objective of the study is to analyze an effect of foreign aid on the long-run economic growth prospects of Ethiopia and its relative contributions vis-à-vis the domestic savings.

1.3. Significance of the Study

An empirical understanding of the impacts of foreign aid on economic growth of Ethiopia and its relative importance vis-à-vis domestic savings is crucial for national policy makers.

The study could be used as an input by policy makers in devising strategies for better utilization and mobilization of financial resources in the achievement of long term goal as stipulated in successive Growth and Transformation plans. The study also can contribute to our empirical understandings on the relative significance of aid in supporting economic growth of highly aid dependent countries.

1.4. Scope of the Study

The study analyzes the role of foreign aid in the economic growth of Ethiopia and makes comparative analysis with the domestic saving. The time series data from 1970-2011 is used in the econometric analysis.

Moreover, the quantitative analysis is supplemented with separate trend analysis of foreign aid, domestic saving and FDI to increase consistency and reliability of the study findings.

1.5. Limitation of the Study

The researcher has attempted to address the research question on understanding relative role of foreign aid and domestic savings in economic growth of Ethiopia. The available data on aid and macroeconomic variables were annual time series that may be relatively small to apply more comprehensive estimation with extended number of variables and lag structure. Even though many researchers have recently used the same econometric model (ARDL model) with fewer time series data, the nature of data in this research seems to fluctuate much and makes the accurate estimation likely more difficult. The researcher is aware of this issue and attempted to address it by reducing estimated parameters through the general to specific approach of excluding insignificant parameters.

2. Review of the Literature

2.1. Introduction

There is large body of literature on impact of development aid on growth and poverty reductions in recipient countries. The macroeconomic impact of foreign aid had entailed a series of debates and policy orientations towards recipients and aid delivery

mechanisms. Proponents of aid claim that achievement of certain desired economic growth targets need to be supplemented with large aid. Whereas critics of aid argue that high reliance on foreign aid entails some macroeconomic challenges and this could delay executions of necessary policy decisions. In the next few sections, summary of studies is provided on the basic rationales for aid, the role of aid in public investments and domestic resource mobilization efforts.

2.2. Basic Rationales for Giving Aid

To achieve better economic progress, a continuous improvement in productive capacities has long been found very crucial. However, financing the key development activities in many poor economies had been limited mainly due to the sweeping constraints in domestic savings and unfavorable balance of payments.

The gap between required investments and available domestic resources was one main argument widely used in aid for development dialogue during early development decades. The resource gap model was the widely applied framework in the *first generation* studies of macroeconomic impact of aid (Wijnbergen, 1986; Easterly, 1997, 2001) and continued as influential paradigm for policy dialogue among international financial institutions and policy makers (Ranaweera, 2004). The basic growth equation behind the *financing gap model* was due to the works of Evsey Domar and Harrod that was later coined as the ‘two-gap’ model by the World Bank economists (White, 1992). The model elaborated that investment is the main driving force of high economic growth. Sufficient level of savings is required to achieve certain income growth rate through proportional investments. Thus, lack of sufficient domestic financing capacity has been the main argument in development assistance literature for the continuous flow of official resources, despite the less appealing ex-post performances of many countries (Easterly, 2006; Moyo, 2010; Seriex, 2011).

Another theoretical rationale for high aid flows that has recently become popular in calling for scaling up aid to recipients is called theory of ‘big push’. It implied a need for large investments on a set of inter dependent economic activities so as to break the vicious poverty cycle in which the aid dependent countries are trapped. Thus, aid inflow is expected to continue until sufficient domestic savings could be generated (Easterly, 2006).

The Economist (2011) describes the theory as follows:

- In development, it seems, you cannot do anything until you can do everything, even the simplest activity requires a network of other activities and that individual firms cannot organize such a large network, so the state or some other giant agency must step in.

However, it was argued that the overreliance on the premises of *bigpush* theory might have resulted in over riding of domestic policy matters and less realizations of the expected outcomes from massive resource inflows (Harms and Lutz, 2004).

2.3. Aid and the Public Expenditure

Foreign aid in low income countries are often received by public sector for spending on physical infrastructure projects or developing human and institutional capacities. Aid could also be provided as budget support to some broadly defined development programs. In both cases, it is supposed to strengthen productivity of economy in recipient countries.

However, the extent to which aid is systematically used for consumption - a ‘fungibility’ of aid resources, was found to partly explain differences of empirical findings on return to aid (Heller, 1975; Mosley, 1980; Pack and Pack, 1993). Studies found that aid can also increase public consumption by inducing governments to either squander domestic resources for consumption or reduce ‘tax efforts’. In this case, Heller (1975) has found some evidence for African countries including Ethiopia. The presence of moderate switching of aid funds was reported in later studies (Synder, 1990). Furthermore, empirical studies by Easterly (2006) and Moyo (2010) have confirmed that aid has not been adding to capital formation on one- to- one basis.

2.4. Recent Empirical Studies on Foreign aid and Economic Growth

There have been many controversies on extent of aid contribution to economic growth and poverty reductions. Project based case studies have often reported substantial positive impacts of aid on economic objectives and poverty reduction efforts while macroeconomic effects remained area of debate. Mosley (1987) had observed the ‘seemingly contradictive’ project based and macroeconomic level studies and named it the “Micro-Macro Paradox” in aid literature.

Part of the empirical debates were due to study related problems in estimation of aid coefficients in growth, saving or investment regressions. Some useful insights, however, have emerged from such studies. These include aid ‘fungibility’ (switching away of domestic resources from productive uses), some undesired consequences of aid on prices, real exchange rate, challenges to developments of sound institutions; and effectiveness of fiscal and monetary policies.

Beginning from 1970s, a growing number of empirical studies have applied the available data on aid to prove theoretical predictions of the so called ‘two-gap’ models that link economic growth linearly to capital formation (Mosley, 1980; White 1992). Successive empirical studies focused on proving ‘saving displacement’ hypothesis (Hazari, 1976) and confirmed that aid resources could have been diverted to public consumption than forming full increment to capital formation. Hence, the negative coefficients reported in many of the aid regression studies had been given some reasonable grounds (see Mosley, 1980).

Hansen and Tarp (2001) categorized the empirical studies on aid effectiveness into three generations based on the respective focus and analytical frameworks.

First generation studies were characterized by their focus on relationship between aid and growth mainly through investment channels. The second generation studies attempted to identify the relationships between foreign aid and domestic savings. Aid was found to affect the recipient governments’ fiscal policy decisions— consumption, public investment and taxation (Khan and Hoshino, 1992).

Many researches on determinants of gross national savings continued examine the relationships between savings and foreign aid (Baharumshah *et al.*, 2002). In a review of 41 aid-saving regression studies, Hansen and Tarp (2000) found that there is negative aid – savings relationship. Other studies also reported that aid reduced national savings mainly through governments' fiscal adjustment response and efficiency loss in resource allocations¹(Lipton, 1986; White, 1992; Thanoon and Baharumshah, 2003).

Ouattara (2009), in a panel study of 97 countries, found that only project aid exerted negative effect on domestic savings. It also indicated presence of regional differences for impacts of other forms of aid. The study implied the importance of country based studies on macroeconomic effects of aid. A study by Salih (2012) on a group of East African countries found that aid tended to reduce *taxefforts* of governments and increased the current expenditures of public sector.

The *third generation* studies are represented by studies that recognize the role of policies, institutions, and aid delivery system itself in determining effectiveness of aid. These groups of studies extended over the earlier two generations of studies to recognize policies and institutions as major determinants of aid effectiveness.

Burnside and Dollar (1997) studied panel data on 56 developing countries by including the index of policy variables (fiscal balance, inflation and trade openness) in a 'modified neoclassical' growth model. Their result suggested a robust positive impact of aid in conditions of good fiscal and monetary policies and no impact in absence of favourable policies in developing countries.

Subsequent studies on policy and institutional conditionality of aid effectiveness continued to gain popularity. The extended review by World Bank research report (1998) concluded that aid would have significant positive effect if allocated to the 'right countries'. The right countries are those with high poverty level and 'good policies' (including low inflation, small budget deficits, trade openness, and efficient bureaucracy). Ndulu (2002) found that large fall in return to investments was observed in Sub-Saharan African countries following the huge aid inflows during early 1970s to 1980s.

Audu(2004) studied relationships between foreign aid, economic growth and public investments in Nigeria using data on debt accumulations between 1970-2002 and applying cointegration methods. The marginal debt accumulations (net aid inflows) until certain threshold level was found to have positive effect on economic growth.

Melese Gizaw (2005) tried to test the 'debt overhang' problem in Ethiopia, and concluded that external debt stock is positively related to economic growth, but the effect of debt servicing was found to be negative. This happened by crowding out of public investment.

The possible explanations for the 'self-inconsistent' results of many past empirical studies on effect of aid in recipients' economic progress are summarized below:

- A. Different aggregation biases in many studies that analyzed single cross sectional type of analysis. Aid effectiveness could vary with countries' institutional performances (rule of law, property right and justice systems), trade and investment policies, and fiscal and macroeconomic environments. Well documented theoretical studies of Rebelo (1991) and Easterly *et al.*, (1993) argued that proper policies can affect growth in many important ways, mainly influencing size and efficiency of private sector investments.
- B. The use of various aid modalities and measurements of 'foreign savings' in empirical investigations. Ouattara and Strobl (2008), and Ouattara (2009) have found that various aid modalities (project, program or grants) had different impacts on both domestic savings and economic performances of recipients. Serieux (2011) also found that the use of net ODA as indicator of resource transfer would overestimate the actual transfer available for expenditure in recipients due to presence of 'reverse flows'.
- C. Differences in methods of estimation used to establish statistical relationship between economic performance and aid flows (Doucouliagos and Paldam, 2008).
- D. The advances in analytical tools through time that has continuously made earlier studies less reliable.

Recent studies in general tend to have resolved the seemingly inconclusive controversies of the so called '*micro-macro paradox*' in aid literature by providing a more case to case evidences. Durberry *et al.* (1998) support the view that foreign aid has strong positive impact on economic growth and its effect largely depends on macroeconomic environment, policy or institutions, income level, size of aid and regional location of recipient.

2.5. Aid and Domestic Resource Mobilization efforts in Ethiopia

Beginning from the turn of 2000s, many studies indicated that overall economic growth and effectiveness of aid are functions of many interrelated factors. It is related to political, institutional and policy factors, nature of aid delivery (Aldasoro *et al.*, 2010) as well as the incentive mechanisms in aid allocation for governments (Loots, 2006; Chong *et al.*, 2009).

It was followed by the consensus, in policy dialogues, that increased size and quality of aid was needed to address financing needs of developing countries (Monterey Consensus, 2003; United Nations, 2008). Many initiatives of 'aid for development' have emerged, including the UN 'Millennium Project' (Erixon and Sally, 2006); establishment of the New Partnership for African Development (NEPAD) (United Nations, 2009).

The domestic resource mobilization has become a key agenda for promotion of economic and social developments. Monterey Consensus (2003) reflected that official development assistances would support domestic resource mobilizations and raise capacity to attract foreign private investments by enhancing infrastructure, export performances and human capacity of aid recipients. The

¹ Lipton, 1986 makes some reference to empirical studies on this regard. Baharumshah and Thannon, 2003, also found that foreign inflows (FDI and Aid) displaced national savings in the long run for Malaysian economy. This evidence is among the studies with robust dynamic econometric analysis supporting the 'crowding -out' effect hypothesis for private investments.

recommendations of ‘Millennium project’ (2005) advisory group also underlined the need for increased domestic resource mobilizations besides the scaling up of aid.

Currently, there are huge financial resource requirements that have to be mobilized more steadily in order to fuel the development projects in the *Growth and Transformation Plan* of Ethiopian (MoFED, 2011). Foreign loan worth of about 2.1 billion USD was disbursed to the economy in 2010/11 - an increase by 36% from previous year (MoFED, 2011). Similarly, it is expected that foreign resource inflow will grow substantially in the future.

Given the low domestic saving rates, there are growing uncertainties about availability and effectiveness of the ever growing foreign aid to continuously support the investments of Ethiopia. Large foreign aid inflows are feared to exacerbate the inflationary pressure and limit credit availability to the private sector in the face of under developed capital markets.

2.6. Theoretical Frameworks of Earlier Studies

The importance of national savings in promoting economic development has been well documented in literature (Azariadis, 2006).

Most early studies (*the first generation studies*) employed simple regression analysis with *Harrod-Domar* type of GDP growth equations by using domestic saving and foreign aid. The early thinking was that aid serves as increment to the capital formation by helping to bridge the ‘investment- saving gaps’, thus affecting growth through investment:

$$\Delta K = S_d + A + PF \dots \dots \dots (2.1)$$

Where, ΔK is change in capital stock (investment); S_d is aggregate domestic savings, A is foreign aid and PF is other private capital inflows.

The model fitted in the studies of aid and economic growth [through investment channels], looks as follows (see reviews of Hansen and Tarp, 2001; Harms and lutz, 2004):

$$g_y = \beta_0 + \beta_1 i_t + \beta_2 X_t + e_t \dots \dots \dots (2.2a)$$

$$i_t = \alpha_0 + \alpha_1 A_t + \alpha_2 pf + \alpha_3 s_{dt} + u_t \dots \dots \dots (2.2b)$$

Where, g_y = growth rate in aggregate output(Y); i_t = investment rate(I/Y); A = foreign aid (as ratio of Y); pf =proportion of foreign private capital inflows, s_d = is domestic saving rate (Sd/Y); X is set of control variables; u_t and e_t are error terms in regression analysis.

Combining the two equations gives the following empirical economic growth model:

$$g_y = \beta_0^* + \beta_1^* A_t + \beta_2^* pf + \beta_3^* s_{dt} + \beta_4^* X_t + e_t^* \dots \dots \dots (2.3)$$

Where, $\beta_0^* = \beta_0 + (\beta_1 \alpha_0)$; $\beta_i^* = \beta_i \alpha_i$ for $i = 2, 3$ and $\beta_4^* = \beta_2$.

Three major criticisms on the early ‘orthodoxy’ of aid and growth relationship were later forwarded (Harms and Lutz, 2004). The first criticism was the assumption that aid would be fully transferred into investment activities. The second was related to the constant incremental capital-output ratio assumption of Harro-Domar model. The empirical validity of constant incremental contribution of capital was heavily criticized (Easterly, 2001; Ranaweera, 2003). Third was the exclusion of roles of relative prices in growth by assuming domestic price rigidity during aid inflows (Feldstein and Horioka, 1980; Wijnbergen, 1986).

The debate that continued in the *second generation* studies was about the relationship that existed between foreign aid and domestic savings, expressed as follows²:

$$S_d = sY + \sigma A \dots \dots \dots (2.4)$$

Where, S_d is domestic saving; Y is aggregate domestic product and A is foreign aid or capital, depending on types of foreign financial resources used across studies; s is marginal propensity to save from income ($0 < s < 1$); σ is constant number (with absolute value between 0 & 1).

The parameter σ had been point of debate in empirical studies at least until the early 1990s. The argument has been that foreign capital inflows ‘crowd-out’ some domestic savings for many reasons, so that σ in equation (2.4) is negative.

The influential works of Sen (1983) indicated that lack of efficient enterprises and weak capacity of people were among the real ‘bottlenecks’ to developing countries that has recently shifted the focus official development aid to broader development goals including education and health.

There is a growing consensus that aid by itself cannot lead to development. What matters most is how aid and other efforts can affect trade, investment, job creation and productivity of the private sector.

3. Analytical Frame Work and the Model

3.1. The Analytical Framework

The analytical framework in this study draws largely from Schumpeterian type endogenous growth model of Aghion and Howitt (2009).

The analysis of government expenditure in economic growth is, in many ways, analogous with Barro (1991), and Romer (1986, 1990) as well as Bernanke and Gurkaynak, (2002) on the role of human capital. The aggregate output produced takes the following Cobb-Douglass production function form:

$$Y = AK^\alpha (hL)^\beta K_g^\gamma \dots \dots \dots (3.1)$$

² Detailed mathematical account of the ‘Two-gap’ model and their early empirical applications is provided in Howard White, 1992

Where Y is aggregate output (real GDP), A is total factor productivity parameter; K is private capital stock; K_g is aggregate stock of public capital; h is human capital embodied in individual labor force and L is total labor force. Parameters α, β, γ represent factor elasticity of output to private physical capital, efficiency of worker and public capital. By dividing both sides of equation with L , we express aggregate output (Real GDP) in per-capita terms (y), with the following equality:

$$Y/L = [AK^\alpha (hL)^\beta K_g^\gamma] L^{-1} \dots \dots \dots (3.2)$$

Taking natural logarithm (ln) of both sides gives the following per-capita output equation:

$$\ln(y) = \ln(AK^\alpha h^\beta (L)^{\beta-1} K_g^\gamma) \dots \dots \dots (3.3)$$

Further simplification gives the following *log-linear* equation for per-capita output:

$$\ln y = \ln A + \alpha \ln k + \beta \ln h + (\beta - 1) \ln L + \gamma \ln K_g \dots \dots \dots (3.4)$$

Applying total differential (d) to both sides of equation (3.4) finally gives the following basic growth equation that relates per-capita output growth (\dot{y}) to the growth rates in factor productivity (\dot{A}), human capital (\dot{h}), labor force (\dot{L}) and public capital (\dot{K}_g):

$$\dot{y} = \dot{A} + \alpha \dot{K} + \beta \dot{h} + \varphi \dot{L} + \gamma \dot{K}_g \dots \dots \dots (3.5)$$

Where, $\varphi = (\beta - 1)$; variables with dot overhead represent relative changes (growth rates) of respective variables. α, β, γ are positive constants (between 0 & 1) that measure the *elasticity* of output with as explained before. In this paper, the returns to scale of the basic production function is hypothesized to be unity ($\alpha + \beta + \gamma = 1$) or constant returns to scale.

The public investment in human capital formation and infrastructure can improve private sector productivity and rate of technology adoptions in line with contemporary endogenous growth theories (Economides *et al.*, 2008). While total factor productivity growth is often considered to be exogenously determined in neoclassical growth models, the endogenous growth theories argue that it can be achieved through developments in human capital, expenditure on research and development, outward looking trade policies and other institutional factors.

In practice, growth rate in public and private capital is measured by the total investment as percentage of GDP. Growth in labor is also replaced by population growth rate. The total investment (I) on fixed capital is obtained from three main sources as commonly studied in investment and aid relationships:

$$I = \Delta(k + k_g) + Sd + Aid + PF \dots \dots \dots (3.6)$$

Total investment in open economy is composed of domestic saving (Sd), foreign official development assistance (Aid) and part of private capital inflows (PF). Theoretical analysis on two categories of physical capital is only to provide analytical ground on channels through which aid contributes to economic growth.

3.2. The Empirical Model Specification

As argued by Levine and Renelt (1992), there are many theoretical frameworks to guide the identification of empirical determinants of economic growth and there is no such single model that encompasses all determinants of economic growth.

Aghion and Howitt (2009) showed that determinants of economic growth in developing countries range from basic factors of production to trade openness, change in terms of trade, level of financial developments and nature of government policies or institutions.

The capacities of attracting large foreign direct investments and promoting export sector are affected by economy's quality of institutions and infrastructures. Forward looking governments, better income distribution and strong openness to trade were considered as major factors in the success stories of many East Asian economies (Ray, 1998). A review of empirical studies by Harrison (1996) indicated that various indicators of trade openness tended to show its significant positive association with GDP growth.

The expected effect of human capital on output growth is positive for a number of obvious reasons: spillover effect, increased productivity of labor and further "increased investment in both physical and human capital" as a result thereof (Barro, 1991:409).

Following the frameworks discussed in section 3.2, a log-linear model from *Cobb-Douglas* production function is adopted. It is augmented with foreign aid and domestic savings as shown in equation of investment rate (3.6). Private capital inflow (FDI) is not considered in our model given the very small foreign direct investments in Ethiopia. The per-capita output growth model is specified on the following variables:

$$\dot{y} = f(S_d, Aid, h, L, OPN)$$

Finally the empirical study will fit and test the following main model:

$$\dot{y} = \beta_0 + \beta_1 S_{dt} + \beta_2 Aid_t + \beta_3 \dot{h}_t + \beta_4 \dot{L}_t + \beta_5 OPN_t + e_t \dots \dots \dots (3.7)$$

Where; \dot{y} is real per-capita GDP growth rate, and t is time of observation (year). The rate of change in human capital is measured by gross enrollment rate in secondary school (%); change in labor force is measured by population growth rate; OPN is trade openness indicator (policy control variable) as widely used in studies and e_t is stochastic error term.

Theoretical relationship between population growth rates (fertility) and output in the long-run could be negative or positive across countries and through time (Becker *et al.*, 1994).

Foreign inflow of resources including aid can have a significant role in supporting growth of economy's aggregate output through various channels among which financing public investment is a key in enhancing productivity of private sector. However, adverse effects of foreign aid can possibly happen through its pressure on appreciation of real exchange rate, domestic price level and loss of efficiency in its delivery system (see Verbeke, 2007; Easterly, 2003, 2006). This effect is also captured in our model specifications by including aid variable in growth regression where effect of investment rate is explicitly controlled.

4. Materials and Methodology

4.1.1. Data Sources

The econometric estimation is based on annual time series data extending from 1970 to 2011 on aid, real per-capita GDP, domestic saving rate and others. Data are obtained from UNCTAD's statistical database for import and export figure; The World Bank databases (Global Economic Prospects) for real GDP in econometric analysis. Data from domestic sources like National Bank of Ethiopia (NBE) is used only for some descriptive analysis. The internationally comparable data sources were preferred in the quantitative analysis. Data are carefully selected by cross checking on available sources to ensure reliability and consistency of different sources.

The collected data are organized and expressed in rate of change for real per-capita GDP; net official aid inflows as percentage of GDP (both at constant 2005 US\$); change in human capital as measured by gross secondary enrollment rate (EDU). Averages of preceding and next year were taken for some missing data in enrollment rate. Growth in labor force is measured by population growth rate. Trade openness (OPN) is calculated by ratio of trade to GDP (% of export plus import in GDP). The common practice in use of Openness is to measure economy's level of integration with world.

4.1.2. Method of Data Analysis: ARDL to co-integration

Co-integration analysis is very important in this study since the exact nature of how foreign aid interacts with growth has long been subject to empirical debates. This is partly due to lag structures that appear in relationships of many variables with economic growth. The Autoregressive Distributed lag (ARDL) model of Pesaran *et al.*, (2001) is employed to test and estimate the long-run relationships among foreign aid, gross domestic savings and per-capita GDP growth through appropriate selection of lag lengths.

The estimates of ARDL are preferred on three accounts of their superiority. First, it can reliably fit to studies of relatively small samples. Second, its estimates of both long-run and short-run can be obtained simultaneously by addressing the omitted variable bias and autocorrelation problems in data. Thirdly, the ARDL model uses dependent and independent variables explicitly (Pesaran and Shin, 1998; Pesaran *et al.*, 2001; Narayan, 2004).

The dynamic granger causality test within ARDL approach is made in three steps (Binh, 2010). First, *stationarity* of time series data is tested (using both ADF and PP unit root tests). Next, the test and estimation of long-run relationship is undertaken. The final step is to test Granger Causality on Error Correction Model (ECM) that involves error correction term from long-run estimation of step two.

The Unrestricted Error Correction is estimated as follows: $Z_t = f(Y_t, X_{it})$:

$$\Delta Y_t = \alpha'_{ki} D_i + \delta_y Y_{t-1} + \beta X_{t-1} + \sum_{i=1}^{p-1} \delta_y^* \Delta Y_{t-i} + \sum_{i=0}^{q-1} \beta^* \Delta X_{t-i} + \varepsilon_t \dots \dots \dots (4.1)$$

Where, Δ shows a differenced variable. D_i represents vector of appropriate deterministic terms such including intercept and trend variables, and α_{ki} are coefficient vectors of the corresponding deterministic terms. δ_y and β ($\beta_1, \beta_2, \dots, \beta_k$) are estimates for the long-run coefficients of $Y_t, X_1, X_2, \dots, X_k$ respectively. The co-integration test is made by comparing F-statistic from *exclusion* restrictions with asymptotic *critical bound values* tabulated in Pesaran *et al* (2001). The hypothesis tested is as follows:

$H_0: \delta_y = \beta_1 = \beta_2 = \dots = \beta_k$; against the alternative hypothesis:

$H_1: \delta_y \neq 0$ and $\beta_1 \neq 0$ or $\beta_2 \neq 0$, but $\beta_1 = 0$ and vice – versa

Co-integration in our model is hencetested on the following conditional UECM model:

$$\Delta \dot{y}_t = \alpha'_{1i} D_i + \delta_y \dot{y}_{t-1} + \beta_1 Sd_{t-1} + \beta_2 Aid_{t-1} + \beta_3 EDU_{t-1} + \beta_4 OPN_{t-1} + \beta_5 \dot{L}_{t-1} + \sum_{i=0}^{q-1} \beta_{1i}^* \Delta Sd_{t-i} + \sum_{i=0}^{q-1} \beta_{2i}^* \Delta Aid_{t-i} + \sum_{i=0}^{q-1} \beta_{3i}^* \Delta EDU_{t-i} + \sum_{i=0}^{q-1} \beta_{5i}^* \Delta \dot{L}_{t-i} + \sum_{i=0}^{q-1} \beta_{4i}^* \Delta OPN_{t-i} + \varepsilon_{1t} \dots \dots \dots (4.2)$$

Where, \dot{y} is per- capita income growth and variables on the right hand sides are its determinants as defined before.

5. The Empirical Result and Discussions

5.1. Recent Trends of Aid and Some Macroeconomic Variables in Ethiopia

The saving and investment data shows significant gap between investment rates and the average yearly domestic savings in the last decade. Economic growth has been as large as 12.6% in 2009/10. The size of gross capital formation has been relatively large in the economy. The data is illustrated below

Fiscal Year	Real GDP growth rate	Gross capital formation (% GDP)	Gross domestic savings (% GDP)
2003/04	11.7	29.0	15.1
2004/05	12.6	26.0	9.5
2005/06	11.5	27.6	8.3
2006/07	11.8	24.2	12.4
2007/08	11.2	24.5	9.2
2008/09	10.0	24.9	9.8
2009/10	10.6	27.0	9.3
2010/11	11.3	27.9	12.7
2011/12	8.8	33.1	15.0
2012/13	9.7	33.0	17.7
Average	10.9	27.7	11.9

Table 1: Real GDP growth, domestic saving and capital formation (2010/11 base year series)

Source: National Bank of Ethiopia (NBE), Annual report 2012/13

The percentage of gross capital formation during the Ethiopia's recent robust economic growth period has been high, on average about 27.7% of GDP over the last 10 years. On the other hand, domestically mobilized savings on average had been 11.9 % of GDP. It indicates that 15.8% of GDP in gross investments, on average, had been filled by various forms of net foreign resource inflows which translate into an average total investment of 57% over the decade.

5.2. Composition of foreign Capital flows to Ethiopia

The nature and trends of foreign resource flows to Ethiopia since 1990s is shown below in comparison to average Sub-Sahara African countries.

Inflows as % of GNP	1992-1994	1995-1997	1998-2000	2001-2003	2004-2006	2007-2010
Ethiopia						
Grants	8.97	7.06	6.52	11.28	23.07	10.34
Loans	2.65	1.10	1.340	5.58	3.05	3.67
FDI	0.10	1.24	1.94	4.36	3.74	0.80
Sub-Sahara Africa						
Loans	1.73	1.19	0.03	0.30	0.28	1.14
FDI	0.88	1.70	2.34	3.73	2.54	3.47

Table 2: Snapshot of compositions of foreign resource inflows: 1992-2010

Source: International Debt Statistics (IDS) database with author's calculations

The data shows that foreign direct investment (FDI) flows to Ethiopia had been very low for long period of time. This fact that Foreign Direct Investment and domestic saving mobilizations were not satisfactory could have links to the over reliance on foreign aid.

Estimation and statistical tests on significance of foreign aid and other variables in economic growth model are provided in the next section followed by conclusions and policy implication in the last chapter.

5.3. Analysis of Econometric Results and Discussions

Estimations and tests of both long-run and short-run relationships between economic growths on one hand and the domestic saving and foreign aid on the other hand are made.

5.3.1. The Unit Root Tests

The assumption of serially uncorrelated residuals from the estimated UECM is made in the test for co-integration. Before running the standard regression analysis, it is thus important to check whether individual data series is *stationary* to avoid possible misleading inferences from the OLS regression of time series data. This analysis called the *unitroot* tests and made by using two test statistics: Augmented Dickey Fuller (ADF) and Phillips-Perron(PP). If the null hypothesis is rejected, then the time series is stationary.

The Null hypothesis is that the data series (Y_t) has unit root (i.e. **non-stationary**).

Variable	Augmented Dickey Fuller (ADF) Tests			Phillips – Perron (PP) Test	
	Level Y_t t_c	Level Y_t t_{ct}	$\Delta Y_t (1)$ t_c	Level Y_t t_{ct}	$\Delta Y_t (1)$ t_c
\dot{y}	-2.2530(2)	-5.07 (1)***	-5.2068 (4)**	1.701(5)	-3.948**(0)
Sd	-3.101(2)**	-3.17486(2)	-8.4527(0)***	-3.20232(1)*	-8.5183(4)***
Aid	-2.4645(0)	-2.46253(0)	-7.318(0)****	-2.42168(2)	-7.3707(2)***
Δ (EDU)	2.1930(0)	-2.3956(0)	-3.0462(1)	-2.57391(6)	-10.045***
OPN	-0.0282(0)	-1.89212(0)	-6.0124(0)***	-2.02132(2)	-6.006(4)***
POPG	-2.922(4)*	-8.27(8)***	-3.1689(8)**	-1.69541(4)	-2.5606(3)
INV	-0.6676(1)	-2.5932(0)	-8.0920(0)***	-2.54793(2)	-8.0709(0)***
INFL	-2.2161(2)	-2.23761(2)	-8.9009(1)***	-5.033(4)***	-11.106(4)***

Table 3: ADF and PP Unit root test results

Values in (...) Shows the order (m) of lags in the corresponding series, selected automatically by *Akaike Information Criteria* (AIC) in regressions for unit root test ($\Delta Y_t = c_0 + \gamma t + \beta Y_{t-1} + \sum_{i=1}^m \phi \Delta Y_{t-i} + u_t$); ***, **, * show significance of test statistics at 1%, 5% & 10% respectively. t_c represents test statistics with intercept (c) and t_{ct} includes intercept and trend (t) in unit root test equations.

The tests show that many series are non-stationary at levels, except \dot{y} , Sd and INFL which are stationary at 1% or 5% confidence levels in at least one of the tests. All variables except EDU become stationary after differencing them once- **I (1)** mostly in both tests. Educational variable (EDU) becomes stationary after differencing twice- **I (2)** though it does not alter the co-integration results. Thus, we keep level variable (EDU) in estimation for meaningful economic interpretation. Data are detected for possible extreme outliers.

5.3.2. Overview of Data

The graphical inspection of outliers indicated the presence of extreme outliers in most of the variables, mostly arising from unexpected external shocks during the observations (fig 4.1 on appendix). Accordingly, the dummy variable is used to account for these major natural, political and economic events as follows:

Dww: is a *dummy* variable to represents *war* and *weather* related crisis that take values of **1** for 1981-82 (debt crisis), 1984-1985(drought incidence), 1991-92 domestic political instability (regime change), 2002-2003 (bad weather and border war), and 2008 (global financial crisis); and taking value of **0** for the remaining years.

5.3.3. Tests for co-integration: ARDL bounds test

To proceed with the bounds test procedure, selection of appropriate lag length is then important in estimation and test for co-integration. The optimal lag length is selected based on *information criteria* and a series of diagnostic tests on the Unrestricted Error Correction Model (UECM). The Unrestricted Error Correction Model (UECM) is estimated by using the Ordinary Least Squares (OLS) regression technique. Accordingly, the conditional UECM for our growth equation is constructed as: $\dot{y} = f_y(\dot{y}/ \text{Sd}, \text{Aid}, \text{EDU}, \dot{L}, \text{OPN})$.

To reduce the over parameterization bias in small data, a flexible lag length selection is adopted. We started from maximum lag length 2 and reduced insignificant parameters using significance tests until robust model is achieved through general to specific selection method.

ARDL (\dot{y} , Sd, Aid, EDU, OPN, POPG)	AIC	SC	$X^2_{sc}(1)$	$X^2_{sc}(4)$	df
ARDL(2, 2, 1, 1, 2, 1)	-4.17132	-3.66465	0.99189	1.210642	28
ARDL(1, 1, 1, 1, 1, 1)	-3.87719	-3.45925	0.13210	1.693265	31

Table 4: Parsimonious Optimal lag length selections

The 1st Model (with 2 lags): ARCH₍₃₎ = 0.72186; Normality (JB) = 0.3608; RESET = 1.1694.

The 2nd Model (with 1 lag): RESET = (2.933434)**; Normality (JB) = 5.9695*

The second UECM model (with lag length 1) has minimum information criteria (AIC and SBC). However, it could not pass functional specification (Ramsey RESET) and normality (JB) tests.

The first model has passed all the model diagnostics tests. Thus, co-integration analysis is based on lag structure of this model (maximum lag length 2). Wald test statistics for the corresponding parsimonious UECM models and the co-integration test results are reported below:

UECM equations (Main Functions)	With Trend		Without Trend			Co-integrated
	F _V	F _{IV}	F _{III}	Df	Signif.	
y (Output growth rate)	16.9295	14.654	....	28	[]***	YES
S _d (Domestic saving)	5.2808	4.564		29	[]**	YES
Aid (Foreign Aid)	...	...	5.9157	28	[]***	YES

Table 5: Bounds F-Statistics on co-integration from UECM

** and *** show significance of tests at 5% and 1% significance levels respectively (co-integrated); $f_y[...]$, $F_{S_d}[...]$ and $F_{Aid}[...]$ are co-integration equations corresponding to the variables considered as dependent variables

The null hypothesis of *no co-integration* is rejected when F-statistics is greater than upper critical bounds tabulated in Pesaran *et al.* (2001) (adopted on *appendix*). The analysis shows presence of a co-integration relationship in growth function since the *F-test* statistics is greater than upper bounds critical value at 1% significance level. Therefore, the presence of at least one *degenerate* long-run relationship in growth model could not be rejected regardless of order of integrations.

Moreover, there is some evidence of co-integrating relationship in domestic saving and aid functions since the null hypothesis is rejected for both models at 5% and 1% significance levels, respectively. Therefore, it is important to estimate and test the effects of foreign aid and gross domestic savings on per-capita output growth.

5.3.4. Estimation of Long-run Relationships in Growth Equation

Once the presence of co-integration relationship in our output growth function is confirmed, the estimation of long-run parameters is performed. The long-run estimates are obtained following the necessary diagnostic tests by using the *general to specific* approach of Hendry (1995). This methodology was suggested to reduce the over parameterizations, mainly when the data is small.

ARDL based estimates of the long-run relationships

$$\dot{y} = 0.6162S_d + 0.3606Aid + 0.10298EDU - 0.3092OPEN - 1.6884POPG - 0.0443$$

(-3.668)*** (-2.805)*** (-0.807) (3.705)*** (1.747)*** (2.265)**

R-square = 0.8996; Adj. R-square=0.8602; Prob(F-statistic) = 0.000000

Values in (...) are *t*-statistics; and *** and ** show that the corresponding coefficients are statistically significant at 1% and 5% significance levels respectively.

5.3.4.1. Model Diagnostic Tests

Generally the model has passed major model diagnostic tests at 1% significance level.

The test statistics are: Normality (JB) = (0.3608); LM (1) = 0.992; LM (4) = (1.210642); ARCH (3) = (1.210642); functional misspecification (Ramsey RESET₍₃₎ test = (1.169366). The CUSM-square test for multiple structural breaks also failed to reject constancy of variance over time at 5% significance level (graphical *recursive estimate* is provided in *appendix*).

Estimated coefficients on all variables had their expected sign and statistically significant except the unexpected negative sign for coefficient of trade indicator and the insignificant coefficient for educational enrollment. The result shows a robust and positive contribution of aid to per-capita output growth. However, estimated coefficient of aid is much smaller than an estimated coefficient of gross domestic savings.

Effectiveness of aid is also statistically strong and increase in net aid by 1% of GDP can raise average real per-capita GDP growth by 0.36% in Ethiopia. The estimated coefficient of gross domestic saving is highly significant at 1% significance level. It implies that an additional 1% in GDP of domestic saving will pay off about 0.61 % growth of per-capita GDP in long-run. Positive growth effect of aid is consistent with more recent empirical studies. Durbarry *et al.* (1998) found strong positive effect of aid on average economic growth of 68 aid recipients in both cross sectional and panel data (1970-1993) estimations, when aid and domestic savings were separately included.

The fact that all aid is not used for investment purposes may have resulted in the lower contribution of foreign aid to growth. Aid could also be more likely used for consumption purposes. A study by Peterson (2007) has found evidence for *fungibility* of sector-specific aid. Moreover, it has been the case that much aid supports poverty reduction activities which may have lower multiplier effect on income growth than domestic savings.

This finding is supported with empirical consensus that aid gives leverage to recipient economies, despite the unresolved issue on ways of making aid more effective in the various countries' circumstances (Hansen and Tarp, 2000). Guillaumont and Chauvet (2001) also confirmed that aid is particularly more effective in countries where aid is provided during situations of external shocks such as fluctuations in export earnings. The foreign aid had some negative effect on rate of growth in short-run as discussed in the next section.

5.3.5. Dynamic Short-Run Relationships: Granger Causality Analysis

The standard granger causality analysis states that if a presence of co-integration is confirmed, then there is at least one causality relations between co-integrating vectors (Gutierrez *et al.*, 2007). X is said to granger cause Y if the values of X_t provide useful information in predicting the values of Y_{t+1} . The short-run relationship is estimated by including the lagged error term from long-run estimation.

The dynamic ECM shows a change in per-capita GDP growth in response to the short run change in explanatory variables and the lagged deviations of per-capita GDP growth from its equilibrium. The following ECM is estimated:

$$\Delta \hat{y}_t = c + \sum_{i=1}^p \varphi_1 \Delta \hat{y}_t + \sum_{i=0}^p \varphi_2 \Delta Sd_{t-i} + \sum_{i=0}^p \varphi_3 \Delta Aid_{t-i} + \sum_{i=0}^p \varphi_4 \Delta \hat{h}_{t-i} + \sum_{i=0}^p \varphi_6 \Delta POPG_{t-i} + \sum_{i=0}^p \varphi_5 \Delta OPEN_{t-i} + \mu ECT_{t-1} \dots \dots \dots (4.3)$$

In the language of Granger Causality, significance and size of μ shows the adjustment speed of \hat{y}_t to its past deviation from equilibrium.

The result of short-run analysis also reconfirms the presence of long-run relationship based on the negative and highly significant coefficient of error correction term (ECT). The coefficient of lagged ECT implies that per-capita output growth corrects about 47% of its previous equilibrium deviation within one year. Results are depicted in table 4.4 below.

Dependent Variable: D(\hat{y})		Included observations: 39 after adjustments		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.014495	0.010932	1.325977	0.1949
DWW	-0.060874	0.017301	-3.518439	0.0014***
D(AID)	-0.319637	0.182923	-1.747388	0.0908*
D(Sd)	0.169295	0.230009	0.736037	0.4674
D(EDU)	2.532722	0.789592	3.207633	0.0032***
D(OPN(-1))	-0.530564	0.239954	-2.211104	0.0348**
D(OPN(-2))	0.350081	0.240727	1.454266	0.1563
D(POPG(-1))	2.745961	3.700990	0.741953	0.4639
ECT(-1)	-0.476917	0.082014	-5.815068	0.0000***
R-squared = 0.7306 F-statistic = 10.1723 Prob(F-statistic) = 0.000001				
Adj. R-squared = 0.6588 Durbin-Watson stat = 2.093 Log likelihood = 73.299				

Table 6: Dynamic relationships: economic growth, domestic savings and aid

D is differenced values of each variable in ECM regressions; ***, ** and * show that the estimated coefficients are significant at 1%, 5% and 10% significance levels respectively.

5.3.5.1. Diagnostic Tests: On the above model

LM (1) $x^2_{autoc} = (0.2726)$ p-value=0.6055; LM(4) $x^2_{autoc} = (1.7837)$ p-value= 0.16242; Normality JB= (4.5271), p-value= 0.10397; ARCH(3)= (0.8254) p-value= 0.4896.

Ramsey RESEST (3) test = (2.010), Chow Test (1992) = (1.5668).

The effect of change in foreign aid on short-run output growth is negative and significant at 10% significance level. Causality runs from aid to growth. However, the effect of domestic savings is positive but insignificant in the short-run. This makes sense as it may take some years for savings to affect output growth through investments. The short-run effects of Trade openness, educational enrolment and population growth are also positive though insignificant for the population growth.

The analysis on indirect effect of aid on economic growth is provided in the next section. It is captured in a model where both foreign aid and investment rate are included as an alternative practice to inclusion of squared aid term.

5.4. Estimation of growth equation with Investment and Inflation

We now turn to explore possible indirect effects of aid on economic growth by running a growth regression in which investment rate is explicitly controlled for. The inflation rate as key macroeconomic policy indicator is included in place of trade policy variable. The second per-capita output growth model is estimated on the following variables:

$$y_t f(INV_t, Aid_t, EDU, POPG_t, INFL_t),$$

Where INV_t is investment to GDP ratio (gross fixed capital formation at constant price); $INFL$ represents inflation rate and other variables are as explained earlier.

Function	With Trend		df	Co-integrated
	F_{VI}	F_{II}		
$F_{\hat{y}}[...]$	...	15.86857	28	Yes
$F_{INV}[...]$	5.655648	....	28	Yes
Without Trend		Df	Co-integrated	
$F_{Aid}[...]$	F_I	10.37631		Yes

Table 7: Co-integration tests: economic growth, investment and aid
Source: Computation from software

The above co-integration test statistics confirm that there is co-integration relationship among per-capita output growth, investment rate and aid inflows so that the estimation of long-run level relationships is meaningful. The result of estimation with investment rate is provided below:

$$\dot{y} = 1.861 + 0.519 \text{ INV} - 0.018 \text{ Aid} + 0.366 \text{ EDU} - 0.219 \text{ POPG} - 0.346 \text{ INFL}$$

$$(-0.46871) \quad (-2.20496)** \quad (0.12250) \quad (-2.6755)** \quad (0.14666) \quad (3.1227)***$$

$$R^2 = 0.914149; \quad LM(1) = 0.026410; \quad LM(4) = 1.275624; \quad RESET(3) = 1.206402; \quad ARCH(3) = 0.448524; \quad Normality \quad JB = 0.051609, \\ RESET \quad Test = 1.2064; \quad Chow \quad Test = 2.21107.$$

The estimated coefficients of other variables had their expected signs; particularly the effect of human capital formation becomes significant when investment is explicitly included.

Part of the direct positive effect of aid on economic growth seems to have been offset by its indirect macroeconomic challenges in line with the widely documented recent studies. Increased aid is found to have some negative effect on economic growth when investment rate is explicitly controlled in the model *although* statistically insignificant.

6. Conclusion and Policy Implications

6.1. Conclusion

It has been widely recognized that aid by itself is not enough. It is expected that aid augments public sector's capacity building efforts by supporting various productive investments in physical capital and human capacity on conditions of good governance, effective macroeconomic policies, and better resource mobilization efforts (Harms and Lutz, 2004; United Nations, 2008).

Capital formation in Ethiopia's recent economic progress has been considerable over the last 10 years. However, domestically mobilized savings had been much smaller, showing a significant gap between domestically mobilized savings and investment activities. Moreover, the flows of foreign direct investments (FDI) into Ethiopia had been very small for a long period of time. Ethiopia has been receiving growing proportions of aid to its GNP relative to average SSA in recent years.

The researcher has attempted to develop a comprehensive econometric model that handles roles of both foreign aid and domestic savings in economic growth. In addition, the framework for estimating indirect channel through which aid may affect economic growth is considered.

The co-integration tests were made before estimation of level relationships between real per-capita GDP growth and other variables. There is long-run relationship among per-capita output growth, domestic savings and foreign aid. Both domestic saving and foreign aid had statistically significant positive effects on long-run per-capita output growth. However, the short-run effect of aid on per-capita output growth is negative though statistically insignificant.

The positive effect of aid on economic growth confirms its importance in financing public investment activities as a supplement to domestic savings. The result is robust and the income growth contribution of aid is however much lower than that of domestic savings. The estimated coefficient of gross domestic saving is larger and highly significant at 1% level. The domestic saving had much larger marginal effect on growth than aid in long-run. Furthermore, the short run growth effects of both aid and domestic saving are realized after two year lags.

The fact that growing proportion of aid has recently been directed to social sectors (human capital) whose effect is partly controlled in estimation by education variable could have resulted in lower coefficient estimate. It has also been the case that aid has been spent on poverty reduction activities which may not have an equal multiplier effects on capital formation.

Furthermore, controlling for investment level, the estimated coefficient of aid in long-run output growth turned negative though statistically insignificant. This indicates that large aid poses some indirect challenges on macroeconomic management. These factors might have sustained weak institutions or delayed necessary reforms and limited improvements in productivity of aid funds.

Generally, an aid financed public projects are less efficient than the investments from domestic savings, partly due to its associated absorptive capacity problems, resulting in lower efficiency of aid. It could also indicate the possible undesired resource competition over the 'rents created in resource allocations' among the groups having control on aid.

6.2. Policy Implications

Some important policy and further research implications that emerge from this study are briefly forwarded as follows:

- An effort to increase financial sector efficiency and promoting domestic financial resource mobilizations would likely be fruitful than much reliance on foreign aid for a continued financing strategy of the ongoing development programs.
- Possible ongoing institutional and policy efforts need to be strengthened in order to improve FDI flows and domestic saving mobilization efforts. Policy makers should pay attention to enhancing domestic financial capacity and have to work more on mobilization of capital from domestic financial markets by encouraging corporate and household savings.
- While the inflow of foreign aid has statistically significant positive effect on growth, its relative contribution is lower than the effect of domestic savings. When the channel of investment contribution is controlled, aid has negative effect on growth though statistically insignificant that indicates the associated macroeconomic challenges of effectively utilizing aid. Thus, it appears that better management and coordinated use of foreign aid is needed to optimize growth benefits of large inflows.
- Proper prediction of aid flows and necessary fiscal and monetary adjustment rules need to be pursued to ensure that fluctuations of aid do not cause large absorptive capacity constraints and undesired effects with large money circulation in economy. This is

important to reduce the likely inflationary pressure from aid, since inflation has large negative effect on capital formation/investment rates.

- Further study can give insights on why private sector savings have been low in Ethiopia by emphasizing on determinants of domestic saving mobilizations.

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Appendices

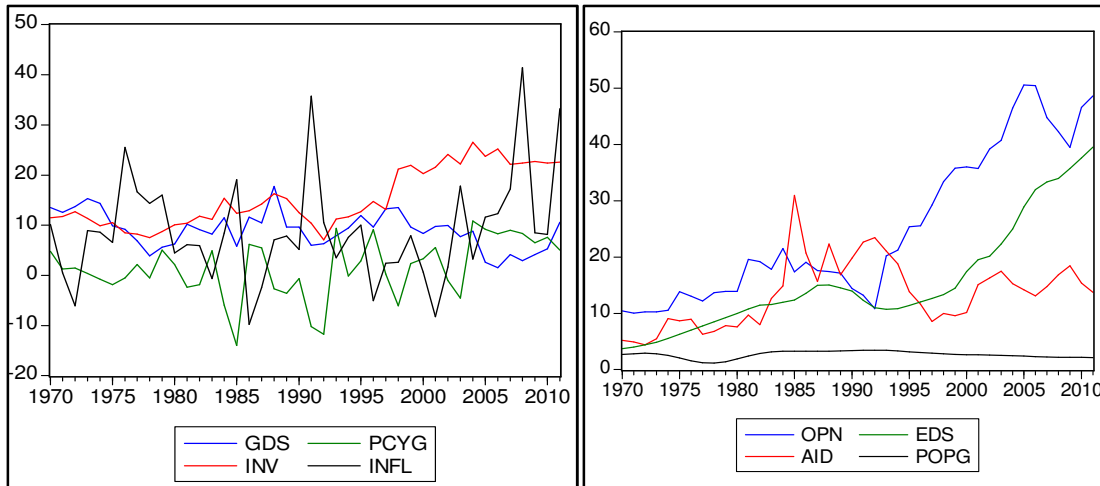


Figure 1: Graphical inspection of different data for outliers
 Note: PCYG represents per-capita GDP (\hat{y})- recognizable format for software

Dependent Variable: D(PCYG)		Included observations: 40 after adjustments		
Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.059036	0.026065	2.264959	0.0314
DWW	-0.073666	0.011129	-6.619302	0.0000
PCYG(-1)	-1.329973	0.154076	-8.631904	0.0000
GDS(-1)	-0.819546	0.223438	-3.667890	0.0010
AID(-1)	-0.479611	0.170964	-2.805342	0.0090
EDS(-1)	-0.136971	0.169799	-0.806669	0.4267
OPN(-1)	0.347582	0.093823	3.704661	0.0009
POPG(-1)	2.245592	1.285625	1.746692	0.0917
D(GDS(-1))	0.521875	0.187014	2.790567	0.0094
D(PCYG(-1))	0.214291	0.099066	2.163107	0.0392
D(AID)	-0.558724	0.137689	-4.057877	0.0004
D(OPN(-1))	-0.523631	0.173390	-3.019962	0.0053
R-squared	0.899620	Adjusted R-squared		0.860185
Durbin-Watson stat	2.298542	Prob(F-statistic)		0.000000

Table 1: UECM for Lag length Selection: AIC, SC and serial correlation tests

Normality (JB) = (0.3608); LM₍₁₎ = 0.992; LM₍₄₎ = (1.2106); ARCH₍₃₎ = (1.2106); RESET test(3) = (1.1694)

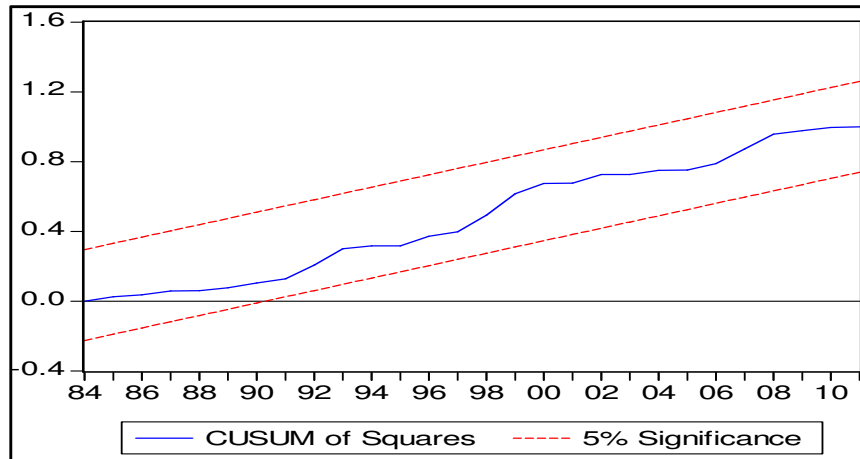


Figure 2: Recursive CUSUM-square tests in long-run growth with domestic saving and aid

Case V: Both intercept & trend unrestricted					
0.01		0.05		0.10	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3.93	5.23	3.12	4.25	2.75	3.79
Case IV: Unrestricted intercept & restricted trend					
0.01		0.05		0.100	
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
3.50	4.63	2.81	3.76	2.49	3.38
Case III: Unrestricted intercept & No trend					
0.01		0.05		0.10	
Lower (I(0))	Upper (I(1))	Lower (I(0))	Upper (I(1))	Lower (I(0))	Upper (I(1))
3.41	4.68	2.62	3.79	2.26	3.35

Table 2: Bounds Test Critical values for model with K= 5

Source: Taken from asymptotic critical bounds in Pesaran et.al.(2001) under tables CI(iii), CI(iv) & CI(v): pp. 300-301