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Impacts of Foreign Aid on Economic Growth of Ethiopia: Time Series Econometric Analysis

A Research Thesis Submitted in Partial Fulfillment of the Requirement for the Award of the Degree of Master of Science in Economics (Development Economics)

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Declaration

I confirm that the paper now submitted is not copied or plagiarized version of some other published work or I have not plagiarized in the preparation of this paper and have not allowed anyone to copy my work. All sources of materials used for this paper has been appropriately acknowledged.

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Acronyms

ADF: Augmented Dickey-Fuller

AIC: Akaike Information Criteria

ARDL: Auto-regressive Distributive Lags Model

CSA: Central Statistical Authority

CUSUM: Cumulative Sum

CUSUMSQ: Cumulative Sum of Square

DAC: Development Assistance Committee

DF: Dickey-Fuller

DRC: Democratic Republic of Congo

ECM: Error Correction Mechanism

EEA: Ethiopian Economic Association

EPRDF: Ethiopian Peoples' Revolutionary Democratic Front

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

GMM: Generalized Method of Moment

GNI: Gross National Income

H-D: Harrod-Domar

I(0): Integrated of Order Zero

I(1): Integrated of Order One

I(2): Integrated of Order Two

ICOR: Incremental Capital-Output Ratio

IMF: International Monetary Fund

LM: Lagrangian Multiplier

NBE: National Bank of Ethiopia

NGO: Non-Governmental Organization

ODA: Official Development Assistance

OECD: Organization for Economic Cooperation and Development

OLS: Ordinary Least Square

SBIC: Schwarz Bayesian Information Criteria

UECM: Unrestricted Error-Correction Model

US: United State

VAR: Vector-Auto-Regressive

VECM: Vector Error-Correction Model

WB: World Bank

WEO: World Economic Outlook

Δ: First Difference Operator

Abstract

Developing countries are constrained, among other things, by low level of saving in their endeavor to develop their economies. To augment their scare resource, they seek foreign aid. Empirical evidences provide mixed results on the effect of foreign aid on economic development. This study aimed at examining the effect of foreign aid on economic growth in the case of Ethiopia. It used time series data covering the period between 1981 and 2018. Autoregressive Unit root test results revealed that the variables included in the model have a mixed order of integration (or I (0) and I (1)) and none of them is I (2). Accordingly, Distributive Lag (ARDL) model was employed taking labor force, capital stock, external debt stock, debt servicing, and openness to trade, inflation and gross national saving as control variables in the regression equation. Result of co-integration tests confirmed the existence of long-run co-integrating relationship among the variables. Estimation result shows that foreign aid variable was found to be statistically significant both in the short run and long-run to explain the variance of economic growth for Ethiopia. The long run elasticity of economic growth with respect to foreign aid is -0.1242, implying a percent increase in foreign aid results in .0124% fall in real per capita GDP in the long run. The estimated short run short run coefficient of aid variable and its lag negatively affect economic growth in Ethiopia at 1%significance level. Hence, the study recommends policymakers in Ethiopia to establish strong institutions, avoiding dependency on foreign aid through well-structured domestic resource mobilization initiatives, proper engagement of the donor community as well as accurate channeling of foreign aid resources to productive and growth enhancing economic sectors.

Chapter One

Introduction

1.1.Background of the study

Next to Nigeria, Ethiopia is the second largest populous nation in the Africa continent, with an estimated population of nearly 79 million (in 2007) and a growth rate of 2.6 percent per year (Tasew, 2011). Recently in 2018, the country's population is estimated to be 109 million people (WB, 2020). The second most populous nation in the African continent, Ethiopia remains among the poorest and maintains a relatively low urban population at 17 percent; most Ethiopians continue to reside in rural areas and 82 percent of the country's population depends on subsistence agriculture (Oakland institute report, 2013).

Agriculture is the main stay of the economy; and exports are almost fetches the largest foreign exchange. According to FAO reports agriculture sector accounts 85 percent of all employment in Ethiopia (FAO, 2020). Even though its contribution to the total employment in the country is largest, the share of its contribution to GDP is falling steadily whereas the share of the service sector contribution towards the country's GDP is rising. Recently, in 2018/19, the country's economy has recorded 9 percent growth, attributed to 12.6 percent growth in industrial output, 11 percent increase in service sector and 3.3 percent expansion in agriculture. According to National Bank of Ethiopia reports, the share of industry in GDP has increased to 28.1 percent in 2018/19 from 27 percent in 2017/18 while that of service sector rose slightly to 39.8 percent from 39.2 percent. In contrast, the share of agriculture to GDP dropped to 33.3 percent from about 35 percent during the same period. This gradual but steady shift in the structure of the economy reflects the government's policy direction of developing manufacturing sector and promoting export-led growth while continuing to give due attention to modernizing the agriculture sector which has dominated the country's economic base for years (NBE, 2018/19).

Historically, Ethiopia like any other developing country has experienced poor economic performance. However, recently (especially since 2003), the country has experienced remarkable economic growth (Tasew, 2011). During 2004-11 Ethiopia experienced strong and generally broad-based real economic growth averaging around 10.6 percent a year; industry and the service sector grew on average 10 percent a year, and foreign direct investment increased from US$0.5

billion in 2007 to US$1.2 billion in 2011. The growth of goods and services exports reached close to 10 percent annually during 2000-10, and Ethiopia made good progress in diversifying processed exports. Significant improvements have been made in access to and, to a lesser extent, the quality of infrastructure (World Bank, 2012). The country's economy experienced strong, broad-based growth averaging 9.9 a year over the years 2007/8 to 2017/18 (WB, 2020).Recently, however, in 2018/19, the country has registered 9 percent annual real GDP growth (NBE, 2018/19).

Despite the fact that the current economic performance of the country is highly remarkable, there are a number of challenges to sustain the present trend of economic growth. High dependency of economic growth on rainfall and the country's vulnerability to terms of trade and similar external shocks are structural constraints facing the economy. Further, the country has limited capacity to invest because of inadequate resources resulting from low savings rates and poor export performance. Available data shows that, in the year 2018/19, the country's investment to GDP ratio was to 35.2 percent while that of domestic savings stood at 22.3 percent (NBE, 2018/19). The high import intensity of the economy, limited capacity to produce capital goods, low levels of domestic savings and limited capacity to generate foreign exchange make Ethiopia to look resources beyond its domestic capacity for development efforts (Tessew, 2011; Fentaye, 2015, p1).

It is obvious that, developing countries in general, Ethiopia in particular is characterized by capital resource starved nation. Capital to boost economic growth and welfare is largely inadequate domestically, which results the need for external capital. Among different external capitals, foreign aid is well known to support development effort of developing countries in general and Ethiopia in particular. All the above characteristics of the country have provided an apparently objective justification for the need and huge inflow of foreign aid (Haile, 2015, p 1).

Foreign aid is the donations of money, goods, or services from one nation to another. Such donations can be made for a humanitarian, altruistic purpose, or to advance the national interests of the giving nation. Aid can be between two (bilateral) or many (multilateral) countries/institutions. Bilateral aid is usually tied aid (conditional aid) is when recipients must purchase products/ services from the donor country. Multilateral aid is usually untied aid that can be spent in any sector of the recipient country (Murshed and Mustari, 2014).

For the sake of this study, "foreign aid" refers only to “Official Development Assistance (ODA) which consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent”(World Bank, 2020).

As other African economies, Ethiopia has received large inflow of foreign aid since 1950s. Ethiopia was also among the countries which received large volumes of foreign aid in Sub-Saharan Africa in 2002-2006. Others include Congo DRC, Tanzania and Mozambique (Nestory, 2008). According to Oakland institute reports, a country is a locus of international attention in the Horn of Africa due to both its consistently high rates of economic growth and for its continued problems with widespread hunger and poverty. The nation is also significant for being among the most dependent on foreign aid. Topping the worldwide list of countries receiving aid from the US, UK, and the World Bank, the nation has been receiving $3.5 billion on average from international donors in recent years, which represents 50 to 60 percent of its national budget (Oakland institute report, 2013, P 1). In 2018, the country’s net official development assistance received was amounted to $4,732,240,234.375(constant 2016 US$). This covers 5.9% and 17.1 % of the country’s GNI and gross capital formation, respectively (WB, 2019).

Recently, the country Ethiopia becomes one of the countries receiving large proportions of aid from international donors (WB and IMF) and many bilateral countries. There is a substantial amount of aid flows, especially after the introduction of the policy changes or political reforms in 1992 (Sintayehu, 2007).

Despite the fact that Ethiopia has been among the top countries in receiving foreign aid; and also well performing country in terms of economic growth, it has remained among the least developed countries of the world for a number of years. This phenomenon has prompted this research to find out why the country has not been able to increase investments and growth despite additional resources. Thus, this paper will attempt to examine the growth impacts of official development assistance (foreign aid) by using a multivariate analysis. Its finding will have great policy implication for the economic growth of the nation.

1.2. Statement of the problem

It is obvious that developing countries are experiencing very weak domestic savings and foreign exchange earnings, the result of which is very weak investment and economic growth. As a result of this, many of these countries experience low per capita income for many years. It is well known that foreign aid has a major role in these countries in narrowing the saving – investment gap, trade gap and fiscal gap by supplementing domestic savings required for investment.

The history in Ethiopia is not different from other developing countries. According to National Bank reports, there is a clear gap between investment to GDP ratio and domestic saving to GDP ratio in 2018/19. In this period, the country's investment to GDP ratio was to 35.2 percent while that of domestic savings stood at 22.3 percent (NBE, 2018/19). Hence, one can understand that 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. This makes the importance of foreign aid indisputable to the performance of the country's economy.

The purpose of much Official Development Assistance ('foreign aid') to developing countries, including Ethiopia, is the promotion of economic development and welfare, usually measured by its impact on economic growth. However, despite a massive inflow of foreign aid and impressive growth recently, the country Ethiopia remains among the poorest. Thus, the actual role of foreign capital inflow has been an area of controversy. Ethiopia has been one of the major recipients of international aid. It is evident that despite notable donor intervention in the country's economy, less economic growth and poverty remain inherent for many years.

In connection to this controversy (foreign aid-economic growth link), few empirical works have been done in Ethiopia. The study by Tasew T (2011), shows that foreign aid has a significant positive impact on the Ethiopian economy in the long run. Similarly, the study by Yohannis (2011), Fentaye (2015), and Ejigu (2015), revealed that aid has a significant positive long-run effect. But Ejigu (2015) found that the short-run impact of foreign aid is insignificant. Contrary to these studies, the study by Abeba (2002) shows that aid has negative impact on economic growth of Ethiopia.

Despite the massive literature on the subject, a consensus has not been reached on the growth impact of aid, rather the results are inconclusive. According to Tesew (2011), the reasons for the inconclusive aid-growth link 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.

The role of foreign aid in the growth process and hence its implication for poverty reduction of developing countries has been a topic of intense debate. Previous empirical studies on foreign aid and economic growth generate mixed results. For example, (Papanek, 1973), (Dowling and Hiemenz, 1982), (Gupta and Islam,1983), (Hansen and Tarp,2000), (Burnside and Dollar,2000), (Gomanee,2003), (Dalgaard,2004), and (Karras,2006), find evidence for positive impact of foreign aid on growth; whereas (Brautigam and Knack,2004) find evidence for the existence of negative relationship between foreign aid and growth. There are also studies that find no evidence for the effect of foreign aid on economic growth. For example, (Mosley, 1980), (Mosley, 1987), (Boone, 1996), and (Jensen and Paldam, 2003) find evidence to suggest that aid has no impact on growth.

There is still heated debate on whether or not foreign aid is effective in promoting economic growth in aid-recipient countries. Therefore, this study aimed at contributing its part in addressing the unresolved question of aid effectiveness (measured by its impact on economic growth) on Ethiopia using a time series data covering the period 1981 to 2018. Although studies on this area have been done on a number of countries in both developed and developing countries, to the best of the researcher's knowledge, the number of studies conducted so far is limited in number and scope in the case of Ethiopia. Neither the studies to-date provided conclusive evidences. This calls for further study.

Therefore, this study is expected to contribute to the existing literature and ongoing debate on foreign aid-economic growth link by examining the effect of foreign aid on economic growth in Ethiopia. The study will use newly developed co-integration technique which is Autoregressive Distributive Lags (ARDL) and which has rarely been used. Further, the current study will use new methodology with latest and detailed data to examine the impact of foreign aid on economic growth of Ethiopia.

1.3. Research question

This study is guided by the following research questions.

“Does foreign aid contribute for economic growth in Ethiopia?”

“Is there a long run relationship between real per capita GDP and foreign aid in Ethiopia?”

1.4. Hypothesis of the study

- ✓ Foreign aid has a positive impact on economic growth in Ethiopia
- ✓ There exist long and short run relationships between foreign aid and economic growth in Ethiopia.

1.5. Objective of the study

1.5.1. General objective

The main aim of this study is to empirically assess the relationship between foreign aid and economic growth in Ethiopia over the period 1981 to 2018 using ARDL approach.

1.5.2. Specific objectives

Specifically, the study aims at:

- ✓ Analyzing the trends of foreign aid and economic growth in Ethiopia over the study period.
- ✓ Empirically estimating the elasticity of economic growth with respect to foreign aid and other key macroeconomic variables.
- ✓ Suggesting appropriate policy measures arising from the empirical findings to support the need for foreign aid in Ethiopia.

1.6. Significance of the study

In Ethiopia, the number of studies conducted so far on the impact of foreign aid on economic growth is limited in number, and somehow old in age, which warrants further study to be undertaken. By examining the aid-growth relationship, this study is expected to provide the following values:

- ✓ It helps to provide inputs for policymakers in their endeavor to design appropriate policy measures and institutions for effectively implement, monitor and evaluate the effective use of foreign aid to help the country moving towards middle income economy.
- ✓ Even though the study was conducted in Ethiopia, the results from this study may also hold for other developing countries, especially for most Sub-Saharan countries.
- ✓ The paper might serve as a stepping stone for other researchers while conducting related researches.

1.7. Method of Study

1.7.1 Data Type and Sources

The study employed mainly secondary macroeconomic time series data in its analysis. All data used in the analysis were taken from the World Bank Development Indicators, IMF and World Economic Outlook database. Other augmenting sources included published articles and journals, working papers, textbooks and relevant internet resources.

1.7.2 Data Analysis

The data collected were both descriptively and econometrically analyzed. Charts such as trend graphs and tables were employed to aid in the descriptive analysis. Econometrically, stationary test was carried out on all variables to ascertain their order of integration to avoid the problem of spurious regression. Further, the study adopted the newly developed Autoregressive Distributed Lag model for co-integration procedure introduced by *Pesaran et al* (2001) to estimate both the short and long-run relationships with economic growth and its determinants, particularly foreign aid. All estimations were carried out using the econometric packages STATA 13 and Eviews 9.0.

1.8. Scope of the study

The study is limited to the period 1981-2018 where the researcher specifies the growth model incorporating foreign aid and other macroeconomic variables. The choice of the study period is dependent on data availability on most of the variables used in the study.

1.9. Structure of the study

The study is organized into five main chapters. The rest of the paper is organized as follows. Chapter two reviews relevant theoretical and empirical literatures related to foreign aid. Chapter three presents the research methodology adopted for the study, touching on issues such as data description and definition, and model specifications. The fourth chapter presents and analyses results of the estimated growth models. The research concludes in chapter five, with a summary of major findings and their policy implications and also limitations of the study and issues for further research and conclusion.

Chapter Two

Literature review

2.1. Theoretical Literature

2.1.1. Definition and concepts of foreign aid

2.1.1.1. Definition of foreign aid

"Foreign aid" consists of all resources- physical goods, skills and technical know -how, financial grants (gifts), or loans (at concessional rates) transferred by donors to recipients'' (Riddell, 2007). Also the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD) defines aid as Official Development Assistance (ODA) (2019, p 1). ODA is defined by the OECD Development Assistance Committee (DAC) as "government aid that promotes and specifically targets the economic development and welfare of developing countries" (OECD, 2019, p 1). According to the DAC, aid qualifies as ODA on three criteria: it has to be undertaken by official agencies; it has to have the promotion of economic development and welfare as its main objectives and it has to have a grant element of twenty five percent or more. In most cases foreign aid is provided in the form of project aid, humanitarian aid including food aid, technical assistance and program aid (balance of payments support and budget support). Also the Non-Governmental Organizations (NGOs) provide aid in support of poverty reduction activities and emergency relief in aid recipient countries. This study uses the DAC definition of foreign aid.

2.1.2. Theories of aid-growth

According to literature, numerous theories have emerged since 1960s to explain aid-growth linkage. Still no theory seems to offer a concrete answer to the discourse (Clemens et al., 2012). This section, therefore, discusses notable theories attempting to address this contentious linkage. For clarity, the section classifies these theories in three generational groups following similar categorization by influential scholars like Hansen and Tarp (2000) and Moreira (2005).

2.1.2.1. First Generation Theories: Aid, Savings and Growth

The bulk of earliest theories on aid-growth nexus from 1940s to mid-1970s primarily relied on the Harrod-Domar model (Arvin, 1999). The underlying premise was that foreign capital, say aid, increases savings which ultimately boast investments and economic-growth (Papanek, 1973). Indeed, theorists like Rosenstein- Roden (1961) proposed that each additional dollar of foreign reserves (aid) would result in an equal increase in total savings. However, this preposition is unconvincing since in reality aid is fungible (movable) as it may finance other avenues like consumption rather than savings (Boone, 1996). Nevertheless, aid-fungibility was not allowed for in early aid-growth models (Moreira, 2005).

Briefly, the Harrod-Domar model which is regarded as a theoretical workhorse of the popular gap theories, assumed that poor countries fail to climb the economic ladder because of extensive gaps in savings-investments rates (S-I), hence foreign-capital or aid is indispensable. The popularity of this model heightened due to success of the Marshal Plan. Hence, Arvin (1999) states that most first national development-plans were modeled around Harrod-Domar at the behest of the World Bank. Still, the Harrod-Domar model was too simplistic hence Chenery and Strout (1966) introduced a more comprehensive Two Gap model by incorporating trade balance (X-M) or foreign exchange. Notwithstanding Bacha (1990), motivated by the 1980s debt crisis, proposed the Three Gap model with fiscal deficit (T-G) as the third gap.

A simple version of the Two Gap model used by many scholars, in particular, the World Bank, resembles the following equations:

$$g_t = \frac{dYt}{Yt} = (\frac{It}{Yt})/\mu \quad \text{..... (2.1)}$$

$$\frac{I_t}{Y_t} = \frac{A_t}{Y_t} + \frac{S_t}{Y}, \quad \text{..... (2.2)}$$

Here, I_t is required investment with respect to time t, Y_t is output, g *or* dY_t/Y_t is targeted GDP growth, A is aid or given as F_t, foreign capital as in equation 2.3, and S is domestic saving. Parameter μ represents incremental capital-output ratio (ICOR), often ranging between 2 and 5, where high ICOR indicates poor quality of investment. The final model after combining equations 2.1 and 2.2 becomes:

$$g = (\frac{S_t}{Y_t} + \frac{F_t}{Y_t})\mu \text{..............................} (2.3)$$

Briefly, growth, *g*, results from growth in savings ratio, *s* and foreign aid, *f*, given μ as ICOR-level.

Other notable theories from this generation include the Big Push theory by Rosenstein-Rodan (1961), Hirschman's Backward and Forward Linkages Theory, and Rostov's Stages of Development theory. Importantly, the Big Push theory is still the overriding argument used by influential aid-proponents such as Sachs (2005) and Collier (2007a) including celebrities to proselytize the need for aid (Moyo, 2009). Nevertheless, leading aid critics such as Bauer (1972) and recently Easterly (2014) criticize the Big Push model on several grounds, particularly, that it undermines critical role of market forces.

To summarize, earliest theories though inconclusive, largely assumed a positive role of aid on growth via savings (Moreira, 2005). Although early-models receive credit for initiating theoretical underpinnings of aid-growth nexus, still they are often criticized for being too simplistic and static in their formulations (Hansen and Tarp, 2001). Furthermore, they seemed to ignore active-role of recipient countries by taking a paternalistic approach to development (Easterly, 2014).

2.1.2.2. Second Generation Studies: Aid, Investments and Growth

By mid 1970s to early 1990s, it was clear that the aid-savings-growth pendulum set by the early economists was no longer agreeable (Hansen and Tarp, 2001). For example, Griffin et al. (1970) argued that in the long-run aid reduces domestic savings by acting as a substitute to savings. They further confirmed that the bulk of aid only increased government spending rather than investments, a condition which Griffin et al (1970) called 'fungibility of aid' (Rajan, 2005a). However, an aid proponent, the first to develop a multivariate regression model, Papanek (1973), criticized Griffin's view and further quashed previous (aid-savings-growth linkage) models. Instead, he hypothesized that foreign inflows (aid, foreign private investment, and other foreign inflows) and savings are autonomous variables that directly explain investments or growth.

Noticeably, two strands emerged from Papanek's works; the first strand proposed that aid influences growth directly through investments and not necessarily savings (Moreira, 2005).

However, the second and more recent strand also influenced by Augmented Solow model, proposed that aid has a direct impact on incomes via economic multiplier-effects (McGillivray and Morrissey, 2000). The flexibility of this strand hiked its popularity although poor data availability at the time hampered its applicability (Tarp and Hjertholm, 2000). The two related models resemble the following:

$$I_{i,t} = \alpha + \beta Aid_{i,t} + F_{i,t}\,\eta + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.4.)$$

$$G_{i,t} = \alpha + \beta Aid_{i,t} + X_{i,t}\,\eta + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.5)$$

Here, $I_{i,t}$is rate of investment for country i at time t , $Aid_{i,t}$= net disbursements of aid, $F_{i,t}$ = other types of capital inflows, e.g. FDI, η is a vector of other capital inflows. $g_{i,t}$= growth per capita in country i at time t, $X_{i;t}$ = vector of country characteristics and $\varepsilon_{i,t}$is white noise. The test was on whether parameter for aid, β, was positive, negative, and significant. Generally, this generation posted mixed results. However, the most influential preposition came from Boone (1996) who reconfirmed controversial claims by Bauer (1972) and Griffin (1970) that aid financed government consumption rather than savings. Although increasing consumption seems desirable as argued by Collier (2007), overwhelming evidence still suggests that growth resulting from investment is more meaningful than that from consumption (Rajan and Subramanian, 2008).

2.1.2.3. Third Generation Theories: Aid, Conditions (Policies) and Growth

The third generation theories span from late 1990s to date. According to Clemens et al. (2012), these models may generally be viewed as reactions to Boone's controversial hypothesis that aid supports consumption rather than investments.

The current generation argues that the absorption rate of aid is conditional on domestic factors such as, human capital, infrastructure, governance, institutional, and policy capacities (McGillivray and Morrissey, 2000). However, the most dominant hypothesis from this generation originates from works of Burnside and Dollar (1996; 2000) that aid-effectiveness is dependent on policy environment (monetary, trade, and fiscal policies). More recently, new strands have emerged in reaction to this hypothesis. Now, there are models advancing for diminishing returns role of aid (Hansen and Tarp, 2001); distinguishing aid by timing (lagged effect) (Moreira, 2005)*;* and disaggregating aid by type or purpose (Clemens et al., 2012, Rajan, 2005b). Finally, there is the 'null' hypothesis or 'unconditional' strand reconfirming Boone's

(1996) view that aid has null effect on growth irrespective of any policies or conditions (Rajan et. al.,2008). The following are the most notable of the new theoretical models.

Conditional and Policy Strands

The following multivariate regression models may represent the conditional and the policy strands adopted from Burnside et al. (2000), respectively:

$$G_{i,t} = \alpha + \beta 1 Aid_{i,t} + \eta X_{i,t} + \beta 2 Z_{i,t} + \beta 3\left(Aid_{i,t} * Z_{i,t}\right) + \varepsilon_{i,t} \quad \ldots\ldots\ldots 2.6$$

$$G_{i,t} = \alpha + \beta 1 Aid_{i,t} + \eta X_{i,t} + \beta 2 Policy_{i,t} + \beta 3\left(Aid_{i,t} * Policy_{i,t}\right) + \varepsilon_{i,t} \quad \ldots\ldots\ldots 2.7$$

Here, $Z_{i,t}$are country's conditions, $(Aid_{i,t}*Z_{,i,t})$ is an interactive term of aid and conditional factors. Particularly, in Equation 3.2, an interactive term $Aid_{i,t}*Policy_{,i,t}$ measures the impact of aid subject to policies. Here, test is on parameter $\beta 1$ and $\beta 3$ for conditional (policy) effect of aid on growth. Still, results from these models have been contentious. Although the policy model commands overwhelming support now, some economists including Clemens et al. (2012) argue that there is no consensus regarding definition of 'good policy-environment'. Indeed, this assertion is a reminder to researchers to handle policy indices with caution when conducting aid-growth studies.

2.2. Review of Empirical Studies

The nexus between aid and economic growth has been the area of intense research over the past few decades. However, depending upon the econometric techniques adopted, underlying variables used, the development stages of the countries studied and the time period used in the analysis, the evidence of the studies remain controversial to-date. Given the controversial and mixed results of aid-growth studies, the role of foreign aid in the growth process of developing countries has been a highly debated issue. The mixed empirical results concerning the relationship between foreign aid and economic growth has attracted economists for decades and a number of studies have been conducted by a number of economists.

A study by Hansen and Tarp (2001) examined the nexus between aid and growth in 56 countries using a Generalized Method of Moment (GMM). The results confirmed that aid in all likelihood increases the growth rate, and the result is not conditional to "good" policy. However they saw that there are decreasing return to aid and the estimated effectiveness of aid is highly sensitive to

the choice of estimator and the control variables. When investment and human capital are controlled for, they saw that there is no positive effect on aid. Yet they agreed that aid continues to impact on growth via investment.

Adamu (2013) investigated the impact of foreign aid on economic growth in member countries of the Economic Community of West African States over the period 1990-2009. The investigation utilized panel data and he specified and estimated three equations (simultaneous equations) model. The empirical result shows that the effect of foreign aid on economic growth among these ECOWAS countries was found to be positive and strong.

Using OLS, Paneldata and the GMM as estimation techniques, Minoiu and Sanjay (2009) researched the relationship between foreign aid and economic growth in 107 countries over the period 1960 to 2000. In their analysis, they differentiate between developmental aid (aid expanded in a manner that is anticipated to promote development, whether achieved through economic growth) and non- development aids (other kind of aid). They found that development aid produces long term growth with the effect being significant, large and robust. While non-developmental aid is growth-neutral, and occasionally negatively associated with growth.

Julius et al., (2014) studied the link between foreign aid and economic growth in 36 African countries. The empirical study used a Co-integrated VAR model as statistical benchmark to study the long run-impact of foreign aid. The study revealed that aid has a positive long run impact on investment and GDP.

Chong et al. (2010) considered Tanzania in investigating the effect of foreign aid on economic growth. The study used a 33 years regression analysis from 1970 to 2002 and found that foreign aid work effectively unconditionally and that the addition of good policy would foster the growth.

In a related study, Appiah- Konadu et al. (2016) assessed the two-way relationship between foreign aid and economic growth in Ghana over the period 1972-2012. The assessment employed the ARDL and error correction term approaches to test the relationships. The study result implies that capital, labor and government expenditures had positive effect on the economic growth in Ghana both in short- and long-run. However, interest payments and foreign aid had negative effects on economic growth of Ghana.

Taking the same issue, the study by Rajan & Subramanian (2015) investigated the causal relationship between aid and per capita economic growth in thirteen Asian countries that have historically been some of the largest recipients of foreign aid. The paper found that both short-run and long-run effects of foreign aid on economic growth are significantly negative. A 1% rise in aid (in share of GDP) results in 0.18% fall in per-capita real income in the long-run; thus, if the aid-dependent Asian countries continue to receive foreign aid, then over time, per-capita economic growth in those countries will decline. Co-integrating relationships also indicate significantly positive long-run effects of trade openness and domestic investment on per-capita economic growth.

The study by Fazily, (2014) examined the impact of official development assistance on economic growth in conflict affected countries, more particularly, Afghanistan. The result found that ODA is a major factor in reconstruction of conflict-affected economies. ODA, without closely monitoring its efficiency and results for infrastructure and production, is not a solution for economic growth recovery. It would, rather, reduce ODA to a short-term tool to boost economic recovery – without reaching a sustainable level of GDP growth.

Specifically in Ethiopia, Delessa (2012) assessed the impact of foreign aid on economic growth during the period of 1969-2011. The study applied the multivariate co-integration analysis. The co-integration test result, using Johansen co-integration approach, shows that there is long-run relationship among the variables in the model. The estimated short-run model shows that the current and past level of aid inflow, entered alone, has a negative impact on economic growth. Similarly, current level of aid interacted with policy has also negative effect on economic growth. However, in the long-run foreign aid inflow, entered alone, has a negative and significant impact on economic growth. Whereas, aid interacted with policy appears to have a positive contribution to economic growth of Ethiopia in the long-run.

For the same country (Ethiopia), 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. The examination used Johansen's maximum likelihood estimation procedure. Tolessa 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.

Moreover, by using the same econometric approaches (Johansen's maximum likelihood technique), Wondwesen (2003) analyzed the impact of foreign aid on growth in Ethiopia covering the period 1962/63 to 2000/01. The empirical results 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, study found that when aid is interacted with policy, the growth impact of aid found to be significant-i.e. aid is conditional on good policy environment. His result further implied that attention should be focused on improving the existing macroeconomic policy environment for the inflow and effective use of aid. This study is better than the other studies at least in two aspects. The first reason is that the study tried to incorporate recent advances in the aid-growth link literature, and the second one is that the models are specified in a better way, for instance, constructing a broader policy index, and considering other variables (notably rainfall variability) to the growth equation.

Another study by Fentaye (2015) assessed the impact of foreign aid on economic growth in Ethiopia through transmission channel over the period 1980 to 2013. The assessment utilized multivariate co-integration analysis and the result from growth model reveals that aid has a significant positive impact on growth in the long-run. The empirical result from investment model also indicated that the positive and significant contribution of aid on investment in the long run. In other words, one of the theoretical views of the gap models which states that aid can enhance growth by financing the saving gap is proven in this study. The growth equation further revealed that rainfall variability has a significant negative impact on economic growth. This study indicated also that the country has no problem of capacity constraint as to the flow of foreign aid.

Using the same co-integration analysis (multivariate co-integration), Tasew (2011) researched the impact of foreign aid on investment and economic growth in Ethiopia over the period 1970 to 2009. The study found aid to have a significant positive impact on investment in the long run. Further, the study shows that 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. This study indicated also that the country has no problem of capacity constraint as to the flow of foreign aid.

Moreover, using Harrod-Domar (H-D) growth model, Ejigu (2015) analyzed the impact of foreign aid on economic growth of Ethiopia. The data was analyzed using Multivariate VAR approach. The empirical result found that foreign aid has a significant positive long-run effect on economic growth and insignificant in short run.

Using similar growth model (Harrod-Domar), Yohannes (2011) examined the impact of foreign aid on economic growth in Ethiopia using the maximum likelihood estimation. The empirical test result shows that foreign aid has a positive and significant effect in the long run through its contribution to investment while its effect in the short run is insignificant.

Among the above growth aid studies on Ethiopia, most of them focus on the investment financing of aid through investment equation and the studies provided inconclusive results. Further, the studies so far in the country have not included debt burden in their aid growth model. This paves the way to have this study. Therefore, this study contributes to the existing literature by analyzing the two-way linkage between foreign aid and economic growth in Ethiopia by incorporating debt burden and debt servicing and also other macroeconomic variables as a control variable.

Chapter Three

Methodology of the study

3.1. Introduction

This chapter focuses on the econometric framework of the empirical model of the study. The chapter is organized as follows. Section 3.2 presents the types and sources of data. Section 3.3 presents the specification of the operational models (aid-growth models). Section 3.4 presents definitions of variables while Section 3.5introduces the estimation methods of the models. Finally, Section 3.6 presents the estimation procedures and time series properties of the data.

3.2. Types and sources data

For the purpose of analyzing the impact of foreign aid on economic growth, annual time series data spanning for 38 years, from 1981 to 2018, on gross domestic growth, foreign aid and other variables were used. The choice of the period is based on the availability of relevant data for the study. The relevant data were collected from various sources: World Bank Development Indicators, IMF and World Economic Outlook databases.

3.3. Model specification

The theoretical foundation of the study is the augmented Solow model for economic growth equation, which is modified to capture the effect of foreign aid on economic growth in the case of Ethiopia. As implied by Solow's formulation, economic growth is a function of capital accumulation, an expansion of labor force and exogenous factor, technological progress which makes physical capital and labor more productive. According to the Solow's formulation, production function can be specified as:

$$\boldsymbol{Y = F(Lt, Kt, A)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3.1})$$

Where Y= is a proxy for economic growth, K= Capital stock, L=Labor force and A= technology.

Following the success of Marshal Plan, inflow of foreign aid is also considered as an important deriving factor of economic growth. According to Tasew (2011), the perceived success of this plan could be revisited with developing countries. Poor countries remained poor because the levels of investment remain 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. Therefore, this study adopts a production function, in which foreign aid is introduced as an input in addition to labor and domestic capital. In general, the production function can be specified as follows:

$$\boldsymbol{Y = F(Lt, Kt, AIDt, A)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3.2})$$

Where AID is foreign aid and all other variables are as they are defined earlier.

Real GDP per capita is considered as a proxy for economic growth in the model as it is believed to be a better indicator in the context of Ethiopia. The other important variables include public external debt stock and public external debt servicing. It is well known that Ethiopia has huge debt burden. According to Karagol (2002) if a country has a significant debt burden, there is a need to service its debt. This will affect the employment of labor and capital in the production function and through its effect on the productivity of capital and labor, economic growth will be affected. Further, highly indebted countries have to set aside a sizeable fraction of their scarce resources to service their debt, which naturally affects their development spending (Shabbir and Yasin, 2015). A great amount of foreign exchange reserves is spent on debt servicing accompanied by devaluation of currency and it can affect social spending in particular and the economy in general. Therefore, it is necessary to know the magnitude of relationship of growth with the debt service liabilities and the debt burden should be decomposed to public external debt stock and public external debt servicing. To account the impact of debt stock and debt servicing, Equation 3.4 can be rewritten as follows:

$$\boldsymbol{Yt = F(Lt, Kt, AIDt, , Dt, DSt, A)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{3.3})$$

$Yt$is real GDP per capita at time t, Lt is total active population at time t, Kt is capital stock at time t, AIDt is foreign aid at time t,Dt and DSt are public external debt stock and debt servicing at time t, respectively. Equation (3.3) suggests that labor force, capital stock, foreign aid, and debt stock and debt servicing, respectively can be the determinants of economic growth of Ethiopia.

Furthermore, following the study by Frimpong (2008), that explains Ghana's economic growth as depending on labor, capital, foreign aid, openness to trade and inflation, and by

Nestroy(2008), that that explains Tanzania's economic growth as depending on foreign aid, gross national saving and total debt servicing, the present study also includes openness to trade, inflation and gross national saving in its modeling framework. Thus, Equation (3.3) can also rewrite as:

$$\boldsymbol{Yt = F(Lt, Kt, AIDt, , Dt, DSt, OPNt, INFt, GNSt, A)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \textbf{(3.4)}$$

Where OPNt, INFt and GNSt respectively are openness to trade at time t, inflation at time t and gross national saving at time t. All other things are as they are defined earlier. Further, Equation (3.4) is expressed in an explicit parametric model as follows:

$$\boldsymbol{Yt = b0 + b1Lt + b2Kt + b3AIDt + b4Dt + b5DSt + b6OPNt + b7INFt + b8GNSt + et} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots. (\mathbf{3.5})$$

Where, et represents the error term overtime t, $b0$ represents the intercept. The slope $b1, b2, b3, b4, b5, b6, b7$ and $b8$ are the coefficients of labor force, capital stock, foreign aid, debt stock debt servicing, openness to trade, inflation and gross national saving respectively. Other studies like study by Tasew (2011) included rainfall in their modeling framework and found significant coefficient. But the present study dropped the rainfall variable and included debt and debt servicing in its modeling framework because as aid has a loan component that has to be paid, the debt accumulation and debt servicing are found to be important variables that affect economic growth.

Further, in order to see the effect of major political shifts in political environment on the growth performance of Ethiopia, the dummy variable showing major political shift is incorporated in the modeling framework. Once the dummy variable capturing the major political shift is included in the modeling framework, Equation (3.5) becomes:

$$\boldsymbol{Yt = b0 + b1Lt + b2Kt + b3AIDt + b4Dt + b5DSt + b6OPNt + b7INFt + b8GNSt + b9DD + et} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (\mathbf{3.6})$$

Finally, all the variables included in the model, inflation variable will be transformed into their logarithmic form for estimation purpose. Such transformation has some advantages in the estimation process. First, it minimizes the fluctuations in the data series or minimizes the effects of possible outliers as well as large coefficients. Second, it allows the

measurement of approximate growth rates or it captures growth impacts. Finally, coefficients are interpreted as elasticity. Elasticity's give significant implications as they would capture the actual responses of the dependent variable to changes in the independent variables. In this context, the elasticity's bring the actual responses of changes in labor force, capital stock, foreign aid, debt, debt servicing, and openness to trade, inflation and gross national saving at any point in time. Then, the empirical model of economic growth can be expressed as:

$$\boldsymbol{lYt = b0 + b1lLt + b2lKt + b3lAIDt + b4lDt + b5lDSt + b6lOPNt + b7INFt + b8lGNSt + b9DD + et} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . (\mathbf{3.7})$$

The terms, $b1, b2, b3\ \ b4\ , b5, b6, b7, b8and\ b9$ are elasticities. All other things are as they are defined earlier.

3.4. Variable description

The descriptions of the dependent and the explanatory variables that are included in the model are explained as follows:

Real GDP per capita (Y): It is defined as the annual amount of real GDP divided by the total population and it is assumed to be the best indicator of economic growth which shows the standard of living of the society.

Labor force (L): In this study the labor force is proxied by total population between the ages 15 to 64. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship (World Bank, 2020). Since the rate of utilization of the labor force is important in production, expect a positive relationship between economic growth and labor force. But if it couldn't be used efficiently and if it is less productive, it may be a burden for the economy because of high rate of unemployment.

Capital stock (K): Capital is prioxied by total investment as a percentage of GDP. Theoretically capita measured by gross domestic capital formation (total investment) as a percentage of GDP is expected to exert a positive impact on the rate of growth of real GDP. There are points of view that capital stock is generally believed to be of critical importance, not only as a component of final aggregate demand, but also in terms of the impact of capital stock on the economy's growth

and employment opportunities (Ghali, 1999). Consequently, the study expects the coefficient of capital to be positive.

Foreign aid (Aid): Foreign aid is proxied by Net official development assistance (ODA) received as a percentage of GNI. Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent) (World Bank, 2020). Similarly, foreign aid should generally be expected to exert a positive effect on real output, as it is considered as an inflow of foreign capital to complement domestic capital. It is therefore expected that an increase in the inflow of foreign aid will lead to an increase in aggregate output and hence its rate of growth. Thus coefficient of foreign aid *is* expected to be positive. The study is however; interested in testing whether the impact of foreign aid on real GDP is statistically significant.

Public debt stock (D): Public debt stock is proxied by total external debt. Total external debt is debt owed to non-residents repayable in currency, goods, or services. Total external debt is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt (World Bank, 2020). Stock of public external debt which is the control variable in this study, can affect economic growth in different ways. Shuaib et.al, (2015) reveals that the gross public investment includes investment by government and/or public enterprises financing through public external borrowing. Hence public external borrowing is correlated positively with public investment and can serve as financing capital formation in any economy and calls for technical, managerial, and financial support for the borrower countries to bridge the resource gap and contributes for economic growth through more productivity. On the other hand, according to the conventional view of the public debt and/or the overhang theory of Krugman (1988), public external debt acts as a major constraint to capital formation in developing nations by discouraging investment if this borrowing is not used for productive purposes. That is if the burden and dynamics of external debt show that they do not

contribute significantly to financing economic development, it leads to negative contribution for the economy. Therefore stock of public external debt is expected to have either positive or negative impact on the economy.

Public debt servicing (DS): Public debt servicing is proxied by total debt service on external debt. Total debt service is the sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments (repurchases and charges) to the IMF(World Bank, 2020). Public external debt servicing is also another main control variable in this study and it is assumed to have negative effect on economic growth. Cunnigham (1993) state that when a government has a substantial external debt burden, the manner in which labor and capital will be exploited in the production process is bound to be influenced by the need to service that debt. Karagol (2002) and Clements et al. (2003) argued that external debt service burden has a negative impact on investment and capital accumulation. The main reason is that the greater percentage of capital and foreign currency reserves goes to meet debt service and there will be a reduction in domestic resources because of transferred to principal and interest payments and will leads to poor trade performance. Secondly, when the debtor countries are unable to meet their debt services promptly, they face bad credit standing and will have difficulties in borrowing and pay too much to get new credit. These two effects are likely to negatively influence economic growth.

Openness to trade (OPN): Openness to trade is proxied by the ratio of total trade (export + import) to GDP. It is often hypothesized to raise growth through several channels, such as access to advanced technology from abroad, possibilities of catch-up, greater access to a variety of inputs for production, and access to broader markets that raise the efficiency of domestic production through increased specialization. Thus, on a priori and theoretical grounds, the effect of openness of the economy on GDP growth is positive.

Inflation (INF): Inflation is expected to proxy the general macroeconomic instability. It indicates the overall ability of the government to manage the economy: high inflation rates implying that the government has lost control. Consequently, the study expects the coefficient of inflation to be negative.

Gross National Saving (GNS): In economics, a country's national saving is the sum of private and public savings. It is one of macroeconomic variables that relate with economic growth. It plays very important role in economic growth and development. Low national savings rate is one of the most series obstacles to achieving higher and more sustainable economic growth and vice versa. Further, the more is the national savings of the country, the larger is economic growth of that country. Consequently, the study expects the coefficient of saving to be positive.

Dummy Variable (DD): The variable captures the major political shit from Derg to EPRDF. Thus, the variable took a value of 0 for Derg and 1 for EPRDF. Since it was not common to transfer political power in a peaceful way in Ethiopia, political unrest and violence also resulted. Therefore, the study expects negative immediate impact of the variable.

3.5. The Estimation Method

This study investigates the effects of foreign aid and other selected economic indicators on economic growth for the period of 1981 to 2018 for Ethiopia. In time series data analysis so far, various approaches have been used to examine the relationship between the variables of interest under investigation. These include OLS, VAR, and VECM. However, in this study, the Autoregressive Distributed Lag (ARDL) co-integration in the form of Unrestricted Error Correction Model (UECM) is used. ARDL model is preferred over the other standard time series data model because it has a number of advantages over them. First, the ARDL approach can be applied irrespective of whether the regressors are I(1) and I(0). Second, while the Johansen co-integration techniques require large data samples for validity, the ARDL procedure provides statistically significant result in small samples (Pesaran et al., 1999; Narayan, P., 2005; Udoh et.al, 2012). It avoids the problem of biasness that arises from small sample size (Chaudhry et.al, 2006). Third, the ARDL procedure provides unbiased and valid estimates of the long run model even when some of the regressors are endogenous (Harris et.al, 2003, Pesaran et.al, 1999, Ang, J., 2007). Moreover, the ARDL procedure employs only a single reduced form equation, while the other co-integration procedures estimate the long-run relationships within a context of system equations. Further, in using the ARDL approach, a dummy variable can be included in the co-integration test process, which is not permitted in Johansen's method (Rahimi et.al, 2011).

Therefore, in order to achieve the targeted objectives of the study, the model of economic growth equation is estimated using ARDL model of econometric technique.

Therefore, in order to achieve the objectives of the study, the model of economic growth equation is estimated using ARDL econometric technique.

Following Pesaran*et al.* (2001), the present study adopts the following general unrestricted ARDL (p, q) model specification:

$$\boldsymbol{\Delta y_t = \alpha + +\rho y_{t-1} + \beta x_{t-1} \sum_{j=1}^{q} \delta \Delta y_{t-j} + \sum_{j=1}^{p} \gamma \Delta x_{t-j} + e_t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{3.8}$$

where Δ denotes for first difference operation,y_t is for a vector of dependent variables, x_t is a vector of **p** determinants of y_t regressors, $e_t$is the residual term which is assumed to be white noise. Basically, the ARDL approach to cointegration (See Pesaran *et al.* 2001) involves estimation of the error correction model (ECM) version of ARDL model for the determinants of economic growth.

Taking the variables under investigation such as a log of real GDP per capita, labor force, capita stock, foreign aid, foreign aid square, foreign aid interacted with policy, debt stock and debt servicing into consideration, the model above or Equation (3.8) becomes:

$$\boldsymbol{\Delta lY_t = \alpha + \beta 0 lY_{t-1} + \beta 1 lL_{t-1} + \beta 2 lK_{t-1} + \beta 3 lAID_{t-1} + \beta 4 lD_{t-1} + \beta 5 lDS_{t-1} + \beta 6 lOPN_{t-1} + \beta 7 INF_{t-1} + \beta 8 lGNS_{t-1} + \sum_{j=1}^{q} \gamma 0 \Delta lY_{t-j} + \sum_{j=1}^{p} \gamma 1 \Delta lL_{t-j} + \sum_{j=1}^{p} \gamma 2 \Delta lK_{t-j} + \sum_{j=1}^{p} \gamma 3 \Delta lAID_{t-j} + \sum_{j=1}^{p} \gamma 4 \Delta lD_{t-j} + \sum_{j=1}^{p} \gamma 5 \Delta lDS_{t-j} + \sum_{j=1}^{p} \gamma 6 \Delta lOPN_{t-j} + \sum_{j=1}^{p} \gamma 7 \Delta INF_{t-j} + \sum_{j=1}^{p} \gamma 8 \Delta lGNS_{t-j} + \gamma 9 DD + e_t} \ldots\ldots\ldots\ldots\ldots \mathbf{3.9}$$

Where, lYt, lLt, lKt, lAIDt, lDt , lDSt, lOPNt, and lGNSt respectively are the natural logarithm of real GDP, labor force, capital stock, foreign aid, debt stock and debt servicing, openness to trade and gross national saving at time t.INFt is inflation rate at time t.$\beta 0, \beta 1, \beta 2, \beta 3, \beta 4, \beta 5, \beta 6, \beta 7 and \beta 8$, are coefficients that measure long run relationships.
$\gamma 0, \gamma 1, \gamma 2, \gamma 3, \gamma 4, \gamma 5, \gamma 6, \gamma 7, \gamma 8 and \gamma 9$ arecoefficients that measure short run relationships. All other things are as they are defined earlier.

3.6. Estimation procedure

3.6.1. Unit root test

It is well known that the regression result is consistent and can also be used for forecasting and policy analysis when the variables incorporated in the model under investigation are stationary. A variable is stationary when it's mean; variance and auto-covariance are time-invariant over time. However, most of the macroeconomic variables in the practical world are non-stationary. This occurs when a variable has a persistent long-run movement or if it is unstable over time. Thus, proper care should be taken to the issue of stationary of the variables in order to avoid the problem of spurious regression before going to estimation. Spurious regression is common when least square regression is run on variables which are non-stationary. In this case, one can obtain a significant relationship while the variables are unrelated. In such a case, results of the study can be used to infer the behavior of the variables at a single point in time but not for the different period under investigation.

Since most economic time series data are unlikely to be stationary, the first step is to test whether the variables are stationary; checking for the presence of unit roots to avoid the problem associated with spurious regression (Tasew, 2011). Various mechanisms have been developed to transform non-stationary time series variables to attain stationary. If a variable has deterministic trend, including trend variable in the regression removes the trend component and makes it stationary. Such process is called trend stationary since the deviation from the trend is stationary. However, most time series data have a characteristic of stochastic trend.

If a variable has a stochastic trend, it needs to be differenced in order to obtain stationary. Such process is called difference stationary process (Gujarati, 2004). The number of unit roots in a given variable determines how many times the variable should be differenced in order to make it stationary. In this paper unit root test is conducted using Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests.

The testing procedure for the ADF unit root test is specified as follows:

$$\Delta y_t = \alpha + \lambda t + \rho y_{t-1} + \sum_{j=1}^{q} \delta \Delta y_{t-j} + e_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.10)$$

where y_t is a time series variable under consideration in this model at time t, t is a time trend variable; Δ denotes the first difference operator; $e_t$is the error term; q is the optimal lag length of each variable chosen such that first-differenced terms make e_t is a white noise.

The parameter of interest in the ADF model is ρ and the null and alternative hypotheses that will be tested are set as follows:

H_0: ρ= 0, and H_1: ρ< 0 ……..……(3.11)

The test guide line is that: if the *t* value or t-statistic is more negative than the critical values, the null hypothesis (I.e. H_0) is rejected and the conclusion is that the series is stationary. Conversely, if the t-statistic is less negative than the critical values, the null hypothesis is accepted and the conclusion is that the series is non-stationary.

3.6.2. Co-integration test

Following the assessment of the order of integration of the variables under investigation using unit root test, co-integration analysis will be conducted to examine whether the variables of interest have long run relationship or not. The concept of co-integration refers to situations when the time series present co-movement over the long run. From the economic point of view, such behavior provides evidence of a stable long-run relationship between the variables.

According to Pesaran et al. (2001), the long- run relationship or co-integration among the variables of interest can be carried out via bound test approach for co-integration. The bounds test is mainly based on the joint Wald test or F- test whose asymptotic distribution is non-standard under the null hypothesis of no co-integration. Such a co-integration test can be performed by formulating the following null hypothesis of no co-integration.

H_O: $\beta 0 = \beta 1 = \beta 2 = \beta 3 = \beta 4 = \beta 5 = \beta 6 = \beta 7 = \beta 8 = 0$, means there is no long-run relationship among the variables of interest.

H_1: $\beta 0 \neq \beta 1 \neq \beta 2 \neq \beta 3 \neq \beta 4 \neq \beta 5 \neq \beta 6 \neq \beta 7 \neq \beta 8 \neq 0$ means there is long-run relationship among the variables of interest.

In order to test the existence of long-term relationship among the variables of the model, Equation (3.9)is estimated using OLS. To test the above hypothesis, the appropriate statistic is F-

test or Wald test as Pesaran*et al.* (2001) proposed for bound test approach is applied. The computed F-statistics is compared with the upper and lower bound critical values since the name of the test is a bound test. The guideline of the test is such that if the computed F-statistics is higher than the appropriate upper bound of the critical value, the null hypothesis of no co-integration among the variables can be rejected and the alternative hypothesis is accepted. If it is below the appropriate lower bound, the null hypothesis cannot be rejected, and if it lies within the lower and upper bounds, the result would be inconclusive.

3.6.3. Estimation and diagnostic tests

After checking and confirming the existence of long-run relationship among all the dependent and independent variables, the long-run and short-run model coefficients are estimated. Prior to interpreting the estimated coefficients, model diagnostic tests are conducted. Diagnostic and stability tests are tests to check the soundness of (standard property) of the model. These tests are undertaken to make sure that the model and estimated coefficients are reliable and can be inferred or not. These include tests for normality, model specification tests, and tests for the presence of serial correlation and stability of the model. As explained in Gujarati (2003), the above concepts are explained very briefly below.

Normality of the error term is the other test for the distribution of the error term whether they are normal or not for all observations and hence the influence of the terms included in the error term are small and at best random. The test for the serial correlation is testing whether the different lagged values of the error term are correlated or not. The other important test is the test for the specification of the model; or checking whether there is no specification bias or error in the model used. It checks whether important variables are excluded or not, unrelated variable is included or not, the functional form of the model and assumptions made.

Therefore the specified model is checked whether it passes the above tests (normality of residual, serial correlation, heteroscedasticity, functional form and stability) or not using appropriate techniques (Jarque-Bera normality test, Breusch-Godfrey Serial Correlation LM test,Breusch-Pagan-Godfrey, Omitted Variables: Squares of fitted values(Ramseys RESET) test, and cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test) for each.

Chapter Four

Discussion and Analysis

4.1. Introduction

Having looked at the methodology, this section discusses the findings of the study based on empirical investigation in relation to prevailing literature. The analysis employs both descriptive tools and multiple regression analysis discussed earlier. It presents the types, source and unit of measurement of the data, descriptive statistics (summary statistics and correlation), trends and stylized facts about economic growth and foreign aid, stationarity and co-integration properties (or nature) of the variables under investigation. In addition, the chapter presents the long- run and short-run estimates of the ARDL model.

4.2. Types, sources and measurement units of the data

Annual time series data spanning over 38 years, from 1981 to 2018, on real per capita GDP(measured in constant 2010 US$), labor force (measured in total number of population between the ages 15 to 64), capita stock (measured in total investment as a percentage of GDP), foreign aid (measured in net ODA received as a percentage of GNI), external debt stock and debt servicing (both measured in current US$), openness to trade (measured in terms of the ratio of trade (export plus import) to GDP), inflation rate (measured in percentage change) and gross national saving (measured in percentage of GDP) were collected from different sources. The source and measurement of the variables are briefly summarized in the following table.

Table4. 1: Type, Sources and unit of measurement of the model variables

Variables	Unit/proxy	Sources
Economic growth (Yt)	Real per capita GDP(2010 US$)	World Bank
Labour force (Lt)	Total number of population between the ages 15 to 64	World Bank
Physical capital stock (Kt)	Total investment as percentage of GDP	IMF, WEO database
Foreign Aid (AIDt)	Net ODA received as a percentage of GNI	World Bank
External debt stock (Dt)	External debt stock, total in current US$)	World Bank
External debt servicing	Debt servicing on external debt, total in current US$)	World Bank
Openness to trade	Sum of export plus import to nominal GDP	Own calculation
Inflation	Percentage change	IMF, WEO database
Gross national saving	Gross National Saving as percentage of GDP	IMF, WEO database

4.3. Descriptive analysis

4.3.1. Summary statistics

Table 4.2 shows the descriptive statistics of all the variables consisting of 38 observations of each. The data are in logarithm, except inflation data. The standard deviation of the variables indicates that inflation has the highest value followed by external debt servicing and gross domestic product per capita and labor supply has the lowest value followed by capital stock variable. That is, inflation is more scattered (from its minimum value -9.16 to its maximum value 44.37) than others and gross domestic product per capita is less scattered and its value is concentrated around its mean (having minimum value of 5.1 and maximum value of 6.34) than other variables. The mean values of each of the variables are found to be positive, except openness to trade.

Table 4.2: Summary statistics results

	Mean	Stand dev	Min	Max	Obs
lYt	5.53	0.3559	5.1	6.34	38
lLt	17.3	0.356	16.7	17.9	38
lKt	3.02	0.38	2.36	3.67	38
lAIDt	2.14	0.47	0.95	2.94	38
lDt	22.7	0.637	21.3	24.05	38
lDSt	19.11	0.889	17.87	21.42	38
lOPNt	-1.22	0.46	-2.42	-0.59	38
lNFt	9.19	10.5	-9.16	44.37	38
lGNSt	2.58	0.63	1.59	3.49	38

4.3.2. Correlation Matrix

Before further analysis, it is useful to provide a descriptive diagnosis of study's variables to identify possible data problems (Multi-col-linearity). Multi-col-linearity is a state of very high inter-correlations or inter-associations among the independent variables. If high inter-correlation exists in the independent variables of the estimated model, the result may be individually unstable and insignificant but jointly significant. In order to test whether the data exhibits the multi-col-linearity problem, the study utilized the correlation matrix. In addition to correlation matrix the study also carried out variance inflation factor among explanatory variables of the model to check whether multi-linearity exists or not.

Table 4.3 (a): Correlation Matrix

	Yt	Lt	Kt	AIDt	Dt	DSt	OPNt	INFt	GNSt
Y_t	1								
L_t	0.8748	1							
K_t	0.9209	0.9048	1						
AID_t	-0.3275	0.0939	-0.0891	1					
D_t	0.7855	0.6834	0.6871	-0.2841	1				
DS_t	0.8828	0.7169	0.7669	-0.3798	0.9222	1			
OPN_t	0.3832	0.7000	0.5727	0.5301	0.0484	0.0998	1		
INF_t	0.2204	0.3080	0.1700	0.1711	0.0014	0.0588	0.3257	1	
GNS_t	0.8307	0.9365	0.9188	0.1123	0.6027	0.6488	0.7400	0.3004	1

Table 4.3 (b): Correlation Matrix of the Data in Log

	lY_t	lL_t	lK_t	$lAID_t$	lD_t	lDS_t	lOP_t	INF_t	$lGNS_t$
lY_t	1								
lL_t	0.7889	1							
lK_t	0.8826	0.8412	1						
$lAID_t$	-0.2862	0.2753	0.0041	1					
lD_t	0.5032	0.5226	0.4567	-0.0635	1				
lDS_t	0.7946	0.5990	0.6964	-0.3077	0.7739	1			
$lOPN_t$	0.4617	0.7746	0.6620	0.4676	0.0521	0.1467	1		
INF_t	0.2417	0.3158	0.1347	0.2091	-0.0588	0.0514	0.2304	1.	
$lGNS_t$	0.7490	0.9305	0.8772	0.2877	0.4500	0.5625	0.8306	0.2594	1

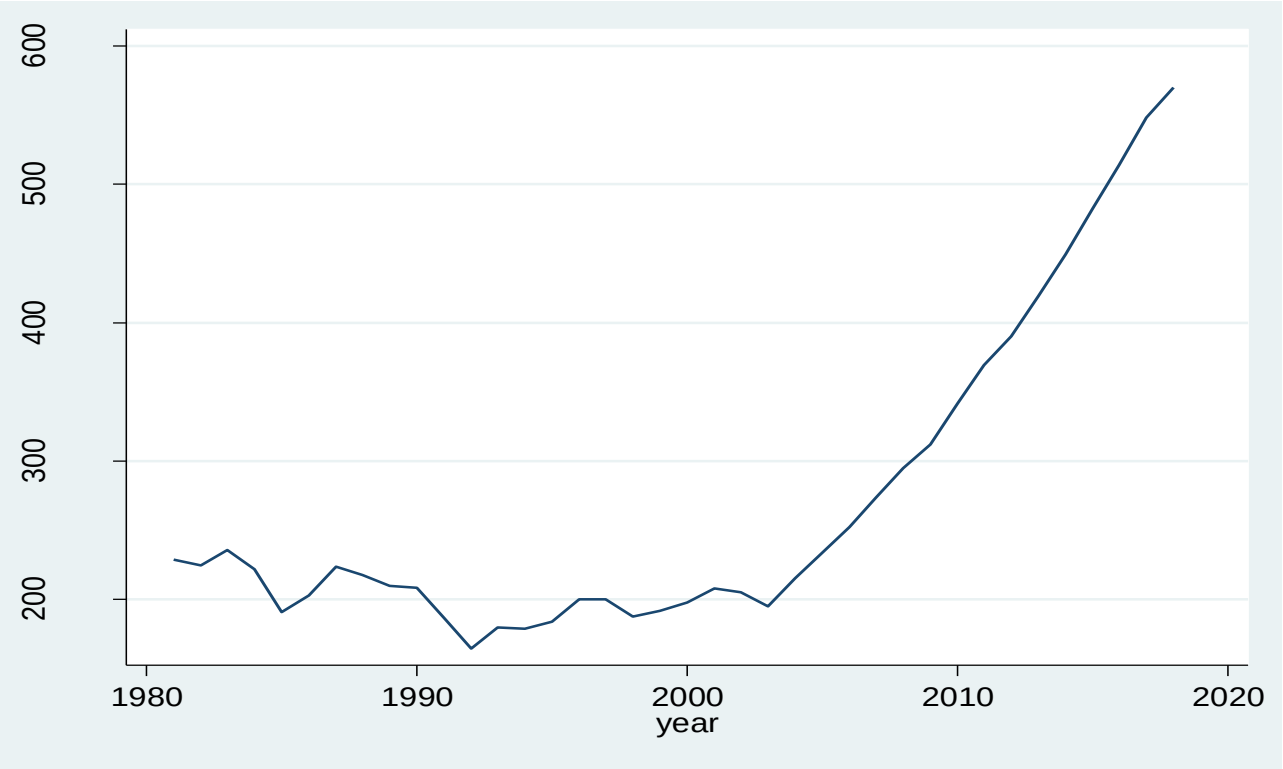
Source: Own computation using Stata 13.

4.3.3. Trends and Stylized Facts about Foreign Aid and Economic growth in Ethiopia

4.3.3.1. Economic Growth in Ethiopia

Ethiopia is currently one of least developed, but a rapidly developing country in the world. Available data shows that, the country's real per capita GDP grew from almost $228 in 1981 to $570 in 2018, representing $342 more real per capita GDP than the year 1981, which is more than double. Thus, the country has experienced strong economic growth in years under investigation, recording a remarkable average annual growth rate of 2.64% (See Figure 4.1).

Figure 4.1: Historical Trend of Real Per Capita GDP (Constant 2010 US$)



Source: Own Computation Based on the Data from WB (World Bank).

However, this positive growth has not been gradual. From the figure, the country's real per capita GDP is slightly decreasing from the year 1981 to the year 1982 by a yearly rate of change of -1.84 % and then it slightly increases in the immediate year (1983) with a yearly rate of change of 4.98 %. This slight increase was however transitory as the years 1984 and 1985 have registered a notable drop in real per capita GDP. The country however experienced the sharpest rise in real per capita GDP in the years 1986 and 1987, when real per capita GDP were $202 and $223, respectively. As it can be observed, the sharpest rise over the period 1986 and 1987 was however transitory as the period 1988 to 1992 registered the largest drop and all-time low real per capita GDP was registered over this period (1992). This was the period during which a civil conflict between the Derg regime and EPRDF reached its climax and the later assumed power. It can be observed that real per capita GDP has increased over the period 1993 to 2003 with an average rate of growth of 1.67 %, despite some fluctuations over the period.

Real per capita GDP has experienced remarkable positive growth performance year after year starting from 2004 to 2018. Over this period, it was growing by average yearly rate of growth of

7.43 %. The year 2018 registered the all-time high real per capita GDP of % 570 USD. From this, one can understand that dynamic changes of real per capita GDP in Ethiopia is quite impressive over the analyzed years (1981-2018).

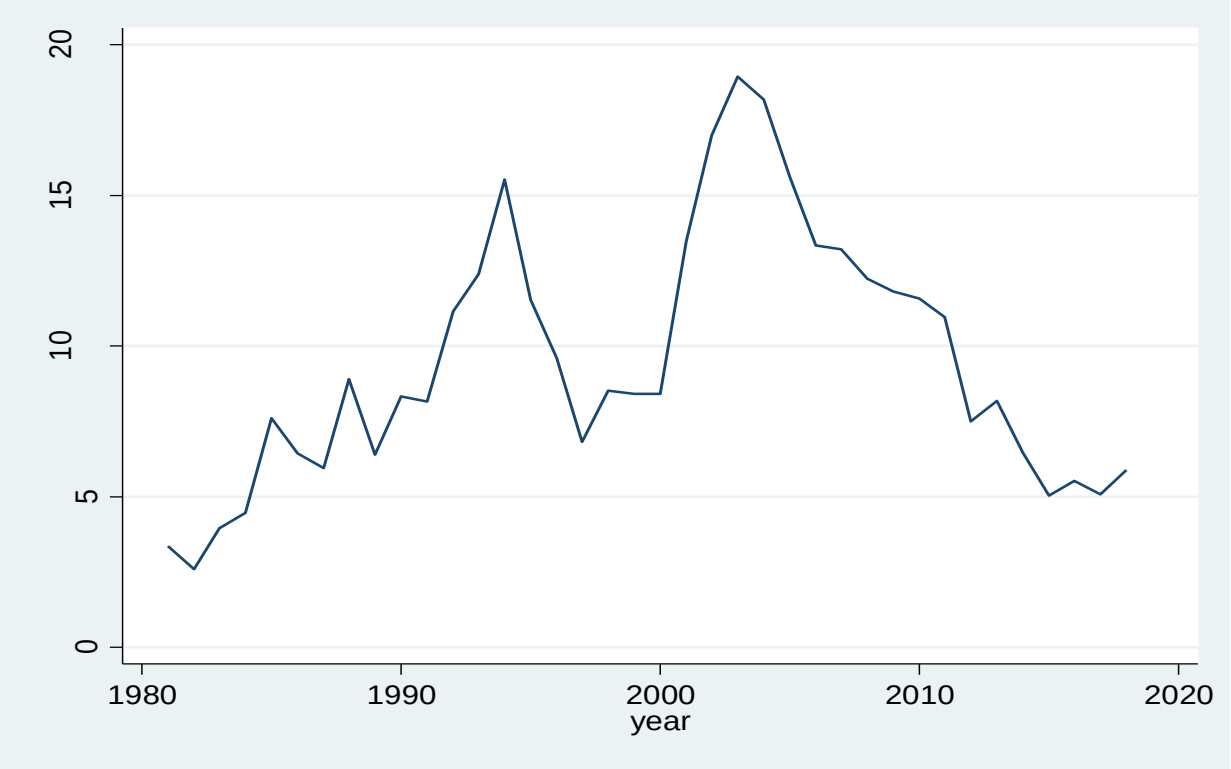
4.3.3.2. Foreign Aid in Ethiopia

Ethiopia is among many nations that have been priority areas for donors and whose dire need for aid persists. Attempts for Ethiopia to exclusively achieve growth objectives through domestic resource mobilization are currently impractical. Due to this reason the role of foreign aid in the economic development of a poor country in general and particularly Ethiopia is unquestionable. Foreign aid can be put into 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.

The net ODA flowing into the country has increased despite some significant fluctuations. It can be observed from Figure 4.2 that the share of net ODA in the GNI of the country registered significant ups and downs over the period between 1981 and 2018. Overall, however, the share of the net ODA in the GNI has increased from almost 3.34 % in the year 1981 to almost 5.88 % in the year 2018, representing a rise of 76.04 % over the analyzed period. From this, one can understand that a substantial growth in the share of the net ODA in the country's GNI has been recorded during the study period.

As it can be observed, the overall trend was one of the sharp fall in the net ODA of the country from 1981 to 1982 with a yearly rate of change of -22.45 % followed by a steady rise in net ODA levels from 1983 to 1985, reaching 7.6 % of the country's GNI in 1985. Over the years 1986 and 1987, the trend of the country's net ODA was one of a steady decline and reaching 5.94 % of GNI in 1987. Starting from 1988, the country's net ODA registered a steady rise until 1994. Over this period, the share of net ODA in the GNI rise 10.47 % on average and reaching 15 % of GNI in 1994.

Figure 4.2: Historical trend of net ODA received (% of GNI)

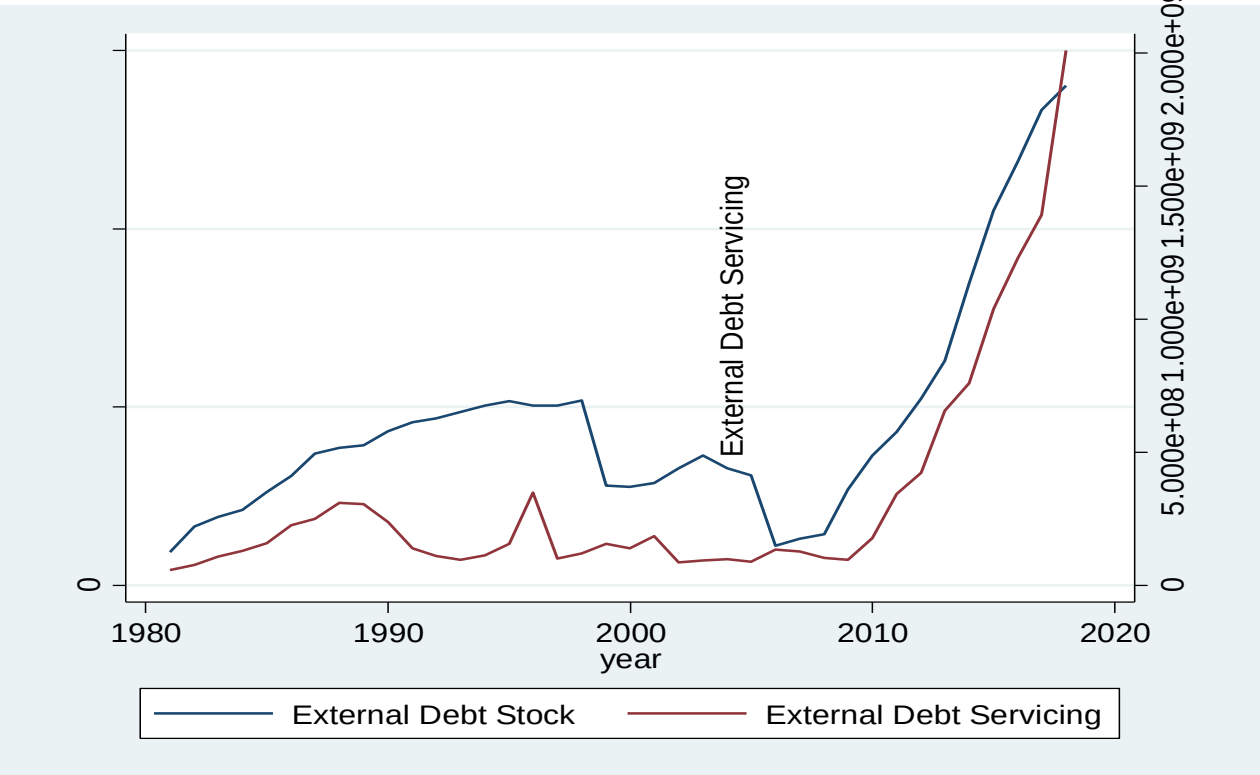


Source: Own computation based on the data from WB (World Bank).

From the figure, it is observed that the share of net ODA in the GNI was at its all-time high in the year 2003, reaching 18.94 % of GNI. From 2003 onwards, however, the share of net ODA decreased significantly and by the year 2018, the total amount of net ODA received was 5.88 % of the GNI.

As aid has a loan component that has to be paid, the debt accumulation and debt service are discussed briefly. According to Ramakrishna (as cited in Tasew (2011)), 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 to GDP ratio, which became more than its GDP since 1992. This has pushed the country into severe debt service difficulties. Available data show that the overall trend was one of a steady increase in both external debt stock and external debt servicing over the study period (See Figure 4.3).

Figure 4.3: Historical trend of external debt stock and debt servicing (current US$)



Source: Own computation based on the data from WB (World Bank)

4.4. Econometric Analysis

4.4.1. Unit root test result

Testing for the existence of unit roots is of major interest in the study of time series models and co-integration. The presence of a unit root implies that the time series under investigation is non-stationary while the absence of a unit root shows that the stochastic process is stationary. But in the ARDL model, the presence of I(2) variables are no more valid because they are based on the assumption that the variables are I(0) or I(1). Therefore, the implementation of unit root test in the ARDL procedure is necessary in order to ensure that none of the variables are integrated of order two or beyond. With the aim of determining the degree of integration, a unit root test is conducted by the standard Augmented Dickey-Fuller (ADF) test. The numbers of lags for the data are selected automatically by Schwarz Bayesian information criterion (SBIC).The test is undertaken for two alternative specifications: with a constant but no trend and with both constant and trend. Further, the test is conducted on the data transformed into logarithm.

Table 4.4: Unit Root Tests Result of the Model Variables

Variables	Augmented Dickey-Fuller (ADF) tests					
	None		Intercept		Intercept &trend	
	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
lYt	1.6450	0.9734	2.0147	0.9998	-0.803	0.9561
D(lYt)	-3.7656***	0.0004	-4.155***	0.0025	-5.272***	0.0007
lLt	3.5699	0.9997	1.7611	0.9975	-1.67742	0.7406
D(lLt)	0.7745	0.8767	-2.7294*	0.0790	-3.7886**	0.0309
lKt	1.1586	0.9334	-1.3141	0.6124	-3.4121*	0.0651
D(lKt)	-9.6636***	0.0000	-9.8037***	0.0000	-9.7994***	0.0000
lAIDt	-0.0545	0.6580	-2.4995	0.1242	-1.4375	0.8327
D(lAIDt)	-6.4805***	0.0000	-5.1915***	0.0001	-5.438***	0.0004
lDt	1.6370	0.9730	-1.4621	0.5413	-1.5781	0.7824
D(lDt)	-4.9349***	0.0000	-5.0288***	0.0002	-4.9666***	0.0015
lDSt	1.5108	0.9653	-0.35577	0.9065	-0.9362	0.9407
D(lDSt)	-5.6937***	0.0000	-5.933***	0.0000	-6.002***	0.0001
lOPNt	-0.9728	0.2898	-1.5044	0.5203	-1.8167	0.6763
D(lOPNt)	-7.5975***	0.000	-7.5496***	0.0000	-7.5282***	0.0000
lNFt	-1.0298	0.2670	-4.4099***	0.0012	-4.6915***	0.0030
D(INFt)	-9.1491***	0.0000	-9.0197***	0.0000	-8.8859***	0.0000
lGNSt	0.5569	0.8319	-1.4135	0.5652	-5.1225***	0.0010
D(lGNSt)	-6.1627***	0.0000	-6.6367***	0.0000	-6.5341***	0.0000

Source: Own Estimation using Eviews 9.0

Note: Accepting or rejecting the null hypothesis depends on critical values and P-values. In the case of P-Value, when the P-Value is smaller than the standard significance levels at 1%, 5%, and 10%, we reject the null hypothesis (See Table 4.4). ***, ** and * indicate the rejection of a null hypothesis of non-stationary at 1%, 5% and 10% level of significance, respectively. The unit root tests are conducted with intercept and intercept and trend. Automatic lag length selection is based on SBIC (Schwarz Bayesian information criteria). lYt, lLt, lKt, lAIDt, lDt, lDSt, lOPNt and lGNSt are natural logarithm of gross domestic product (GDP) per capita, labour force, capita stock, foreign aid, debt stock, debt servicing, openness to trade and gross national saving, respectively whereas lNFt is inflation rate. D indicates their first difference.

From Table 4.4, one can conclude that none of the variables are I(2), which is a precondition for applying the ARDL model. In other words, all the tests revealed that the model has variables that are fractionally integrated or are I(1) or I(0), none of the variables are found to be integrated of order two. Therefore, this condition makes the ARDL model to be the appropriate to conduct long-run relationship analysis among variables under investigation.

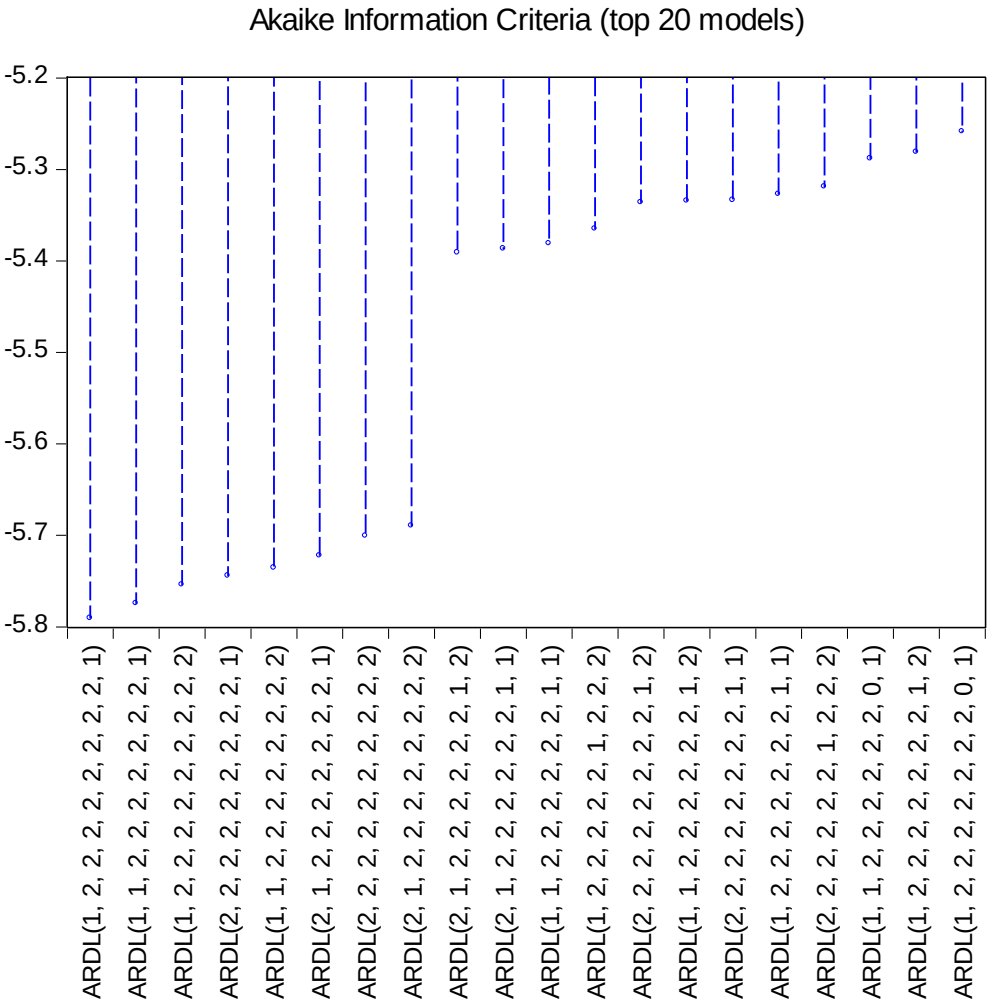
4.4.2. Optimal lags selection

In order to select the length of the optimal lags for the variables under investigation, the present study utilized Akaike Information Criteria (AIC). According to Pesaran and shin (1999), for the yearly data, a maximum of two lags length is recommended to choose the optimal lag for each variable under consideration. Therefore, a maximum of two lag lengths is chosen for the conditional ARDL model and finally both AIC and SBIC automatically selects the optimal lag length of each variable such as lY_t, lL_t, lK_t, $lAID_t$, lD_t, lDS_t, $lOPN_t$, INF_t, $lGNS_t$ and D to be 1, 2, 2,2,2,2,2,2,2 and 1, respectively. Hence, the model under investigation becomes ARDL (1,2,2,2,2,2,2,2,2,2, 1). This automatic determination of the lag length for the variables is to get the valid results and inferences (Geredew, 2017).

4.4.2.1. Measuring the strength of the model selected

The study employed the criteria graph to analyze the strength of the model selected using the standard model selection criteria. The determination of the strength of the model selected is based on the benchmark analysis: the lower the value of the standard model selection criteria, the better/stronger the model selected. Therefore, the strength of the selected model is highlighted in Figure 4.4 below. As can be observed from the figure, the first ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model is stronger than the rest ARDL models and strongly preferred than those 19 because the associated value of the AIC is the lowest or the most negative compared to the remaining 19 models in the graph. However, the second top model is ARDL (1, 1, 2, 2, 2, 2, 2, 2, 2, 1) according to the criteria graph.

Figure 4.4: Akaike Information Criteria



Source: own computation using Eviews 9.0.

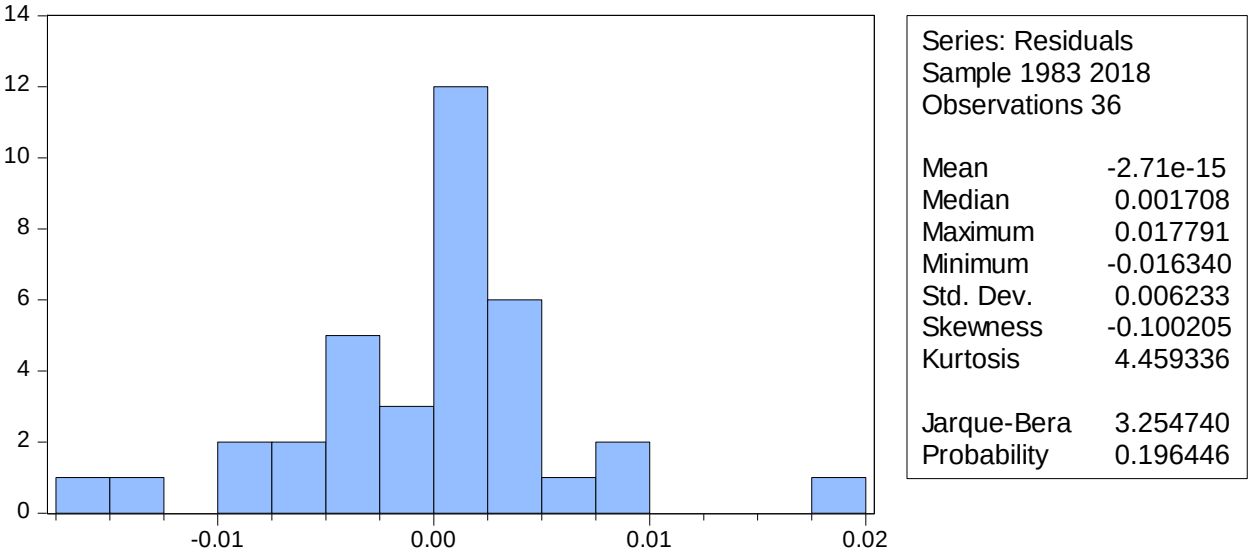
4.4.3. Model Stability and Diagnostic Tests

To check the reliability and verifiability of the estimated long-run and short-run models, diagnostic tests are undertaken. These tests include serial correlation (Brush and Godfray LM test), Functional form (Ramsey's RESET test), Normality (Jaque-Bera test) and Hetroscedasticity (Breusch-Pagan-Godfrey test). CUMSUM recursive residuals and CUMSUM square recursive residuals tests are applied to check the overall stability of the long-run and short-run coefficients which are recommended by Pesaran et al. (2001).

4.4.3.1. Normality test

Normality test result for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model- selected based on Akaike information criteria is presented on Figure 4.5.

Figure 4.5 Normality Test



Source: Own Computation using Eviews 9.0

As it can be observed in the figure (diagnostic test for normality of residual), the P-value associated with the Jarque-Bera normality test probability value (0.1964) is higher than the standard significance level (0.05). Therefore, the null-hypothesis which says the residuals are normally distributed is not rejected. Hence, the model, ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) is free of non-normality problem.

4.4.3.2. Heteroscedasticity test

Table 4.5 presents heteroscedasticity test results for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model- selected based on Akaike information criteria.

Table 4.5. Heteroskedasticity (Breusch-Pagan-Godfrey Test)

F-statistic	1.037576	Prob. F(27,8)	0.5162
Obs*R-squared	28.00323	Prob. Chi-Square(27)	0.4108
Scaled explained SS	2.391916	Prob. Chi-Square(27)	1.0000

Source: Own Computation using Eviews 9.0.

As it can be observed from the result on Table , the null hypothesis of no heteroscedasticity is failed to be rejected at 5% significant level because the P-value associated with the Breusch-Pagan-Godfrey heteroscedasticity test (0.5162) is higher than the standard significance level (> 0.05).

4.4.3.3. Serial correlation test

Table 4.6 displays serial correlation test result for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model-selected based on Akaike information criteria and Schwarz Bayesian Information Criteria.

Table 4.6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.725997	Prob. F(2,6)	0.2558
Obs*R-squared	13.14768	Prob. Chi-Square(2)	0.0014

Source: Own Computation using Eviews 9.0

The null hypothesis of no serial correlation (Brush and Godfray LM test) is failed to reject for the reason that that the p-value associated with test statistic is greater than the standard significant level (0.2558 > 0.05).

4.4.3.4. Test for omitted variables

Table 4.7 shows omitted variable tests for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model- selected based on Akaike information criteria.

Table 4.7: Omitted Variables: Squares of Fitted Values

	Value	Df	Probability
t-statistic	1.916039	7	0.0969
F-statistic	3.671207	(1, 7)	0.0969

Source: Own Computation using Eviews 9.0

The last diagnostic test is a test for omitted variable in the model using Ramsey's RESET test, which tests whether the model suffers from omitted variable bias or not. From the result, we failed to reject the null hypothesis of this test which says that the model is correctly specified, because the p-value is larger than the conventional significance value (0.09 > 0.05).

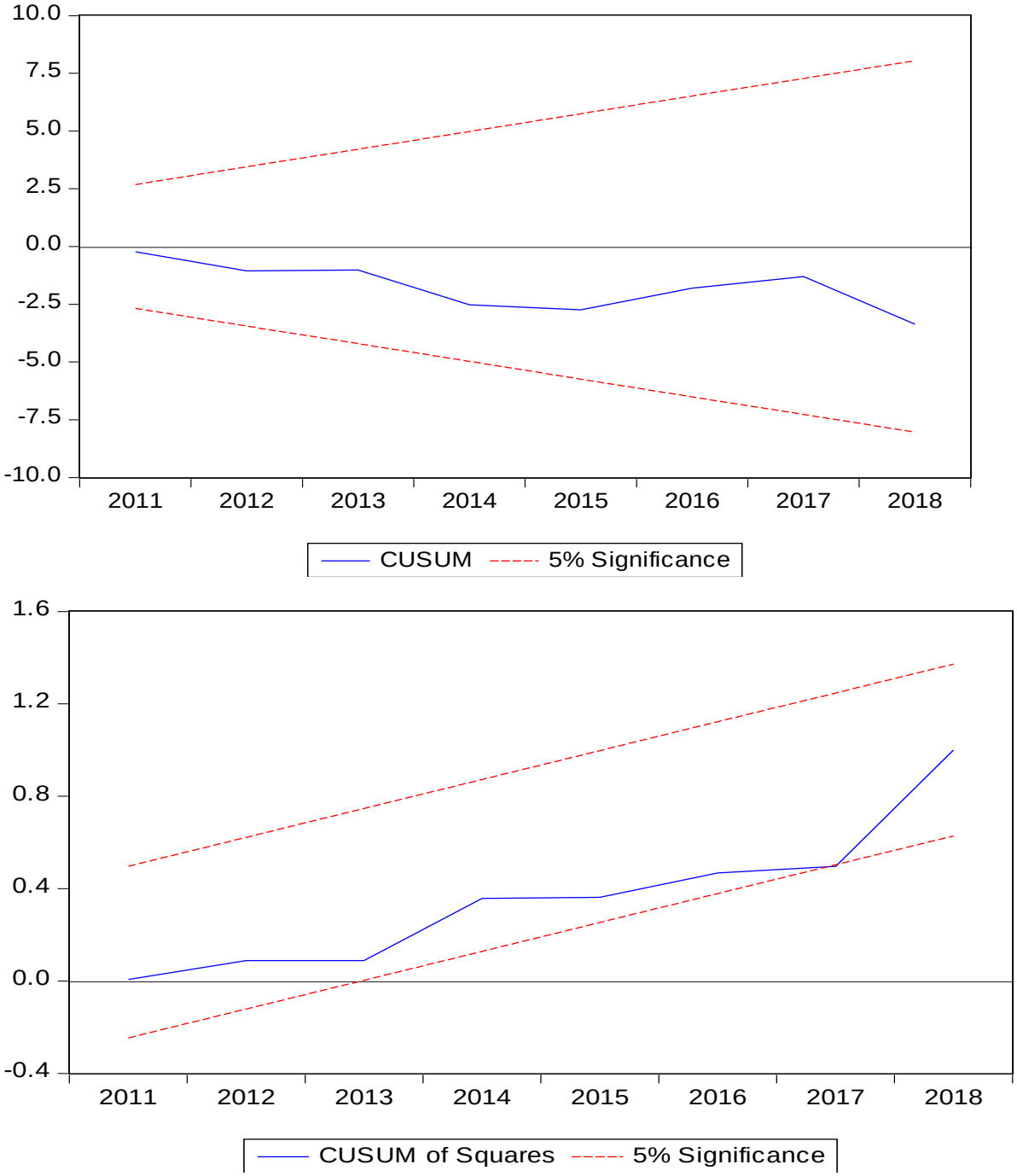
To conclude, the results indicate there is no serial correlation problem and the Ramsey functional form test confirms that the model is specified well. Likewise the errors are normally distributed and the model doesn't suffer from heteroskedasticity problem.

4.4.3.5. Model stability test for ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model

The stability of the model for long run and short run relationship is detected by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) tests. Pesaran and Shin (1997) suggested that structural stability of the long-run and short-run relationships for the entire period is better examined by the cumulative sum (CUMSUM) and the cumulative sum of squares(CUMSUMSQ) of the recursive residual test as proposed by (Brown et al, 1975) to assess the given parameter consistency. The null hypothesis of these tests is that the regression equation is correctly specified, if the cumulative sum goes outside the area (never returns back) between the two critical lines.

Figure 4.6 shows parameter stability test result conducted using CUSUM and CUSUMSQ tests for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model- selected based on Akaike information criteria.

Figure 4.6: Parameter Stability Test Results



Source: Own Computation using Eviews 9.0.

From Figure 4.6, the straight lines represent critical bounds at 5% significance level. The test guide line is that if the plotted CUMSUM and CUMSUMSQ graphs remain inside the straight lines the null hypothesis of correct specification of the model can be accepted. Otherwise, the

null hypothesis is rejected at 5 % level of significance and it can be concluded that the regression equation is miss-specified.

As it can be observed from the CUMSUM and CUMSUMSQ, the plots of CUMSUM and CUMSUMSQ stay within the lines, and, therefore, this confirms the equation is correctly specified and the model is stable. Furthermore, the results reveal that there is no structural instability in the model during the study period. The specified model or ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) seems to be good and robust in estimating the short run and long run relationships between foreign aid and economic growth in Ethiopia. In addition to the model stability test by CUMSUM and CUMSUMSQ, the model is also found to be robust because it's R-squared value and adjusted R-squared respectively are about 99.9% and 99.8% (See Table 4.8). This implies, when adjusted R-squared is considered, 99.8% of the model has been explained by the regressors. Hence the results of the estimated model are reliable and efficient.

Table 4.8: Alternative Model Stability Test

R-squared	0.999708	Mean dependent var	5.540333
Adjusted R-squared	0.998724	S.D. dependent var	0.364942
S.E. of regression	0.013038	Akaike info criterion	-5.790387
Sum squared resid	0.001360	Schwarz criterion	-4.558761
Log likelihood	132.2270	Hannan-Quinn criter.	-5.360516
F-statistic	1015.289	Durbin-Watson stat	2.083203
Prob(F-statistic)	0.000000		

Source:Own Computation Using Eviews 9.0

4.4.4. Co-integration test results

Once the stationarity properties of the variables under investigation, model stability and diagnostic tests are ascertained or checked, one can proceed to test the long-run relationship or co-integration among the variables under investigation using standard co-integration test (Bound Test). In addition to this, the long-run relationship can also be ascertained using the statistical significance of the error-correction term.

Table 4.9 shows co-integration tests for the selected full ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model-selected based on Akaike information criteria.

ARDL Bounds Test
Date: 09/14/20 Time: 15:08
Sample: 1983- 2018
Included observations: 36
Null Hypothesis: No long-run relationships exist

Table 4.9: ARDL Bounds Test Result

Test Statistic	Value	K
F-statistic	30.04696	9

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	1.88	2.99
5%	2.14	3.3
2.5%	2.37	3.6
1%	2.65	3.97

Source: Own Computation Using Eviews 9.0.

Testing for the existence of long run relationship among the model variables is carried out by using the bounds test approach (See Table 4.9). The null hypothesis of the test claims there is no long-run relationship between the variables under investigation, while the alternative is the opposite. As can be observed from the table, the calculated F-statistics is 30.04696and this value is higher than the upper bound critical values at 5% level of significance. The results indicate that there is strong evidence of long-run relationship or co-integration between GDP per capita and the remaining macro variables. Accordingly, the null hypothesis of no long-run relationship among the variables under study is rejected. Therefore, the existence of a long-run relationship between the model variables is confirmed.

4.4.5. Estimation Result

4.4.5.1. Long Run ARDL Model Estimation Result

After confirming the existence of long-run co-integration relationship among the variables, the next step is running the appropriate ARDL model to find out the long run coefficients. In the same token, once the long run relationship for the GDP per capita equation in Ethiopia is confirmed; that is after confirming the existence of a long-run relationship among log of GDP per capita, log of labor, log of capital stock, log of foreign aid, log of external debt, log of external debt servicing, log of openness, inflation rate and log of gross national saving, the next critical step is estimating the long-run coefficients of log of GDP per capita (lY_t) on its regressors. The estimated results of the long run coefficients of ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model selected based on AIC are reported on Table 4.10.

Table 4.10: Estimated Long Run Coefficients of ARDL Model

Dependent variable is lYt Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLT	1.394885	0.168497	8.278385	0.0000
LKT	0.878606	0.148118	5.931780	0.0003
LAIDT	-0.124178	0.037464	-3.314572	0.0106
LDT	-0.120607	0.050552	-2.385811	0.0441
LDST	0.042838	0.039686	1.079419	0.3119
LOPNT	-0.237966	0.119226	-1.995928	0.0810
INFT	0.006822	0.001902	3.586273	0.0071
LGNST	-0.530767	0.189778	-2.796770	0.0233
DD	-0.062760	0.058697	-1.069222	0.3162
C	-17.220021	2.707446	-6.360247	0.0002

Source: Own Estimation Using Eviews 9.0.

The estimated long-run coefficients of the growth equation can be interpreted as elasticities. The long-run results of the selected ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) model on Table 4.10 above indicates the explanatory variables labor, capital stock, external debt servicing and inflation rate are positively and statistically significantly related to economic growth in Ethiopia, whereas external debt stock is negatively and statistically significantly related with economic growth.

In the long-run, labor force has a significant positive impact on economic growth (per capita GDP) in Ethiopia (See Table 4.10). The long-run elasticity of per capita GDP with respect to labor force is 1.394885 or approximately 1.4. This implies, in the long-run, a 1 % change in the labor force leads to a 1.4 % change in per capita GDP in Ethiopia, keeping other things constant. In other words, in the long-run, for 1 % increase in the labor force, per capita GDP will increase by almost 1.4 % and vice versa in country under study, citrus paribus. This result supports the theory that an expansion and utilization of labor force is important in production. This finding is in line or consistent with the other past studies by Geredew A.(2017) who found a positive and significant impact of labor force on economic growth for Ethiopia when he investigated the impact labor force and other macroeconomic variables on economic growth in Ethiopia. The result also corroborates with the result of the studies by Tassew (2011) and Fentaye (2015) who found positive association between labour force and economic growth for Ethiopia in the long-run.

Similarly, the long-run estimation results confirm the theoretical conclusion that capital contributes positively to growth of per capita GDP since the coefficient of capital in the long run growth equation is positive and significant at 1 % level. This means that in the long run, increases in capital has the potential for stimulating growth in Ethiopia. From the results, the coefficient of capital (0.878606) indicated that a percent change in capital input results in a 0.8786 % changein real GDP per capita, ceteris paribus. The result is in line with the study by Frimpong (2008) who found positive relationship between physical capital stock and economic growth when he investigated the interlink age between foreign aid, physical capital stock and other macroeconomic variables with economic growth for Ghana.

On the other hand, there is no evidence to support the theory that aid promotes economic growth in the long-run since the coefficient of log of foreign aid is statistically significant and negative in explaining log of per capita GDP in Ethiopia (see Table 4.10). The long-run elasticity of economic growth with respect to foreign aid is -0.124178, implying a percent increase in foreign aid results in 0.124 % fall in real per capita GDP in the long-run. This result instead supports the hypothesis that foreign aid has been misused and misallocated and benefited the rent seeking segments of economy. Furthermore, the poor performance of aid in the long-run may be attributable to the form with which aid comes into the country. Donor conditionality sometimes

affects the efficient allocation of the loans and thus leads to poor impacts of aid on growth.it is well known that official development assistance (ODA) consists of disbursements of loans made on concessional terms and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients. It includes loans with a grant element of at least 25 percent (calculated at a rate of discount of 10 percent)(World Bank, 2020). Since foreign aid incorporates loans with a grant element of at least 25 percent, a substantial amount of aid inflows into the country over the years under consideration came in the form of loans which become liability in the long run as the debt must be serviced. Further, this result is also attributed to large amount of aid, which could have been allocated to unproductive investment which consequently reduced the productivity of investment. Political abuse of foreign aid, poor institutions and the unfavorable business environment may all play roles in negating the possible gains of foreign aid. Moreover, according to Osew (2012), the negative effect of aid on growth could be attributed to the following reasons: First, the fact that foreign aid may not be used for the intended purpose and may give rise to engagement in corrupt activities such as using foreign aid to sponsor political campaigns leading to the perpetuation of bad governments. Second, the embezzlement or use of foreign aid (which come in the form of loans) to enrich few political elites poses a great economic burden on receiving countries as repayment of principal and interests harm the growth of the economy, which might also the case in this study. The result is in accordance with the study by Girma H (2015) who found a negative long-run association between foreign aid and economic growth for Ethiopia. Furthermore, the present study result is in line with the result of other previous single country studies by Frimpong (2008) for Ghana, Siavhundi (2020) for Zimbabwe, Appiah et al (2016) for Ghana, Nestory (2008) for Tanzania and Abera et al (2018) for Ethiopia.

In the long-run, external debt stock coefficient is found to be negative and statistically significant at 1% level (see Table 4.10 above). This suggests that there is a negative relationship between external debt stock and the growth in output in Ethiopia. The long-run elasticity of GDP with respect to external debt stock is -0.120607. This indicates when the level of external debt stock change (increase/decrease) by 1 %, the level of per capita GDP change (decrease/increase) by 0.12 % in the country under analysis, other things remain constant. This significant negative

impact of public external debt on economic growth implies that, the greater the level of stock of public external debt, the more the economic growth worsens. This result partly reflects the use of public external borrowing (except capital linked loans) on non-productive activities and sectors and this is consistent with the literature. Moreover, a significant portion of public external debt proceeds to repay other past external debts rather than to boost capital investment in domestic economy. The result is consistent with the studies by Geredew (2017) and Abel (2016) who found significant negative relationship between public external debt stock and economic growth for Ethiopia in the long-run.

From the Table 4.10, it is observed that the coefficient of external debt servicing was found insignificant in affecting economic growth in the long-run. On the other hand, there is no evidence to support the theory of a long-run "crowding-out" effect of public external debt since the coefficient of external debt servicing is insignificant in explaining GDP per capita in Ethiopia. The result reveals that external debt servicing, that is fraction of the scarce resources which is transferred to foreign public debt payment, does not affect the development spending and hence economic growth in Ethiopia. It is consistent with a study made by Geredew (2017) for Ethiopia.

Furthermore, an unconventional result was obtained for openness to trade. Openness to trade is often theorized to raise growth through channels such as access to advanced technology from abroad, greater access to a variety of inputs for production and access to broader markets that raise the efficiency of domestic production through increased specialization. However, the results indicate the opposite. Openness to trade rather has a negative effect on economic growth.

This may arise in line with poor quality of institutions and weak exporting capacity of the country or large share of import content of the countries international trade participation. Further, as businesses often complain of losing out of competition as trade liberalization encourages the importation of cheaper commodities into the economy relative to locally manufactured ones. The results suggest that, in the long run, domestic producers in response to the increased foreign competition might have adopted some skill-biased technical change. Thus, trade liberalization worsens the income distribution, which in turn affected economic growth negatively. Thus a 1 percent increase in openness will reduce real per capita GDP by 0.23 percent, which is contrary to the theoretical proposition. The result is in line with the study by Frimpong (2008) who found

negative long-run relationship between openness to trade and economic growth for Ghana economy.

Another variable employed in explaining the economic growth equation is inflation and its coefficient also found to be positive and statistically significant. But, the coefficient of inflation rate is significant in a statistical sense but in economic sense it seems insignificant as it is approximately zero. The long-run elasticity of real per capita GDP with respect to inflation rate is 0.006822. Technically a 1 % change in inflation rate results in a 0.007 % change in per capita GDP in Ethiopia. Finally, the negative gross national saving coefficient for Ethiopia might be caused by high capital outflow. Ethiopia depends heavily on foreign aid and borrowing to meet its investment requirements. There is less saving and the economy depends on external resources to meet the investment requirements.

4.4.5.2. Short Run Error Correction Model

After the acceptance of long-run coefficients of the growth equation, the short-run ECM model is estimated. The error correction term (ECM), as it clearly discussed in methodology part, indicates the speed of adjustment to restore equilibrium in the dynamic model. It is a one lagged period residual obtained from the estimated dynamic long run model. The coefficient of the error correction term indicates how quickly variables converge to equilibrium. Moreover, it should have a negative sign and statistically significant at a standard significant level (i.e. p-value should be less than 0.05).

Table 4.11 shows Error Correction Representation for the Selected ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) selected based on AIC**.**

Table 4.11: Error Correction Model

Dependent variable: D(LYT) Co-integrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLT)	-9.058472	2.863954	-3.162925	0.0133
D(LLT(-1))	-2.360939	3.064179	-0.770496	0.4632
D(LKT)	0.150688	0.028507	5.286060	0.0007
D(LKT(-1))	-0.196026	0.036471	-5.374775	0.0007
D(LAIDT)	-0.141491	0.023935	-5.911426	0.0004
D(LAIDT(-1))	-0.111965	0.015783	-7.093955	0.0001
D(LDT)	0.028364	0.020930	1.355156	0.2124
D(LDT(-1))	0.053291	0.015251	3.494329	0.0081
D(LDST)	0.046455	0.015189	3.058491	0.0156
D(LDST(-1))	0.075055	0.011449	6.555782	0.0002
D(LOPNT)	0.086494	0.025904	3.338976	0.0102
D(LOPNT(-1))	0.129232	0.042103	3.069397	0.0154
D(INFT)	0.000320	0.000504	0.635832	0.5426
D(INFT(-1))	-0.001799	0.000398	-4.517628	0.0020
D(LGNST)	-0.113768	0.026673	-4.265234	0.0027
D(LGNST(-1))	0.079688	0.034168	2.332223	0.0480
D(DD)	-0.115183	0.032567	-3.536843	0.0077
ECM(-1)	-0.491010	0.074193	-6.618017	0.0002

Source: Own Calculation Using Eviews 9.0.

Contrary to the expectation and the long run result, the coefficient of the labor force variable is found to be negatively signed and statistically significant in the short-run. It is expected that additional labor adds to output but a rather unanticipated result is being obtained here. This indicates that the immediate impact of labor on economic growth is negative which presupposes the existence of unemployment and underemployment problem and also low level of productivity facing Ethiopia. Most developing economies in general and the Ethiopian economy in particular are based on land intensive agriculture which has limited employments and consequently limited income generation benefits for the country. Specifically, the results indicate

that a one percent increase in labor force reduces real per capita GDP by 9 %. The result is consistent with studies by Haile (2015) and Frimpong (2008) who found immediate negative association between labor force and economic growth for Ethiopia and Ghana, respectively. Capital sock has produced inconclusive and mixed result in the short-run. As theoretically expected, the coefficient of current capital stock has produced a result which is in line with the long-run equation implying a positive a role in promoting growth in the short run as well, while the one year lagged difference capital stock has a negative impact on economic growth. The result is in line with the study by Frimpong (2008) who found immediate positive relationship between economic growth and physical capital stock for Ghana.

Like the long-run result, the estimated short run coefficient of aid variable and its lag negatively affect economic growth in Ethiopia at 1% significance level. The result indicates that foreign aid is associated indirectly with economic growth. This indicates that the effect of foreign aid in Ethiopia under the study periods is permanent in both short-run and long-run.

Unlike the long-run result, the current estimated short-run external debt stock coefficient is found to have statistically insignificant effect. However, the one period lagged estimated external debt stock coefficient produced statistically significant positive association with economic growth in Ethiopia. This implies, debt stock has contributed for the country's economy immediately. The short-run positive impact of debt stock is might be related with current external debt (borrowing) inflows for Ethiopian economy, the result of which is an increase in debt financed public investment, the result of which is an increase in output and finally contribute to the economy. Current and one period lagged estimated external debt servicing coefficients are found to have positive effects in economic growth. The theoretical possible explanation is that many debtor countries used debt servicing as an instrument to exploit the creditor countries. Meaning, debtor countries use debt servicing to remain credit worthy and attract more debt from creditor countries to finance their gaps.

Unlike the long-run result, the estimated current and one year lagged openness to trade variables are found to have positive effects on economic growth in Ethiopia. Therefore, the result of the study validates the trade-led growth hypothesis in the case of Ethiopia in the short-run. This implies that a substantial portion of the economic expansion of Ethiopia is external. Therefore,

Ethiopia needs to further reduce trade barriers and promote international trade by reducing and simplifying procedures and controls. However, as it can be observed from long-run result, the impact of openness to trade is insignificant. The heavily dependence on international trade may be detrimental to fiscal sustainability and economic growth under the Prebisch–Singer law of decline in the terms of trade, this might be the reason for insignificance of the long-run impact of trade openness in Ethiopia. According to Prebisch–Singer law, the terms of trade have been continuously moving against the developing countries, like Ethiopia. In another words, the terms of trade had secular tendency to move against the primary products and in favour of the manufactured and capital goods. Ethiopian exports mainly primary products, which prices are unstable and determined on the international market, and the heavy dependence on these products might leads to deterioration of terms of trade in the long-run, the result of which is insignificance of the trade openness impact on economic growth. Therefore, for outward-oriented strategy to have much larger impact on economic growth, the country should modify the composition of trade by switching from exports of raw materials and semi-manufactured goods to high valued-added goods. Furthermore, trade policy should promote investments in capital intensive sectors and develop human capital that can absorb technologies coming from advanced countries to improve the long-run impact of openness to trade.

The coefficient of inflation in the short run is negative. The current year inflation coefficient is statically as well as economically insignificant whereas one period lagged inflation variable is statistically significant but from economic point of view its coefficient is insignificant. The results from one period lagged inflation variable suggest that if inflation goes up by 1 %, economic growth falls by -0.0018 %. Similar to long-run result, the estimated short-run coefficient of gross national saving is found to have negative effects on economic growth. The result is also statistically significant at 1 % level. Contrary to this, the one period lagged gross national saving positively affects the per capita GDP and also statistically significant at 1%. The last year saving might contribute current period per capita GDP because saving in the last year can be invested this year.

Major political change from the Derg to EPRDF (DD) 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 Derg to EPRDF, the country experienced a political unrest. Thus the result captures the influence of such political unrest on growth in the short run. The coefficient of major shifts in government from the Derg to EPRDF regime is statistically significant and has a negative sign, showing the immediate negative impact of political unrest.

The speed of adjustment of any disequilibrium towards long-run equilibrium or the equilibrium error correction coefficient (ECM), estimated (-0.491010) is statistically significant and has the expected correct sign. It implies a medium adjustment to equilibrium after a shock. Approximately 49 % of the disequilibrium from the previous year's shock converges back to the long-run equilibrium in the current year and such highly significant error correction term is another proof for the existence of a stable a long-run equilibrium relationship among the variables.

Chapter Five

Conclusion and Policy Implications

5.1 Conclusion

The present study examines how foreign aid influenced economic growth in Ethiopia over the period 1981-2018.It also investigated the variables in the model that are responsible in affecting economic growth both in the short-run and long-run. In order to analyze the short-run and long-run effects of the regressors, the study utilized the ARDL model since it provides the long-run and short-run estimates simultaneously. It also accommodates the variables with mixed order of integration but not beyond integrated of order one. The study tested the integration order and co-integration of the variables under consideration. The integration order of the variables under study was ascertained by utilizing Augmented Dickey-Fuller (ADF) unit root test and the tests showed that the variables under study have mixed order of integration (I(1) and I(0)) and none of the variables were integrated of order two).

The bound-test and the statistical significance of the error-correction term were used to check the long-run relationship between the variables. Furthermore, the results of bound-test and the statistical significance of the error-correction term also show a strong evidence of long-run relationship between the variables. Akiake Information Criteria (AIC) was utilized in order to select the optimal lags for the model and the result suggested ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) is best model to be estimated. The study further conducted a number of standard model diagnostics tests to establish the efficiency of the model and the results were reassuring and confirming the overall significance of the model.

In the long-run ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) estimation, the study found a negative and statistically significant relationship between foreign aid and economic growth in Ethiopia. Other model variables labor, capital stock, external debt servicing and inflation rate are positively and statistically significantly related to economic growth in Ethiopia. Further, the study reveals external debt stock, openness to trade, and saving were negatively and statistically significantly related with economic growth. All the variables in the long run are inelastic, except labor. From the short-run ARDL (1, 2, 2, 2, 2, 2, 2, 2, 2, 1) estimation, foreign aid coefficient was found to be negative which is in line with the long-run result. This implies the effect of foreign aid in Ethiopia under the study periods is permanent in both short-run and long-run.

5.2. Policy implications

The long-run and short-run negative impact of foreign aid to economic growth may imply that Ethiopia needs not to depend on foreign aid as this dependency instead retards economic progression. Alternatively, aid may not be a problem on its own but root problems may related to a number of issues such as the quality of institutions that are expected to complement the effectiveness of foreign aid. Thus, the results of study imply the following policy inputs to be considered.

- There is a need for the government and responsible authorities to relook at and improve the implementation of foreign aid induced projects.
- The Ethiopian government ought to channel foreign aid to more productive sectors such as industry development, infrastructure as well as human capital development.
- The Ethiopian government needs to establish strong institutions, avoiding dependency on foreign aid through well-structured domestic resource mobilization initiatives, proper engagement of the donor community as well as accurate channeling of foreign aid resources to productive and growth enhancing economic sectors.
- The Ethiopian government should put in place appropriate fiscal and monetary policies to steer the economy to a sustained growth. This view is contingent upon the fact foreign aid is found to stimulate economic growth under proper fiscal and monetary policies.
- Cognizant of the immediate negative impact of dummy variable capturing government transmission of power to promote economic growth, there is a need to transfer political power peacefully aiming boosting the growth performance of the country's economy.

5.3. Practical Limitations & Further Research

The major limitation the study encountered, typical of such studies in developing countries, was quality and limited availability of data on some of the key variables used in estimating the growth model. An attempt to extend the data length to 2019 or further was constrained by unavailability of these macro series from domestic official sources as the researcher had to fall on mainly foreign sources such as the World Bank, IMF, among others at a huge financial expense.

References

Abeba S (2002). Macroeconomic Impacts of External Assistance in Ethiopia. A Thesis Submitted to the School of Graduate Studies of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Science in Economic Policy Analysis in Department of Economics.

Abel M.H. (2016). The Relationship between National Saving and Economic Growth in Ethiopia: ARDL and Granger Causality Approaches. School of Graduate Studies. The Department of Economics. Addis Ababa University.

Abera. G, Wondeferew. M and Jibril.H.(2018). Foreign Aid and Economic Growth in Ethiopia: The Two Gap Model Approach. Horn of Africa Journal of Business and Economics (HAJBE).Vol 1(1), PP: 16-30. ISSN:2617-0078.

Adamu, P. A. (2013). The Impact of Foreign Aid on Economic Growth in ECOWAS Countries: A Simultaneous-equation Model(No. 2013/143). WIDER Working Paper.

Ang, J.B. (2007), "Financial Deepening and Economic Growth in Malaysia", Asian Business and Economics Research Unit Discussion Paper No 42, Caulfield, Australia, Department of Economics, Monash University.

Appiah-Konadu, P., Junior, F. S., Eric, A., &Twerefou, D. K. (2016).The Effect of Foreign Aidon Economic Growth in Ghana. African Journal of Economic Review, 4(2), 248-261

Arndt, C., Jones, S. and Tarp, F. (2015) Assessing Foreign Aid's Long-Run Contribution to Growth and Development. World Development, 69, 6-18.

Arvin, B. M. (1999). Foreign Aid and Economic Growth: Brook field, Vermont, Ashgate, 1998. Canadian Journal of Development Studies, 20 (3), 627-629.

Bacha, E. L. (1990). A Three-Gap Model of Foreign Transfers and the GDP Growth Rate in Developing Countries. Journal of Development Economics, 32 (2), 279-296.

Bauer, P. T. (1972) Dissent on Development: Studies and Debates in Development Economics. London

Boone, P. (1996) Politics and the Effectiveness of Foreign Aid. European Economic Review, 40 (2), 289-329

Brautigam, D. & Knack, S., (2004). Foreign Aid, Institutions, and Governance in Sub-Saharan Africa. Economic Development and Cultural Change, Volume 52(2), p. 255–285.

Burnside C. and D. Dollar (1997), Aid, Policies and Growth, Policy Research Working Paper 1777, The World Bank, Development Research Group, Washington, D. C.

Burnside, C. and Dollar, D. (2000) Aid, Policies, and Growth. The American Economic Review, 90 (4), 847-868.

Chaudhry, M. and M. Choudhary (2006), "Why the State Bank of Pakistan Should not Adopt Inflation Targeting", SBP-Research Bulletin, Volume 2, number 1: pp196-209.

Chenery, H. B. and Strout, A. M. (1966).Foreign Assistance and Economic Development.The American Economic Review, 679-733.

Chong,C.K., Zheng,T.J. &Tiong, L.W. (2010). Foreign aid, policy effectiveness and economic growth in Tanzania.

Clements,B, Rina Bhattacharya, and ToanQuoc Nguyen (2003), "External Debt, Public Investment, and Growth in Low-Income Countries", IMF Working Paper WP/03/249.

Clemens, M. A., Radelet, S., Bhavnani, R. R. and Bazzi, S. (2012) Counting Chickens When They Hatch: Timing and The Effects of Aid on Growth. The Economic Journal, 122 (561), 590-617.

Cunningham, R., (1993), "The Effects of Debt Burden on Economic Growth in Heavily Indebted Nations", Journal of Economic Development, 18 (1), June, 115-126.

Delessa, K. (2012). The Impact of Foreign Aid on Economic Growth of Ethiopia (Doctoral Dissertation).

Easterly, W. (2003) 'Can Foreign Aid Buy Growth?' Journal of Economic Perspectives 17 (3): 23-48

Easterly, W. (2014) The Tyranny of Experts. New York: Basic Civitas Books.

Ejigu, (2015).The Impact of Foreign Aid on Economic Growth of Ethiopia (Through Transmission Channels), s.l.: unpublished master's thesis.

Fazily, Mohammad Rahman. (2014, December 12). Official Development Assistance (ODA) and Economic Growth in Afghanistan. Economics of Development (ECD). Retrieved fromhttp://hdl.handle.net/2105/17367

Feeny, S .and M. McGillivray (2008), Aid Allocation to Fragile States: Absorptive Capacity Constraints, Journal of International Development, 20(7), 1 03 1 - 1 05 0.

Fentaye, S. (2015).The Impact of Foreign Aid on Economic Growth of Ethiopia (Through Transmission Channels).International Journal of Business and Economics Research, Volume Vol. 4, No. 3, pp. 121- 132.

Fissha, Sintayehu, "Aid, Growth and Poverty Alleviation in Ethiopia" (2007).International Conference of African Development Archive. 117. Available on: https://scholarwork.wmich.edu/africancenter -lead-archive/117

Frimpong ,P.B. (2008). Foreign Aid and Economic Growth in Ghana (1970-2005).School of Graduate Studies. Department of Economics. Kwame Nkrumah University of Science and Technology, Kumasi.

Geredew, A. (2016). The Relationship between Public External Debt and Economic Growth in Ethiopia: Evidence from ARDL Approach to Co-integration. School of Graduate Studies. The Department of Economics. Addis Ababa University.

Gomanee K., Girma S. and Morrissey O. (2015), "Aid and Growth in Sub Saharan Africa: Accounting for Transmission Mechanisms", Research paper No. 2005/60, United Nation University.

Griffin K. (1970), Foreign Capital: A Reply to Some Critics, Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 32, No. 2, pp. 156-161.

Griffin, K. B. and Enos, J. L. (1970) Foreign Assistance: Objectives and Consequences. Economic Development and Cultural Change, 313-327.

Gupta & Islam, (1983).Foreign Capital, Savings, and Growth: An International Cross- Section Study, Boston: Boston, D.Riedel Publishing Company.

Gujarati.(2004), "Basic Econometrics", McGraw-Hill Companies, 4th edition.

Haile G. (2015). The Impact of Foreign Aid on Economic Growth: Empirical Evidence from Ethiopia (1974-2011) using ARDL Approach. Journal of Research in Economics and International Finance (JREIF) (ISSN: 2315-5671) Vol. 4(1) pp. 1 - 12,

Hansen, H. and Tarp, F. (2000) Aid Effectiveness Disputed. Foreign Aid andDevelopment: Lessons Learnt and Directions for the Future, 103-128.

Hansen, H. and Tarp, F. (2001) Aid and Growth Regressions. Journal of Development Economics, 64 (2), 547-570.

Harris, R. and R. Sollis (2003), "Applied Time Series Modeling and Forecasting", DurhamUniversity, West Essex, England: John Wiley & Sons Ltd.

Julius, k., Moller,N.F., Tarp,F. (2014). The Long-run impact of foreign aid in 36 African countries: Insights from Multivariete time series analysis.

Karagol E. (2002), "The Causality Analysis of External Debt Service and GNP: The Case of Turkey", Central Bank Review, Vol. 2, No. 1, PP. 39-64.

Karras., G.(2006). Foreign Aid and Long-run Economic Growth: Empirical Evidence for a Panel of Developing countries. Journal of International Development, Volume 18 No 7, pp. 15-28.

Krugman P, (1988), "Financing vs. Forgiving a Debt Overhang," Journal of Development Economics, Vol. 29, pp. 253-268.

Mcgillivray, M. and Morrissey, O. (2000) Aid Fungibility in Assessing Aid: Red Herring or True Concern? Journal Of International Development, 12 (3), 413-428.

Moreira, S. B. (2005) Evaluating the Impact of Foreign Aid on Economic Growth: A Cross Country Study.

Mosley, P. (1987). 'Aid, Savings and Growth Revisited'. Bulletin of the Oxford University Institute of Economics and Statistics 42.79-95.

Murshed M. and Mustari M.K. (2014).Impact of Foreign Aid in the Economic Growth of Recipient Country. Journal of the Bangladesh Association of Young Researcher (JBAYR); Volume 2, number 1. ISSN;1991-0746(print), ISSN 2220-119X (online).

Narayan, P. (2005), "The Saving and Investment Nexus for China: Evidence from Co-integration Tests", Applied Economics, 37: pp1979-1990.

NBE (2018).Annual Report, National Bank of Ethiopia. Addis Ababa.

Nestory, C. K(2008). Foreign Aid and Economic Growth: The Case of Tanzania. Graduate School of Development Studies, The Hague, The Netherlands

Oakland institute report (2013). Development Aid to Ethiopia. Overlooking Violence, Marginalization and Political Repression. A Publication of the Oakland Institute, USA.

Papanek, G. F. (1973) Aid, Foreign Private Investment, Savings, and Growth in Less Developed Countries. The Journal of Political Economy, 120-130.

Pesaran, H. and Y. Shin (1999), "An Autoregressive Distributed Lag Modeling Approach to Co-integration Analysis", Cambridge, England.

Pesaran, H., Shin,Y., and R. Smith (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", Journal of Applied Econometrics, 16(3):1924-1996.

Rahimi, M. and A. Shahabadi (2011), "Trade Liberalization and Economic Growth in Iranian Economy", Bu-Ali Sina University, Hamedan, Iran. Available at: <http://ssrn.com/abstract > (accessed on February 25, 2013).

Rajan, R. (2005a) Aid and Growth: The Policy Challenge. Finance and Development, 42(4), 53-55.

Rajan, R., & Subramanian, A. (2008). Aid and Growth: What Does Cross Country Evidence Really Show? Review of Economics and Statistics, 90(4): 643-665.

Rajan, R., & Subramanian, A. (2005). What Undermine Aid's Impact on Growth. IMF Working Paper, 05-126.

Rajan, R. and Subramanian, A. (2015). "Aid and Growth: What Does the Cross-Country Evidence Really Show?" The Review of Economics and Statistics, 90(4): 643-665.

Riddell R C (2007). Does Foreign Aid Really Work? New York: Oxford University Press.

Rosenstein-Rodan, P. N. (1961) International Aid for Underdeveloped Countries. The Review of Economics and Statistics, 107-138.

SadiaShabbir and Hafiz M. Yasin (2015), "Implications of Public External Debt for Social Spending: A Case Study of Selected Asian Developing Countries", The Lahore Journal of Economics, Volume 20 No. 1 pp. 71–103.

Shuaib, I. M and Dania Evelyn Ndidi (2015), Capital Formation: Impact on the Economic Development of Nigeria. European Journal of Business, Economics and Accountancy, Vol. 3, No. 3, ISSN 2056-6018.

Siavhundu.J.(2020). Foreign aid-Economic growth nexus: An empirical study of the Zimbabwean case. PM World Journal, Vol. IX, Issue IV, ISSN:2330-4480.

Tasew, T. (2011).Foreign Aid and Economic Growth in Ethiopia, Munich: Munich Personal RePEc Archive.

Tarp, F. and Hjertholm, P. (2000) Foreign Aid and Development: Lessons Learnt and Directions for the Future. New York; London: Routledge.

Tolessa A. (2001), "The Impact of Foreign Aid on Domestic Saving, Investment and Economic Growth: The Case of Ethiopia", Unpublished M.Sc. Thesis, AAU.

Udoh, E. and U. Ogbuag (2012), "Financial Sector Development and Industrial Production in Nigeria", An ARDL Co-integration Approach. Journal of Applied Finance &Banking, Volume 2 (4): P49-68.

Wondwossen T. (2003), "An Empirical Investigation of the Aid-growth Relationship in Ethiopia." Unpublished M.Sc. thesis, AAU.

WB (2012).Document of the World Bank. Report number-71884-ET.

WB (2019). World Development Indicators database, World Bank. Washington, DC.

WB (2020). World Development Indicators Database, World Bank. Washington, DC.

WB(2020).Ethiopia Overview. Retrieved from http://www.worldbank.org/en/country/ethiopia/overview.

Yohannes, B.(2011). The Impact of Foreign Aid on Economic Growth in Ethiopia Accounting for Transmission Mechanism, s.l.: Unpublished Msc. Paper Submitted to Addis Ababa University Department of Economics.

APPENDICES

Appendix 1: Correlation matrix of the model variables

	YT	LT	KT	AIDT	DT	DST	OPNT	INFT	GNST
YT	1.000000	0.874752	0.920862	-0.327519	0.785489	0.882804	0.383188	0.220434	0.830678
LT	0.874752	1.000000	0.904813	0.093927	0.683410	0.716905	0.699950	0.308037	0.936511
KT	0.920862	0.904813	1.000000	-0.089083	0.687096	0.766944	0.572734	0.170037	0.918822
AIDT	-0.327519	0.093927	-0.089083	1.000000	-0.284108	-0.379813	0.530134	0.171063	0.112306
DT	0.785489	0.683410	0.687096	-0.284108	1.000000	0.922193	0.048420	0.001389	0.602740
DST	0.882804	0.716905	0.766944	-0.379813	0.922193	1.000000	0.099822	0.058787	0.648815
OPNT	0.383188	0.699950	0.572734	0.530134	0.048420	0.099822	1.000000	0.325683	0.739994
INFT	0.220434	0.308037	0.170037	0.171063	0.001389	0.058787	0.325683	1.000000	0.300376
GNST	0.830678	0.936511	0.918822	0.112306	0.602740	0.648815	0.739994	0.300376	1.000000

	LYT	LLT	LKT	LAIDT	LDT	LDST	LOPNT	INFT	LGNST
LYT	1.000000	0.788949	0.882621	-0.286156	0.503221	0.794605	0.461654	0.241682	0.749049
LLT	0.788949	1.000000	0.841166	0.275337	0.522599	0.599008	0.774557	0.315813	0.930517
LKT	0.882621	0.841166	1.000000	0.004114	0.456676	0.696382	0.662039	0.134726	0.877163
LAIDT	-0.286156	0.275337	0.004114	1.000000	-0.063544	-0.307654	0.467559	0.209067	0.287723
LDT	0.503221	0.522599	0.456676	-0.063544	1.000000	0.773881	0.052122	-0.058770	0.450010
LDST	0.794605	0.599008	0.696382	-0.307654	0.773881	1.000000	0.146737	0.051434	0.562505
LOPNT	0.461654	0.774557	0.662039	0.467559	0.052122	0.146737	1.000000	0.230422	0.830565
INFT	0.241682	0.315813	0.134726	0.209067	-0.058770	0.051434	0.230422	1.000000	0.259412
LGNST	0.749049	0.930517	0.877163	0.287723	0.450010	0.562505	0.830565	0.259412	1.000000

Appendix 2: Augmented Dickey Fuller (ADF) unit root tests of the model variables under consideration

Null Hypothesis: LYT has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.645067	0.9734
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LYT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.014702	0.9998
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

Null Hypothesis: LYT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.803437	0.9561
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LYT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.765648	0.0004

Test critical values:	1% level	-2.630762
	5% level	-1.950394
	10% level	-1.611202

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LYT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.155468	0.0025
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LYT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.272852	0.0007
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LLT has a unit root
Exogenous: None
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.569941	0.9997
Test critical values:	1% level	-2.641672	
	5% level	-1.952066	
	10% level	-1.610400	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LLT has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.761182	0.9995
Test critical values:	1% level	-3.661661	

	5% level	-2.960411
	10% level	-2.619160

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LLT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.677423	0.7406
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LLT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.774532	0.8764
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LLT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.729466	0.0790
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LLT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.788603	0.0309
Test critical values:	1% level	-4.284580	

	5% level	-3.562882
	10% level	-3.215267

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LKT has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.158699	0.9334
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LKT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.314930	0.6124
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LKT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.412105	0.0651
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LKT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.663638	0.0000
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	

	10% level	-1.611202

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LKT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.803798	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LKT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.799456	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LAIDT has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.054577	0.6580
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LAIDT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.142035	0.2302
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LAIDT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.657202	0.7499
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LAIDT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.480561	0.0000
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LAIDT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.442427	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LAIDT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.305217	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDT has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.637091	0.9730
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.462123	0.5413
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.578129	0.7824
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.934994	0.0000
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.028855	0.0002
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.966622	0.0015
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDST has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.510680	0.9653
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDST has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.355771	0.9065
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LDST has a unit root
Exogenous: Constant, Linear Trend

Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.936273	0.9407
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDST) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.693747	0.0000
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDST) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.933055	0.0000
Test critical values:	1% level	-3.626784	
	5% level	-2.945842	
	10% level	-2.611531	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LDST) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.002049	0.0001
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOPNT has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*

Augmented Dickey-Fuller test statistic		-0.972838	0.2898
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	
	10% level	-1.611339	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOPNT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.504488	0.5203
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LOPNT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.816742	0.6763
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOPNT) has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.597662	0.0000
Test critical values:	1% level	-2.630762	
	5% level	-1.950394	
	10% level	-1.611202	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOPNT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.549648	0.0000
Test critical values:	1% level	-3.626784	

	5% level	-2.945842
	10% level	-2.611531

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LOPNT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.528200	0.0000
Test critical values:	1% level	-4.234972	
	5% level	-3.540328	
	10% level	-3.202445	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INFT has a unit root
Exogenous: None
Lag Length: 2 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.029800	0.2670
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INFT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.409981	0.0012
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INFT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.691532	0.0030
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	

	10% level	-3.200320

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INFT) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.149111	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INFT) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.019749	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INFT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.885973	0.0000
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LGNST has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		0.556916	0.8319
Test critical values:	1% level	-2.628961	
	5% level	-1.950117	

	10% level	-1.611339

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LGNST has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.413529	0.5652
Test critical values:	1% level	-3.621023	
	5% level	-2.943427	
	10% level	-2.610263	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LGNST has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.122534	0.0010
Test critical values:	1% level	-4.226815	
	5% level	-3.536601	
	10% level	-3.200320	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LGNST) has a unit root
Exogenous: None
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.162746	0.0000
Test critical values:	1% level	-2.632688	
	5% level	-1.950687	
	10% level	-1.611059	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LGNST) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.636774	0.0000
Test critical values:	1% level	-3.632900	
	5% level	-2.948404	
	10% level	-2.612874	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LGNST) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=9)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.534204	0.0000
Test critical values:	1% level	-4.243644	
	5% level	-3.544284	
	10% level	-3.204699	

*MacKinnon (1996) one-sided p-values.

Appendix 3: Long and Short Run Estimation Results

ARDL Cointegrating And Long Run Form
Dependent Variable: LYT
Selected Model: ARDL(1, 2, 2, 2, 2, 2, 2, 2, 2, 1)
Date: 09/14/20 Time: 15:06
Sample: 1981 2018
Included observations: 36

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LLT)	-9.058472	2.863954	-3.162925	0.0133
D(LLT(-1))	-2.360939	3.064179	-0.770496	0.4632
D(LKT)	0.150688	0.028507	5.286060	0.0007
D(LKT(-1))	-0.196026	0.036471	-5.374775	0.0007
D(LAIDT)	-0.141491	0.023935	-5.911426	0.0004
D(LAIDT(-1))	-0.111965	0.015783	-7.093955	0.0001
D(LDT)	0.028364	0.020930	1.355156	0.2124
D(LDT(-1))	0.053291	0.015251	3.494329	0.0081
D(LDST)	0.046455	0.015189	3.058491	0.0156
D(LDST(-1))	0.075055	0.011449	6.555782	0.0002
D(LOPNT)	0.086494	0.025904	3.338976	0.0102
D(LOPNT(-1))	0.129232	0.042103	3.069397	0.0154
D(INFT)	0.000320	0.000504	0.635832	0.5426
D(INFT(-1))	-0.001799	0.000398	-4.517628	0.0020
D(LGNST)	-0.113768	0.026673	-4.265234	0.0027
D(LGNST(-1))	0.079688	0.034168	2.332223	0.0480
D(DD)	-0.115183	0.032567	-3.536843	0.0077
CointEq(-1)	-0.491010	0.074193	-6.618017	0.0002

Cointeq = LYT - (1.3949*LLT + 0.8786*LKT -0.1242*LAIDT -0.1206*LDT + 0.0428*LDST -0.2380*LOPNT + 0.0068*INFT -0.5308*LGNST -0.0628 *DD -17.2200)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LLT	1.394885	0.168497	8.278385	0.0000

LKT	0.878606	0.148118	5.931780	0.0003
LAIDT	-0.124178	0.037464	-3.314572	0.0106
LDT	-0.120607	0.050552	-2.385811	0.0441
LDST	0.042838	0.039686	1.079419	0.3119
LOPNT	-0.237966	0.119226	-1.995928	0.0810
INFT	0.006822	0.001902	3.586273	0.0071
LGNST	-0.530767	0.189778	-2.796770	0.0233
DD	-0.062760	0.058697	-1.069222	0.3162
C	-17.220021	2.707446	-6.360247	0.0002

Appendix 4: Bound test result for co integrating relationship

ARDL Bounds Test
Date: 09/14/20 Time: 15:08
Sample: 1983 2018
Included observations: 36
Null Hypothesis: No long-run relationships exist

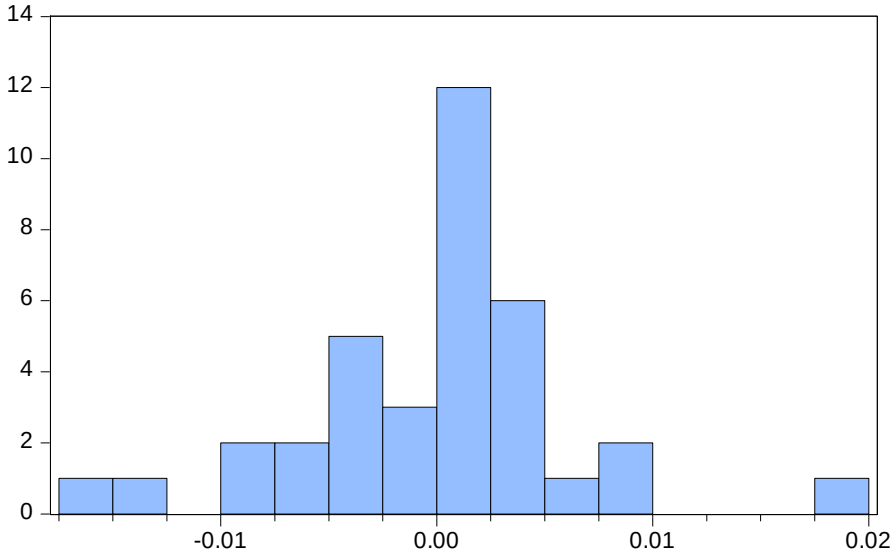
Test Statistic	Value	k
F-statistic	30.04696	9

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	1.88	2.99
5%	2.14	3.3
2.5%	2.37	3.6
1%	2.65	3.97

Appendix 5: Diagnostic Tests of the Model.

a) Normality test



Series: Residuals	
Sample 1983 2018	
Observations 36	
Mean	-2.71e-15
Median	0.001708
Maximum	0.017791
Minimum	-0.016340
Std. Dev.	0.006233
Skewness	-0.100205
Kurtosis	4.459336
Jarque-Bera	3.254740
Probability	0.196446

b) Serial correlation tests

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.725997	Prob. F(2,6)	0.2558
Obs*R-squared	13.14768	Prob. Chi-Square(2)	0.0014

c) Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

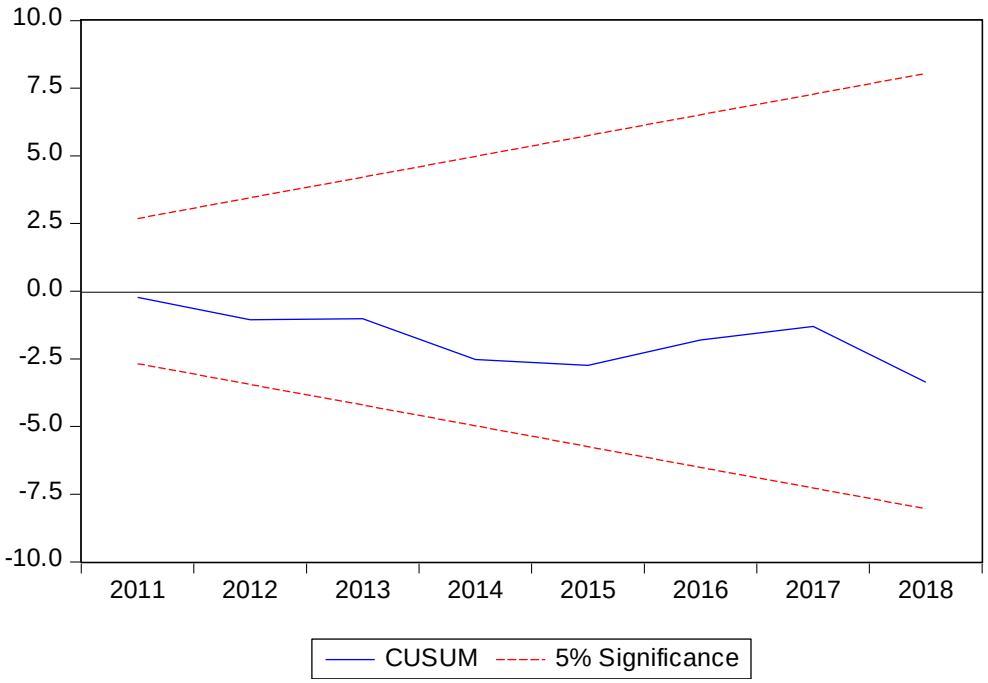
F-statistic	1.037576	Prob. F(27,8)	0.5162
Obs*R-squared	28.00323	Prob. Chi-Square(27)	0.4108
Scaled explained SS	2.391916	Prob. Chi-Square(27)	1.0000

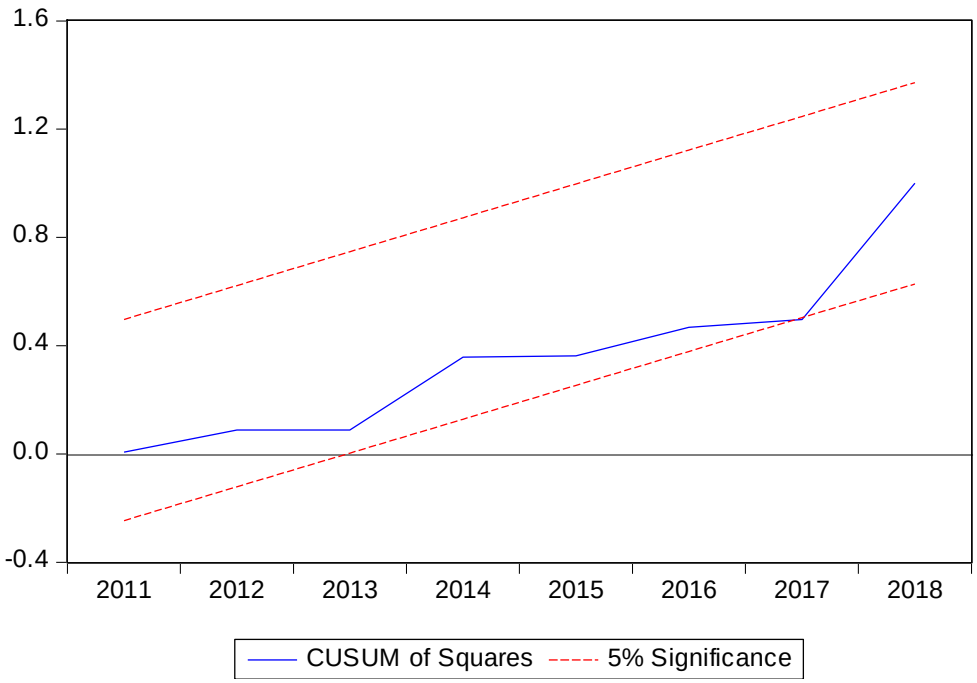
d) Misspecification test

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.916039	7	0.0969
F-statistic	3.671207	(1, 7)	0.0969

e) Stability test


10.0
7.5
5.0
2.5
0.0
-2.5
-5.0
-7.5
-10.0
2011
2012
2013
2014
2015
2016
2017
2018
CUSUM
5% Significance


1.6
1.2
0.8
0.4
0.0
-0.4
2011
2012
2013
2014
2015
2016
2017
2018
CUSUM of Squares
5% Significance