WOLKITE UNIVERSITY

COLLEGE OF BIUSSNES AND ECONOMICS

DEPARTMENT OF ECONOMICS

THE IMPACT OF FOREIGN AID ON AGRICALTURAL GROWTH IN ETHIOPIA

A TIME SERIES ANALYSIS

A thesis submitted to the Department of Economics in Partial fulfilment of the requirements for the Degree of Master Science in Economics (DEVELOPMENTAL ECONOMICS)

By

Abdulhake Teni

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APPROVAL SHEET-1

This is to certify thatthe thesis entitled "The impact of foreign aid on agricultural growth in Ethiopia**"**submitted in [partial] fulfillment of the requirements for the degree of master of science with specialization in development economics of the requirements for the Economics program, college of business and department of economics, and is a record of original research carried out by Abdulhake Teni under my supervision, and no part of the thesis has been submitted for any other degree or diploma.

The assistance and help received during the thesis of this investigation have been duly could be acknowledged. Therefore, it follows the recommendation that, it can be accepted as fulfilling the thesis requirements.

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The undersigned, and members of the Board of Examiners of the final open defense, we certify that we have read and evaluate the thesis prepared by Abdulhake Teni and examined candidate. We recommend that it can be accepted as fulfilling the thesis requirement of the Degree of Master of Science in Economics (Development Economics)

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Final approval and acceptance of the thesis is reliant upon the submission of the final copy of the thesis to the school of graduate studies through the candidate's department.

Declaration

I, the undersigned, declare that this project work is my original work and has not been presented, in part or whole, in any other university or college. All sources of the materials used for this project work have been duly acknowledged.

Declared By:

Name: ABDULHAKE TENI

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Date: _____

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Lists of Acronym and Abbreviation

AIC	Akaike's information criterion
ADF	Augmented Dickey-Fuller
BIC	Schwarz's Bayesian information criterion
DAC	Development Assistance Committee
DAG	Development Assistance Group
DF	Dickey Fuller
ECM	Error Correction Mechanism
FDI	Foreign Direct Investment
FA	Foreign Aid
FAO	Food and Agriculture Organization
GNI	Gross National Income
GDP	Gross Domestic product
HIPCO	Highly Indebted Poor Country
IMF	International Monetary fund
LDC	Low Developed Countries
MOFED	Ministry of Finance and Economic Development
NEPAD	New Partnerships for African Development
NGO	Non-Governmental Organization
OA	Official Assistance
OECD	Organization for Economic Cooperation and development
OLS	Ordinary Least Square
SSA	Sub-Saharan Africa

US	United States
UK	United Kingdom
USAID	United States Agency for International Development
UNICEF	United Nations Children's Fund
VAR	Vector Auto Regressive
VECM	Vector Error Correction Model
WB	World Bank

Abstract

The study has empirically examined the impact of foreign aid on Agricultural growth in Ethiopia over the period 1974/75 to 2015/16 using time series analysis. The main hypothesis of the study is that foreign aid has an impact on agricultural growth of Ethiopia. To test this hypothesis an empirical model is estimated using Johansen cointegration test and Vector Error Correction model (VECM) as the estimation techniques to estimate the long run and short run relationship. The empirical result from the statistical analysis shows that foreign aid has negative insignificant impact on agricultural growth in the long run and also arable land, capital investment, labour and government expenditure on agriculture sector have positive significant impact on agricultural growth in the long run. The result of the study reveals that foreign aid which is directly given to agricultural sector for agricultural growth has a long-run relationship according to the Johansen cointegration test. The most important policy implication of the result is that arable land capital investment labour and government expenditure is crucial to increase agricultural growth of Ethiopia both in both long run and short run than encourage direct foreign aid in agricultural sector.

Keywords: foreign aid, agricultural growth, Cointegration, Vector error correction model (VECM), Ethiopia.

CHAPTER ONE

1. INTRODUCTION

1.1 Back ground of the Study

Foreign aid can be simply defined as economic assistance provided to one country by another country or organization. It can be given for economic, political or humanitarian purposes and can be classified as loans and grants, bilateral and multilateral aid or tied and untied aid. Two prominent areas of concern in recent economic development literature are the effectiveness of foreign aid and the impact of different types of aid on poverty (Ozgur, 2008).Until 1980s and early 1990s, the volume and share of total aid for agriculture was declining. The Food and Agriculture Organization of the United Nations (FAO) reports that in 2014 donors provided only 5 percent of total development assistance to projects in the Agriculture, Forestry and Fishing sector, down from 9 percent in the mid-1990s. However, since 2001 there has been a rehabilitated donor interest in agriculture especially in Africa (John et al, 2017).

Foreign aid on concessional terms is often channelled to developing countries, either directly or indirectly through multilateral institutions or private voluntary organizations for the purpose of supporting social and economic development. Specifically, aid contributes to economic development in two ways. First, aid can accelerate the attainment of a steady state potential growth rate by a country with limited capital. Second, aid can improve a country's ultimate steady growth rate because it brings transfer of technology (knowhow) and encourages good governance and (Patricia, 2013).

Since the end of World War II, official development assistance (ODA) or "foreign aid" has been one of the most prominent policy tools used by advanced economies to induce security, growth, and equity outcomes in developing countries. The Organisation for Economic Co-operation and Development (OECD) defines ODA as government aid designed to promote the economic development and welfare of developing countries. This source of external finance comes in the form of bilateral grants, loans, food aid, emergency relief, technical assistance, financing for construction projects, as well as multilateral flows.(Kin-Boon and Diya,2017).Thus, growth in the agricultural sector would be more pro-poor in the rural areas of developing countries than growth in the non-agricultural sector since agricultural growth is

considered to have direct and indirect linkages to the growth process and it can be used as the engine of growth for agricultural-demand-led industrialization.

Agriculture plays a pivotal role in the development of the Sub- Saharan Africa (SSA) as the major source of income, food, employment, and in its effectiveness in reducing poverty. Growth in agriculture has a larger poverty-reducing effect than growth in non-agricultural sectors, especially among the households below the poverty line. In recent years about the causes of low agricultural production in Sub-Saharan Africa (SSA) while many factors have been implicated, the decline in agricultural investment is thought to be a major contributing factor, depressing agricultural growth and performance. Two components of agricultural investment are of paramount importance. The first is foreign agricultural aid, and the second is public domestic expenditures on agriculture. Foreign aid can provide the necessary solutions to the needs of Africa's farmers: need improved inputs, including improved seeds and soils, roads to connect them to markets, agribusiness credit and private sector investments to encourage growth, facilities to reduce their estimated 40-60% post-harvest losses, and training and technology to cope with climate change (Reuben, 2014).

Ethiopia 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 USA, UK, IMF 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 (Luis, 2013). According to DAG annual report of 2013/2014 there are 22 bilateral and 24 multilateral Organization actively supporting Ethiopia.

Ethiopia has a long history of receiving foreign aid, dating back to the early 1950s. Yet the amount remained very low until the 1980s when the devastating 1984 famine resulted in sharp increase in official development assistance (ODA), mainly in the form of humanitarian aid. Since the 1980s the importance of foreign flows in Ethiopia grew in importance due to recurrent droughts, fast population growth, huge and growing balance of payments deficits, and a largely stagnant economy, among others (Alemayehu and Kibrom, 2011). Average agricultural aid to Sub-Saharan Africa between 2002 and 2010 was about 35 million USD. From this Equatorial Guinea received the least amount of agricultural aid (0.39 million USD)

but also Djibouti, Comoros, Soa Tome, Botswana, and Lesotho received 0.82, 1.3, 1.64, 1.73 and 2.11 million USD respectively while Ethiopia received 126 million USD, the highest amount of agricultural aid during the period under consideration (Reuben, 2014). Next to Ethiopia the highest aid received countries of sub Saharan African are Tanzania, Mali, Ghana, Uganda and Mozambique received 123.6, 103.6, 100, 96 and 84.9 million USD.

The Ethiopian economy is a subsistence one that is highly dependent on agriculture, which in turn depends on vagaries of nature. Over 85 percent of the population depends on this sector for earning the means of its livelihood. Agriculture accounts for almost half of the GDP and more than 90 percent of the export earnings. However, the share of agriculture is declining steadily whereas the share of the service sector in GDP is rising recently. On the other hand, the share of the manufacturing sector is relatively static which is between 13 and 14 percent only. Alemayehu and Kibrom, (2011) argued that in explaining growth in Ethiopia it will be necessary to examine the agricultural sector, its linkage with the other sectors and household behaviour in rural Ethiopia. So the flows of foreign aid to Ethiopia are as it discus before it is different type and highest amount while it compared with other sub Saharan African countries and developing countries. This flow of foreign aid is not one direction due to the objectives of the donor countries and Ethiopian economic development policy. Ethiopian economic development policy is agricultural development lead industrialization.

With the agricultural sector being so productive with arguably massive potential in Ethiopian economy, why then has it been neglected? The answer to this question prompts the motivation for this study. Recent literature is attempting to estimate the relationship between foreign aid and agricultural sector growth because of agriculture is the backbone of Ethiopian economy, and the study used time series data for the year of 1974/75 up to 2015/16. And the accurate methodology that the paper used to examine the impact of aid on agriculture is flawed in the sense that the relationship between foreign aid and agricultural sector growth is best captured over time. Given the so few studies done using time-series data on its impact of aid on economic growth and also using panel data in study of the foreign aid impact on agricultural growth in east Africa, in developing countries, in sub Saharan African countries and so on. This Different time series and cross country investigations have come up with different results and different policy implications.

1.2 Problem Statement

There is a vast literature on foreign aid effect on economic growth, a number of studies tried to address the relationship between foreign aid given to the agricultural sector for the purpose of agricultural growth in developing country. Even though there are many studies about the effect of foreign aid on economic growth, in general, research on the impact of aid on agriculture, especially in Ethiopia is still sparse. Many scholars argue that foreign aid might be effective as it complements the limited local funds in the recipient countries like Ethiopia to stimulate economic growth and development.

The research works have been done to examine the effect of foreign aid on the economic growth of Ethiopia for a period of time. The researcher found varied result in their studies.
As the study shows the question of the effectiveness of foreign aid is an old and controversial issue in general. On one hand, there are many who claim that foreign aid is critical to economic development, while on the other hand there are others who claim that it increases dependence and creates a kind of aid related problems. And also there are two sides to the debate on the impact of foreign aid on economic growth. One side argues that aid has a positive effect on economic growth, while the other side contends that foreign aid fosters corruption, encourages rent-seeking behaviour, and erodes bureaucratic institutions and so on.

To mention few of them the study by Jifar, T.(2002), Tasew, T.(2010), Wondwesen, W.(2011), Yohannes,B.(2011), Alemayew, G.(2011), Tesfahun, B.(2014), Fentaye, S.(2015), Haile, G.(2015) and Yuhannes Gebru. These researchers have been mainly focused on the impact of foreign aid on economic growth and effectiveness of foreign aid in Ethiopian economy. Their result showed that aid has negative/positive effect in the short run/long run effect on economic growth of Ethiopia. And also there is a number of studies on the impact of foreign aid on agricultural growth in Africa specially in developing countries of Africa which is their economy mostly depend on agriculture like Nigeria, in sub Saharan African countries and in east Africa which is done by different researchers. A few of them are Ozgur K.(2008) examined the Impact of Agricultural Aid on Agricultural Sector Growth, Godwim A and Ben U.O, (2008), has tried to investigates the effect of foreign aid flows on Nigeria's agricultural growth, Clement and Isac,(2013), Conducted the study that the effectiveness of foreign aid to the growth of agricultural sector in Nigeria, Reuben (2014)), analysed Impact of Agricultural

Foreign Aid on Agricultural Growth in Sub-Saharan Africa, The study by John et al (2017) also examined the effectiveness of aid, focusing on the sectorial aid in agriculture and Nahanga, V.(2017) Examined the impact of agricultural foreign aid on agricultural in Nigeria.

However the overall economic performance of sub-Saharan African countries is largely determined by what happens to agricultural sector and this sector has the major GDP ratio contribution. But almost all of the study which is done in Ethiopia with this title focus on the impact of foreign aid on economic growth of weather the result has been positive or negative impact rather than study the impact of foreign aid on agricultural growth in Ethiopia. With the agricultural sector being the back boon and massive potential in Ethiopian economy why then has it been neglected? The answer to this question prompts the motivation for this study. Recent literature is attempting to examine the impact of the foreign aid on Agricultural growth of Ethiopia. Given the so few studies done using time-series data to examine the impact in economic growth in Ethiopia and used panel data on agricultural growth in different sub-Saharan countries, there is a gap in explaining the impact of aid on agricultural sector growth in Ethiopia. This gap is what this study aims to fill.

This study aimed to estimate the impact of foreign aid on agricultural growth under the time series framework, using the Vector-Auto regression model (VARM) approach. And also this paper try to identify the existence of a long-run relationship between foreign aid and agricultural growth using the Johansen co-integration test. In this study, the study also determines whether there is causality between foreign aid and agricultural growth granger causality test in Ethiopia.

1.3 Objectives

The general objective of the study is to examine the impact of foreign aid on agricultural growth and its causality in Ethiopia.

Specific Objectives

- ✓ To Examine whether there is causality between foreign aid and agricultural growth in Ethiopia
- ✓ To investigate whether there exist long-run and short run relationship between foreign aid and agricultural growth in Ethiopia.

1.4 Research Questions

- Is there a causal relationship between foreign aid and agricultural growths in Ethiopia?
- Is there long run and long run relationship between foreign aid and agricultural growth in Ethiopia?

1.5 Significance of the study

The Significance of the study is to aware more about the impact of foreign aid on agricultural growth and It will be used as a guideline policy makers, for Government and other concerned body or the major donor countries and organization like USAID, IMF, world bank, UNICEF and others to know the effectiveness of their aid program either to combat or continue. In Ethiopia, the number of studies conducted so far on the impact of foreign aid on economic growth and also there is no other study on the impact of foreign aid on agricultural growth, in which further study is required in this sub sector. Therefore this study will help in filling knowledge gap in such area. As commonly known aid is a back bone of the Ethiopian economy, therefore the expected outcome from this study could also be useful in improving policy design, institutional setup, implementation, monitoring and evaluation of foreign aid. Besides, it can evoke further study in the area. Finally it may also be a source of information or as reference for future researcher.

1.6 Scope and Limitation of the study

There is a great potential of agriculture that have more contribution to GDP of Ethiopia. However, this study was undertaken at national level it looks the impact of foreign aid on agricultural growth in Ethiopia. Because of limited availability of data to cover all time Periods this study look at time series data for Ethiopia starting from 1974/75 up to 2015/6. This period is chosen based on the availability of data. The problem arises from the problem of inconsistence in data by different institutions gives different data for the same variable. However, it is also restricted with the impacts of foreign aid specific sector of the economy to Agricultural growth Ethiopia. In addition to the budget and time constraints, this study was also limited to only the secondary source of data.

1.7 Hypothesis of the study

Based on empirical literature on the relationship between aid and agricultural growth in Ethiopia the studies propose the following relationships to hold true in the analysis.

H_0: FA has no impact on agricultural growth in Ethiopia

H_1: FA has impact on agricultural growth in Ethiopia; and

There exists a causal relationship between foreign aid and agricultural growth for Ethiopia.

1.8 Organization of this Paper

This paper is organized with five chapters. The introductory part of chapter one is dealing with introduction of the study, statements of problem and objective of the study. The second chapter presents the theoretical and empirical literature reviewed related to economic and agricultural growth. Chapter three contains the methodological aspect of the study which includes: model speciation, estimation procedure and variable definition and expected result. Chapter four include estimation and interpretation of results and the final chapter include conclusion and policy implication.

CHAPTER TWO

2. LITERATURE REVIEW

This chapter started by defining aid and presents a review of the literature on aid and agricultural growth and aid with economic growth where by some of the theoretical and empirical debates are presented and discussed. Some studies show a negative impact of FA on agricultural growth while others observe a positive impact.

2.1 Definition and concepts of Foreign aid and agricultural growth

2.1.1 Agricultural growth

Agriculture is a science, art or practice of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation and marketing of the resulting product. Growth in agriculture is a key engine for growth and it is a particularly important pathway for addressing the needs of the chronically poor which is particularly reliant on agriculture. It deals with the cultivation of land for crop production and rearing of animals for the use of man and also for the feed of animals (livestock). Agriculture has several other sub-sectors like forestry, fishery, processing and marketing of the agricultural products. The agricultural sector provides job opportunities and raw materials for many agro-allied industries (Festus, 2015).

Agriculture is known to be an extended age practice in the third world and developing nations. The importance of agricultural development to socio-economic growth and development in many third world countries is keen on their transition to economic prosperity. Agriculture contributes over one quarter to GDP in the most developing nations of the world (United Nation, 2007). According to the World Bank statistics (2008), agriculture serves as a haven for source sustenance of life, for over 2.5 billion people in the world. The agricultural sector engages a large number of the world population directly or indirectly in the value chain.

Agricultural growth would, simultaneously lead to (a) higher rural incomes; (b) lower food prices in urban areas; (c) increased savings in rural areas, allowing for mobilization of capital for domestic industry; (d) expanded domestic markets for non-agricultural goods: by

reducing food prices in urban areas, agricultural productivity gains would allow for nominal wages in manufacturing to remain low, making non-agricultural exports more competitive. Increases in agricultural productivity lead also to agricultural growth and can help to alleviate poverty in poor and developing countries, where agriculture often employs the greatest portion of the population.

2.1.2 Foreign aid

The standard definition of foreign aid comes from the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD),which defines foreign aid (or the equivalent term, foreign assistance) as financial flows, technical assistance, and commodities that are (1) designed to promote economic development and welfare as their main objective (thus excluding aid for military or other non-development purposes); and (2) are provided as either grants or subsidized loans (Yohannes, B.2011).

The DAC classifies Aid flows in to three broad categories: first official development assistance (ODA) is the largest, consisting of aid provided by donor governments to low and middle income countries. Second Official assistance (OA) is aid provided by governments to richer countries with per capita incomes higher than approximately $ 9,000. The third one is private voluntary assistance includes grants from non- governmental organizations, religions groups, Charities, foundations and private companies (Yohannes, B.2011).

ODA is calculated as the sum of grants and loans to aid recipients that: (a) are undertaken by the official sector of the donor country; (b) have as the main objective the promotion of economic development and welfare in recipient countries; and (c) are on concessional1 financial terms (i.e., with a grant element equal to at least 25 per cent of the total). In addition to these financial flows, technical cooperation costs are included in ODA; but grants, loans and credits for military purposes are excluded. Transfer payments to private individuals, donations from the public, commercial loans and foreign direct investment (FDI) are not counted. Moreover, while it is common to treat ODA and foreign aid as the same thing, this is misleading. Assistance funded by non-governmental organizations (NGOs), which are foreign aid but not ODA, has grown very significantly in the last 25 years and now equals about one-third of official assistance (Yohannes, B.2011).

2.1.3 Types of foreign aid

One of the key aspects of economics that can define a country's economies is aid received from various sources. Even though aid is generally received by developing countries, most countries in general have at some point or another been the recipient or the donor. Aid is described as help or assistance for support and relief. In economics however, it can mean much more than that, as there are times when aid can transform a nation. There are several different types of foreign aid with the most common being bilateral, multilateral, tied, project, military, voluntary, official and tied aid(Intelligent economics,2018.)

Bilateral Aid: is Assistance given by a government directly to the government of another country is Bilateral Aid. It is when the capital flows from a developed nation to a developing country. Strategic political considerations and humanitarian ones often direct Bilateral Aid. These are to assist in long-term projects to promote democracy, economic growth, stability, and development.

Multilateral Aid; multilateral Aid is assistance provided by many governments who pool funds to international organizations like the World Bank, United Nations and International Monetary Fund that are used to reduce poverty in developing nations. Though this sector constitutes a minority of the US's foreign aid, the nation's contributions make up a significant percentage of the donor funds received by the organization.

Tied Aid; Tied Aid is one of the types of foreign aid which is must be spent in the country providing the support (the donor country) or in a group of selected countries. A developed country will provide a bilateral loan or grant to a developing country, but mandate that the government spends the money on goods or services produced in the selected country.

Project Aid: Project aid is aid when the funds are used to finance a particular project, such as a school or a hospital, it is considered to be Project Aid.

Military Aid: Military aid is never altruistic. The U.S. gave about $15 billion in Military Aid in 2011. Military aid usually requires said nation to either buy arms or defence contracts directly from the USA or in other cases just simplifies the process by having the federal government only purchase the arms itself and ship them over on military transport.

Voluntary Aid: This is aid usually in the form of charity. For example, Medicines Sans Frontiers (Doctors without Borders) is "is an international humanitarian non-governmental

organization best known for its projects in war-torn regions and developing countries affected by endemic diseases.

2.1.4 The effects of Aid

Aid issues have received renewed political interest during the first years of the 21st century. At the Millennium Summit of 2000, the international community agreed on certain Millennium Development Goals (MDG) to be reached by 2015: Halving extreme poverty, providing universal primary education, promoting gender equality, reducing child mortality, improving maternal health, halting the spread of HIV/AIDS, ensuring environmental sustainability and developing a global partner-ship for development. World leaders have acknowledged that objective attainment depends on increased resource transfers as well as improved aid effectiveness through donor co-ordination. The renewed political interest together with increased resource transfers have resulted in numerous studies on the impact of aid on growth. There is, however, little evidence of a significant positive effect of aid on the long-term growth of poor countries. The link between aid and growth goes via investment and there is no doubt that aid sometimes finances investment (Ann, et al, 2007).

The issue of the economic effects of aid, especially public aid, like that the effects of private foreign investment, is fraught. With disagreement on one side are the economic traditionalist who argues that aid has indeed promoted growth and structural transformation in many LDCs. On the other side are critics who argue that aid does not promote faster growth. But any in fact retard it may substituting for, rather than supplementing, domestic saving and investment and by exacerbating LDC balance of payments deficits as a result of rising debt payment obligations and the link of aid to donor country exports (Todaro, 2012).

Official aid is further criticized for focusing on and stimulating the growth of the modern sector, then by increasing the gap in living standards between the rich and the poor in developing countries. Some critics on the left would even assert that foreign aid has been a positive force for anti-development in the sense that it both retards growth through reduced savings and worsens income inequalities. Rather than relieving economic bottlenecks and filling gaps, aid not only widens existing savings and foreign exchange resource gaps but may even create new ones (e.g., Urban-rural or modern-sector traditional sector gaps). Critics on the charge threat foreign aid has been a failure because it has been largely appropriated by

corrupt bureaucrats, has stifled initiative, and has generally engender a welfare mentality on the part of recipient nations (Todaro 2012).

2.1.5 Why LDCs accept aid?

According to Todaro there are three reasons one major and two minor why LDC's have sought foreign aid. The major reasons are clearly economic. Developing countries have tended to accept uncritically the proposition typically advanced. by developed country economists sought in all university development courses, and supported by references to success case like Taiwan, Israel and south east Korea to the exclusion of many more failure that aid is crucial and essential in gradient in the development process. It supplements scarce domestic resources, it helped to transform the economy structurally, and it contributes to the achievement of LCD's take off in self-sustaining economic growth. Thus, the economic rationale for aid in LDC's based largely on their acceptance of the donor's perception of what the poor countries require to promote their economic development.

The two minor thought still important motivation for LDC's to seek aid arise is political and moral. In some countries, aid is seen by both donor and recipient as providing greater political leverage to the existing leadership to suppress opposition and maintain itself in power. In such instance, assistance takes the form not only financial resources transfers but also military and internal security reinforcement. The problem is that once aid is accepted, the ability of recipient government to extricate themselves from implied political or economic obligation to donors and prevent donor's government from interfering in their internal affairs can be greatly diminished (Todaro 2012).

Finally, the other one is that moral motivation on grounds of basic humanitarian responsibilities of belief that the rich nations owe the poor nation conscience money for past exploitation, many proponents of foreign aid in both developed and developing countries belief that the rich nations had obligation to support economic and social development of the third world. They, then go on to link this moral obligation with the need for greater LDC autonomy with respect to the allocation and the use of aid fund. The reason why developing nations, at least until recently, have been eager to accept foreign aid, even in its most stringent and restrictive forms, have been given much less attention than the reasons why donors provide aid.(Syed *et al*., 2005).

2.1.6 Why Donors Give Aid?

Donor-country governments give aid because it is in their political, strategic, or economic self-interest to do so some development assistance may be motivated by moral and humanitarian desires to assist the less fortunate (e.g., emergency food relief and medical programs) and certainly this has been the international rhetoric in the increases in aid in the first decade of the twenty-first century. Still, there is no historical evidence to suggest that over longer periods of time, donor nations assist others without expecting some corresponding benefits (political, economic, military, counterterrorism, antinarcotics, etc.) in return (Syed*et al*., 2005).

According to Todaro the foreign-aid motivations of donor nations in two broad but often interrelated categories: political and economic.

Political Motivations; Political motivations have been by far the more important for aid-granting nations, especially for the largest donor country. Most aid programs to developing countries were therefore oriented more toward purchasing their security and propping up their sometimes shaky regimes than promoting long-term social and economic development.

Economic Motivations*:* Two-Gap Models and Other Criteria Within the broad context of political and strategic priorities, foreign-aid programs of the developed nations have had a strong economic rationale. This is especially true for like Japan, which directs most of its aid to neighbouring Asian countries where it has substantial private investments and expanding trade. Even though political motivation may have been of paramount importance for other donors, the economic rationale was at least given lip service as the over-riding motivation for assistance.

2.2 Theoretical literature

2.2.1 Theory of foreign aid and economic growth

There are different determinant which determine economic growth of one country. They include the quality of labour force, resources (natural and financial), capital, technology and institutional setting of economic activities. Early economic growth theory in the 1950s and 1960s stressed that the basic problem for many developing countries was in the view precisely capital formation in achieving economic growth. Thus these theories were in the view that development assistance was important for developing countreis to fill the finance gap and technology gap. More popularly, these gaps were known as saving gap and the trade gap. This section provides various theories of economic growth and how foreign aid can be integrated in to these theories. The theoretical view about economic growth can be classified under three broad headlines, namely: (1) the Keynesian (Harod-Domar growth model), (2) the neo-classical (Solow) growth model, and (3) the endogenous growth theory.

2.2.1.1 The Keynesian Theory of Growth Model

According to the Keynesian theory of growth output depends on the investment rate and the productivity of that investment. In an open economy, investment is financed by savings which is a sum of domestic and foreign savings. The model explains economic growth in terms of a saving ratio and capital-output coefficient (Esterly, 2003). The model is expressed as follows,

$$g = (I/Y) /\mu \quad \text{.....1}$$

$$I/Y=A/Y+S/Y \quad \text{.....2}$$

Where I is required investment, Y is output, g is target GDP growth, A is aid, S is domestic saving and μ is the incremental capital output ratio (ICOR). It gives how many units of additional capital are required to yield a unit of additional output, thus the ICOR is the ratio of investment ratio to the growth rate the incremental capital-output ratio (ICOR) is thought to range between 2 and 5 (ibid). A high ICOR is often taken as a measure of poor quality of investment. Using the idea of ICOR, the Harrod-Domar model was the base for the first national development plans in less developed countries (LDS). These made possible to estimate the capital investment and aid needs for a given target rate growth as it provided the simple framework used for quantitative planning techniques.

However the stable linear relationship between investment and growth over the short to medium term is doubtful. For example the endogenous growth models of growth stresses the multitude of inputs besides physical capital such as technology, human capital, intermediate new goods, organizational capital, social capital and institutional design. Despite this argument, savings, especially domestic savings play a major in providing resource for investment and thus boosting growth. Thus for developing countries to minimize their dependency on foreign aid, they need to increase their saving propensities which will increase funds required for investment.

2.2.1.2 The Neo-classical (Solow) growth model.

Solow growth model is an extended version of the harrod-domar growth model. This model has added another important factor such as, labour and introducing a third independent variable technology to the growth equation. Solow growth model is based on assumption that there is diminishing return to scale operate if we consider the factors of production such as, labour and capital separately, but both factors jointly contribute constant returns. Third factors such as, technological progress considered as the independent factors (as it determined exogenously), because of it Solow neo-classical growth model is also known as ‘’exogenous growth model. Economic growth can be traced back to the classical economist of the eighteenth century, whose works are briefly reviewed alongside the transition to neo classical growth theory. Neoclassical model states that, at any time, the total output of the economy depends on the quality and quantity of physical capital employed, the quantity of labour employed and the average level of skill of the labour force.

Through economic literature the standard model for studying the relation between foreign aid, economic growth and more recently policies is Neoclassical (Solow) growth model. The neo-classical model studies the growth path of economies by assuming a neoclassical production function which is combines 2 factor to produce output: capital and labour. Both are perfectly substitutable and exhibit diminishing return to scale.

$$Y(t) = AK(t)^{\alpha}L(t)^{\alpha-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where, $0 < \alpha < 1$, Y is Output, K is capital, L is labour and A is technology. The assumption of diminishing returns implies that each additional investment project produces a smaller

return until the point where the next project is not profitable. When no profit exists there are no incentives to invest and no capital is accumulated. The neoclassical model describes how an economy will eventually converge to a steady state where the growth rate of per capita output is constant in the long run. The growth rate of the economy is determined by the growth of the labour force and the savings rate which are taken as exogenous. The per capita savings rate is defined as:

$$S_t = \frac{I_t}{Y_t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

This equation represents the connection between saving and investment which are the driving force behind growth in the Solow model. Household's savings are lent to investor via banks. These investors can then use the funds to expand production, or replace machinery with cause capital to accumulate. The capital movement equation takes the following form.

$$\mathbf{(1+n)K(t+1) = (1+\delta)k(t) + sy(t)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \mathbf{5}$$

Where, $0 < \delta < 1$,

$(1+\delta)$ is the level of capital depreciation, k (t) is the level of capital at time t and Sy(t) is the fraction of income which is saved, and combining all the components on the right hand side of the equation explains how much capital is available in the next time period i.e.k (t+1). Capital tomorrow depends on the existing capital today minus depreciation plus the fraction of income which is invested. It is assumed that the population grows at a constant rate n, which has a negative effect on capital in the next period. The first limitation is that the Solow Model only describes changes in the level of growth in the long run, whilst the rate of growth cannot be changed.

Solow classified the economy in to two broad sectors, capital or industrial sectors and labour or agricultural sectors. In industrial sectors, the rate of capital accumulation exceeds the rate of labour absorption. But in developing economy, agricultural sector is characterized by the existence of disguised unemployment and shortage of skilled labour which adversely affects the productivity and wage rate of the agricultural labourer. This under utilization of existing resource creates hurdle in the path of attainment of higher economic growth. In this context, the steady growth is possible if we raise the capital-labour ratio in the economic growth. But shortage of capital is common feature of most of the developing economies, so they have to

depend upon foreign aid to supplement their scarce resources. In this context, foreign aid contributes towards the growth process of these developing economies through supporting the scarce domestic resources.

2.2.2 Ethiopian Foreign Aid History

After World war II Ethiopia began to receive economic development aid from the more affluent Western countries. Originally the United Kingdom was the primary source of this aid, but they withdrew in 1952, to be replaced by the United States Between 1950 and 1970, one source estimated that Ethiopia received almost US$600 million in aid, $211.9 million from the US, $100 million from the Soviet Union and $121 million from the World Bank. Sweden trained the Imperial Bodyguard and India at one point contributed the majority of foreign-born schoolteachers in the Ethiopian educational system (Birhanu, 1999).

This aid dried up under the military regime that followed the Ethiopian revolution, except for food aid during the mid-1980s. While the Soviet Union provided extensive amounts of aid, either directly or through its allies like East Germany and North Yemen, this was predominantly in the form of either military aid, or ideological education; these ended with the close of the Cold War. Large aid inflows resumed in the early 1990s aimed at reconstruction and political stabilization but declined during the war with Eritrea. The post-2000 period, however, has seen a resumption of large disbursements of grants and loans from the United States, the European Union, and Individual European nations, Japan, the People's Republic of China, the World Bank, and the African Development Bank. These funds totaled US$1.6 billion in 2001 (IMF, 2016).

In 2001 Ethiopia qualified for the World Bank-International Monetary Fund-sponsored Highly Indebted Poor Countries (HIPC) debt reduction program, which is designed to reduce or eliminate repayment of bilateral loans from wealthy countries and international lenders such as the World Bank. In Ethiopia's case, the program aims to help stabilize the country's balance of payments and to free up funds for economic development. A noteworthy advance toward these goals came in 1999, when the successor states to the former Soviet Union, including Russia, cancelled US$5 billion in debt contracted by the Derg, a step that cut Ethiopia's external debt in half. HIPC relief is expected to total almost US$2 billion (I bid).

In November 2007 the magazine The Economist reported that there was tangible evidence that the foreign aid given to Ethiopia reaches the people it is meant to, based on a visit to the

south of the country. Roads, schools and water systems are being built and "there are few complaints about corruption, a fact that continues to make Ethiopia popular with foreign donors". However, the article also notes that, despite almost a decade of well-intentioned development policies, Ethiopians remain mired in the most wretched poverty (IMF, 2016).

In March 2010, the BBC claimed that it had evidence that millions of dollars earmarked for victims of the Ethiopian famine of 1984–85 went to buy weapons. Rebel soldiers apparently diverting the funding to their organization in an attempt to overthrow the government. Their data were confirmed by participants and eye-witnesses of the time. However, following a complaint from the Band Aid Trust, the Editorial Complaints Unit of the BBC carried out "an investigation" and concluded that the reporting had no evidence to support it, and the BBC apologized to the Trust for the "misleading and unfair representation it created"(Luis, 2013).

Ethiopia has adopted a development model characterized by large-scale infrastructure development and the promotion of large-scale agricultural projects. Ethiopia's development model is centred on expanding the national "export basket," through a transition from agrarian to agro-industrial production While Ethiopia's number-one export has long been coffee beans, the government f is promoting an expansion in the production of high value high value crops like cotton, rubber, sugar, palm oil, and cut flowers (Luis, 2013).

2.2.3. Nature of Foreign aid to Agriculture

The development of agriculture in every country in the world has required government assistance. While rich countries like the United States and those of Europe can, and do, provide aid to their own farmers, most African countries are poor and are so far behind developed countries in terms of agricultural development that they may not have enough resources to provide the necessary aid by themselves. Thus they are reaching out for development aid to help their people can feed themselves (NEPAD, 2010). According to ECA (2009), development partners must increase assistance to Africa's agricultural sector in order to help broaden and accelerate the continent's recent economic and agricultural growth in order to raise the number of countries that will achieve MDGs. However, the subject of foreign agricultural aid remains a thorny issue among donors and recipient countries alike. While the recipient countries want more foreign aid to increase their agricultural production,

donors focus on the effectiveness of aid-funded projects in order to justify the need for future aid.

Foreign development assistance takes many forms: financial, technical, and food. This aid may be transferred through projects or programs and may represent grants or concessional loans. If official flows from one country to another are aimed at economic development or welfare improvements, and have at least a 25% grant element, they are called official development assistance (ODA). Aid through non-official flows is also provided by non-governmental organizations (NGO's) (George *et al*., 1989).

Foreign aid to agriculture is a portion of total ODA and includes such diverse components as agricultural research and extension, irrigation projects, rural roads, agricultural education and training, flood control projects, health improvement programs, integrated rural development projects, and agricultural policy assistance. It is difficult, and for our purposes not entirely appropriate, to separate agricultural from non-agricultural aid. Foreign exchange and budgeting support directed at a country as a whole can indirectly benefit agriculture, as can the policy dialogue and changes which may accompany that support. Food aid may be directed at meeting short term crises or be funnelled through food-for-work programs which improve rural infrastructure. Support to primary and secondary education benefits all sectors of the economy (George *et al*., 1989).

2.2.4 Measuring the Effectiveness of Aid to Agriculture

The effectiveness of foreign assistance can be measured at the microeconomic, sectoral, or national levels. At the microeconomic level, cost benefit analyses have been completed for many foreign assistance projects affecting agriculture particularly irrigation, flood control, road, and agricultural research projects. Although many of these analyses have shown high rates of return on investment, for a variety of reasons it is not sufficient to conclude that the returns of aid to agriculture in the aggregate have been high. Benefit cost analyses of projects often do not consider effects on behaviour elsewhere in the economy or fail to account for positive or negative externalities. Thus it is desirable to consider the wider sectorial or economy-wide effects of aid (George.1989).

2.3 Empirical literature

Many studies have been conducted about the link between foreign aid and economic growth. Most of the earlier studies showed that foreign aid has a negative impact on economic growth of developing countries including Ethiopia and the other side show positive impact to know the partial impact on agriculture sector it needs more and more study but it is expected that if foreign aid affect economic growth it have same or opposite effect on other sector such as agriculture, manufacturing service and others for example if the growth agriculture increase it have impact on poverty reduction. There seems to be extensive empirical work examining the links between aid and growth. As earlier mentioned, the results from these various studies are mixed (while some suggest a negative relationship, some others suggest a positive association). Under this section, the study provide a review of the findings of the major time series studies including the recent dimension into the relationship between aid and growth and the relation foreign aid and agricultural growth.

George W. Norton, (1989) Conducted the study that the impact of foreign assistance on agricultural growth. In this study the effectiveness of aid to agriculture is empirically assessed using a production function approach with cross-sectional-time-series data for 98 countries. The Results of indicate that aid to agriculture has had a positive and significant impact in Asia and Sub-Saharan Africa, but little effect in the Middle East and Latin America. And he concluded that debt problems may be influencing the effectiveness of aid in Latin America. Aid effects did not differ across countries by income level or by importance of the agricultural sector.

Jifar,T. (2002) tried to address the effect of foreign aid on public spending with particular reference to the case of aid fungibility in Ethiopia. In this paper he consider four development sector which is classified as agriculture, construction, education and transport and communication and three non-development sector defence general service and debt service. The analysis was done using OLS estimation. In estimating the short run impact, he employed Error Correction Model. The estimated result in education and agriculture sectors were marked by non fungiblity in which case the sectorial aid impact on sectorial spending have crowding in effect. However, for transport and communication and construction sector, aid fungiblity seems to exist which means that there is crowding out effect. In this case, the sectorial aid impact on the sectors spending is negative. For non-developmental expenditure,

aid is found to be significantly affecting debt servicing expenditure but insignificant for general service and defence expenditures. Developing countries in general and Ethiopia in particular has been experiencing huge amount of saving gap, trade gap and fiscal gap for more than four decades. Consequently, there has been a significant net inflow of official development assistance (foreign aid).

Another study by Ozgur *et al*.,(2008) analysed the Impact of Agricultural Aid on Agricultural Sector Growth from 1974 through 2005 for developing countries that are aid recipients in Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting. The study employed a cross-section time-series econometric model to analyse the impact of agricultural aid on agriculture in developing countries. Variable related to cross country difference are incorporated in the model to control for their impacts on the dependent variable. The paper used agricultural value added as the dependent variable foreign aid given to agricultural sector growth as explanatory variable and GDP percapita, fertilizer consumption, irrigated land, land under serial production, livestock production index, rural population, sum of export and import of goods and services, agricultural machinery and crop production index as control variables. The study found that there is a positive and statistically significant relationship between growth in the agricultural output and agricultural assistance for rural development so foreign assistance given for developmental purposes can achieve its goal if aid is targeted for the agricultural sector of the developing countries.

Godwim A and Ben U.O,(2008), has tried to investigate the effect of foreign aid flows on Nigeria's agricultural growth during 1970 to 2007. Employing a simultaneous equation system with agricultural growth, saving, aid and agricultural imports as endogenous variables. They find that foreign aid has significant positive effect on agricultural growth in Nigeria. And also the result does not support the view that foreign aid flows more to countries with low saving. Moreover, the view that aid flows generate increased imports by recipient countries is not supported by finding of this study.

Clement and Isac, (2013), conducted the study that the effectiveness of foreign aid to the growth of the agricultural sector growth in Nigeria. For the purpose analysing the effectiveness of foreign aid to the agricultural sector growth he used time series data from 1981 to 2009, would be used by the ARDL and the ECM approach and quarterly data. While all the variables used were found to be I(I),one cointegration relationships exists between the

dependent variables. Contrary to expectation, the parameter estimate of foreign aid has a negative and insignificant relationship with agricultural output in the short run and long run. On the contrary, savings and technological trend are significant and have positive relationship with agricultural output both in the short run and long run. A major policy implication of the result is that improved technology is imperative to the increase in agricultural output in both the short run and the long run rather than encourage foreign aid for agricultural growth in Nigeria.

Reuben *et al*., (2014), analysed Impact of Agricultural Foreign Aid on Agricultural Growth in Sub-Saharan Africa. The data used for this study are secondary in its nature foreign aid for agriculture (bilateral, multilateral, and total) and agricultural growth indicators (agricultural GD and agricultural productivity from 2002-2010 for 47 countries in SSA. The relevant data were analysed using the Granger Causality test, Generalized Method of Moments (GMM), and Variance Decomposition methodologies. The analyses were conducted for total, bilateral, and multilateral foreign agricultural aid. Analysis of Variance (ANOVA) was also employed in his study to test for significant differences in the average foreign agricultural aid received by West, East, South, and Central Africa. As the paper indicates that the average agricultural aid to Sub-Saharan Africa between 2002 and 2010 was about 35 million USD. Equatorial Guinea received the least amount of agricultural aid (0.39 million USD), while Ethiopia received 126 million USD, the highest amount of agricultural aid during the period under consideration.

The study of Reoben also revealed that agricultural aid allocation to the region varied from 6.45% in 2002 to 7.80% in 2009, with the average being 7% of total sector allocable aid during the period under consideration. Agricultural development and agricultural policy/administration shared about 25% and 22% of total aid, while about 9%, 8%, 1%, and 1% of total aid was allocated to research, water resources, agricultural finance, and postharvest loss/processing, respectively. And he also found that the amounts of aid received by landlocked countries are significantly higher than the average received by the region as a whole, possibly because these countries are at trade disadvantage due to their location. Finally he suggests that foreign agricultural aid has a positive and significant impact on agricultural GDP and agricultural productivity and also the result show that disaster/conflict have a positive and significant impact on aid receipt countries.

Nahanga,V. (2017), examined the impact of agricultural foreign aid on agriculture in Nigeria. For the purpose of analysing the impact of agricultural foreign aid on agriculture he used time series data, from 1981 to 2014.By using OLS regression, Granger causality and Variance Decomposing (VDA). The finding of Nahanga shows, the OLS result signifies that foreign assistance to agricultural activities has positive effect on crop performance in the country. Similarly, the granger causality shows that unidirectional causality running from foreign aid to crop production in Nigeria. Another study by John Ssozi (2017) analysing the effectiveness of aid, focusing on the sectorial aid in agriculture. Their empirical analysis is based on the ARDL co-integration approach, using the data for the period 1960 to 2008. The empirical findings of the study are that foreign aid and real GDP have a negative relationship, while the aid-policy interactive term.

Ozgur, K (2017), examined the study that Aid to Agriculture and Aggregate Welfare. This study is an empirical investigation of the impact of aid flow directed to the agricultural sector of developing countries on aggregate welfare measured by the Human Development Index. The analysis uses a panel data set covering developing aid recipient countries to empirically test this effect. According to him if agricultural development is more efficient in reducing poverty than some other types of development, then foreign aid directed toward agriculture may be more effective in increasing the welfare of the poor than aid directed to other sectors or uses. A significant and positive relationship between agricultural aid and HDI was found in almost all of the estimations in his analysis. The paper of Ozgur further found that aid directed to the social infrastructure sector is effective in increasing welfare in the developing countries. Other aid types were not significant in the model, but these results do not imply that all other types of aid are ineffective. Rather, alternative aggregations of non-agricultural aid might reveal different results.

John Ssozi (2018), examined The Effectiveness of Development Aid for Agriculture in Sub-Saharan Africa. The data for development assistance for agriculture are broken down into the major agricultural sectors in receiving countries. The empirical evidence of the study is based on the two-step system Generalized Method of Moments to assess the degree of responsiveness of agricultural productivity to development assistance. According to the study there is a positive relationship between development assistance and agricultural productivity in general. However, when broken down into the major agricultural recipient sectors, there is

a substitution effect between food crop production and industrial crop production. Better institutions and economic freedom are found to enable agricultural productivity growth, and to increase the effectiveness of development assistance. The structural economic transformation associated with agricultural development assistance is also found to be weak.

In summary this research is going to study is the review of the literature before itself. The reviewed literatures are theoretical and empirical literature on the impact of foreign aid on economic growth and on agricultural growth. As the researcher result shows foreign aid have positive impact and also negative impact in economic growth, positive impact both in the short run and long run, negative impact both in the short run and long run, negative impact in the short run and positive impact in the long run in economic growth in Ethiopia SSA, in economic growth and it also have positive and significant impact on agricultural growth. A mainstream views from various economic studies that aid-growth effects are limited or non-existent. The impact of aid has been evaluated at the micro and macro level, cross-country and single-country case study level, at total economic growth or in one of the critical sector and finally using qualitative, quantitative and inter-disciplinary approaches.

In broad-spectrum, the above reviewed studies shown that there is no common consensus the causal relationship between foreign aid and Agricultural growth in developing countries in general and in Ethiopia in particular. To best of the researcher, a few of them have tried to study the impact of foreign aid on Agricultural growth. Hence, still there are inadequate empirical results which make it difficult to draw a conclusion as foreign aid plays a significant role for Agricultural growth of Ethiopia. More, as per the researcher reviewed there is no enough researches had done on the relationship between foreign aid of Ethiopian economy and Agricultural productivity in Ethiopia, As a result this study also attempts give to the constraint of literature scarcity.

CHAPTER THREE

3. METHODOLOGY AND DATA DESCRIPTION

Different types of studies were undertaken in order to understand the impacts of foreign aid on economic growth in developing countries especially SSA like Ethiopia and different variables and methods were used to analyse it. It is difficult to analyse the impact of foreign aid on all sectors, and as described earlier in the introduction part that the major objective of this paper is to analyse the impact of foreign aid on agricultural growth in Ethiopia.

3.1 Data Type and Source

The data which is used for this research are secondary in its nature. Time series data for the period between 1974/75 and 2015/16 was obtained from Ministry of Agriculture (Ethiopia), Ministry of Finance and Economic Cooperetion (MOFEC), Central statistics Agency (CSA), National Bank of Ethiopia, Ethiopian Economic Association, World Bank (WB) is used for the empirical analysis.

3.2 Method of Analysis

This study tried to assess the impact of foreign aid on agriculture growth by VAR model. This study used both descriptive and econometric methods of data analysis. In the descriptive method of data analysis part tables, percentages and other statistical tools are utilized in the study. The nature of data described first through table, mean, median, standard deviation, minimum and maximum. Next, econometric model was estimate to study impact of foreign aid on Agricultural Growth. In the econometric analysis part foreign aid is taken as one of an independent variable and agricultural Growth as dependant variable.

3.2.1 Descriptive statistics

Descriptive statistics refers to organizing, presenting and analysis numerical; data on other words,. The area of descriptive method of data analysis includes procedures use to summarize masses of data and present them in an understandable way.

3.2.2 Model Specification and Estimation

The Classical Linear Regression Model (CLRM), specifically, Ordinary Least Squares is a regression model that yields the best, linear, unbiased, and efficient estimator which is proved by the prominent Gauss-Markov Theorem. It is also the basis of most economic theories for it gives empirical proof on the rationality of economic models (Gujarati, 2003).

As offered by Gujarati (2003), the k-variable linear regression model exactly follows the following form:

$$Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots\dots\dots + \beta_k X_{ki} + u_i \quad \text{.....6}$$

For $i = k - 1$

The variables X_{ki} the independent variables of the regression model regresses their total individual effect on the dependent variable Y_i, β is the coefficient of the independent variables of the regression model. It delivers the numerical value of a unit or percentage change in the independent variables to the dependent variable.

This regression model is very significant in determining the impact of foreign aid on Agricultural growth in Ethiopia and specified by logarithm form. Using the determinants of agricultural growth (AGGDP) in the regression model- loan given to Agriculture (LOAN), Government expenditure (GEXP), Arable lands (ARLAND), capital investment on A agricultural sector (CINVEST), Labour (LBR) and Foreign aid (FOREIGN) the effects and significance of the determinants assessed. So the model specification being;

$$LAGGDP = \beta_0 + \beta_1 \mathrm{L}FORAID + \beta_2 LLOAN + \beta_3 LARLAND + \beta_4 LGEXP + \beta_5 LCINV\ EST + \beta_6 LLBR + \varepsilon \quad \text{.....7}$$

The first stages of the analysis were first unit root test, cointegration test and the Granger Causality test of foreign agricultural aid on agricultural GDP growth. The Granger Causality test is a statistical hypothesis test that determines whether one time series is useful in forecasting another. Testing causality, in the Granger sense, involves using an F-test to test whether lagged information regarding foreign agricultural aid provides any statistically

significant information about agricultural growth in the presence of lagged agricultural GDP growth.

3.2.3 Unit Root Test

The standard classical methods of estimation which are used in the applied econometric work are based on a set of assumption. One of these assumptions is that all variables are stationary. A data series is said to be stationary if its error term has zero mean, constant variance and the covariance between any two – time periods depends only on the distance or lag between the two periods and not on the actual time which is computed. Or on the other hand a time series is stationary if its mean, variance and auto covariance (at various lags) remain the same on matter at what point we measure them, i.e they are time invariant (Gujrati, 2003).

The moments of the variables under consideration are time invariant. However, as the economy grows and evolves over time, most macroeconomic variables are likely to grow over time rendering them non-stationary (Granger, 1981). Regression using non-stationary variables will only reveal a relationship that is not real, and therefore such regression is termed as "spurious regression. There are several tests of stationary. These tests are Dickey-Fuller unit root tests, Augmented Dickey-Fuller (ADF) unit root tests and Phillips Perron (PP) unit root tests. This study uses a test which became popular one. Thus, unit root tests for stationary was examine on the levels and first differences for all variables using the most common unit root tests, which is the Augmented Dickey-Fuller (ADF) so ADF unit root test were used in this study.

To avoid reporting spurious regression findings, a unit root test, called Augmented Dickey-Fuller (ADF) coined by Dickey and Fuller (1979) is used. The unit root test determines whether the series is stationary at the level, first or second difference. The standard ADF test is carried out by estimating after subtracting Yt-1 from both sides of the regression equation as follows:

$$Y_t = \beta_0 + \beta_1 t + \varepsilon_t \quad \ldots\ldots 8$$

$$Y_t - Y_{t-1} = (\beta_0 + \beta_1 + \varepsilon_t) - Y_{t-1} \quad \ldots\ldots 9$$

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \varepsilon_t \quad \ldots\ldots 10$$

Where Y_t denotes the variables agricultural GDP growth, foreign aid, loan given to agriculture, government expenditure on agricultural sector and arable land are the independent variable. All variables are in logarithm form. Δ Is the difference operator; β_0 and β_1 are parameters to be estimated; ε_t is white noise.

The regression models of the ADF unit root test below;

$$\Delta Y_t = \beta_0 + \beta_1 t + \delta Y_{t-1} + \sum_{i=1}^{q} \zeta_i \Delta Y_{t-1} + \varepsilon_t \quad \text{.....11}$$

The null hypothesis is that variable is not stationary (has a unit root). On this test even if we add intercept and trend parameters at the right hand side of the equation the null hypothesis remains the same. The null hypothesis of a unit root will be rejected if the calculated t statistics associated with the estimated coefficient exceeds the tabulated critical value of the test at pre-determined significance level.

3.2.4 Optimal Lag Length

Another key element in a model specification process is to determine the correct lag length. Several studies in this area demonstrate the importance of selecting a correct lag length. Estimates of the model would be inefficient and inconsistence if the selected lag length is different from the true lag length. Selecting a higher order lag length than the true one over estimates the parameter values and increases the forecasting errors and selecting a lower lag length usually underestimate the coefficients and generates Auto correlated errors. Therefore, accuracy of parameters and forecasts heavily depend on selecting the true lag length. Though, there are so many criteria used in the literature to determine the lag length of an AR process. Hence, the ability to correctly locating the true lag length depends on AIC, FPE, SBIC and HQIC the ordinary least Squares regression model has been run starting with lag zero upwards, since according to (Engle, 1987) it is the mostly used and recommended methodology used to determine the lag length.

3.2.5 Cointegration test

Most macroeconomic variables like RGDP per capita, agricultural output growth and different variable are not stationary at their levels form, since they exhibit trend or/and seasonality. In order to analyse the long-run relationship between the variables in the model, a cointegration test is employed Several Cointegration techniques are available for the time series analysis. These tests include the Engle Granger (1987) test and Johansen's (1988)

Cointegration test. Their common objective is to determine the most stationary linear combination of the time series variables under consideration. Consequently, Johansen Cointegration technique has been employed for the investigation of stable long run relationships between non stationary variable at their level Therefore, the study used the Johansen's cointegration test to test if there is cointegration equation in the series. Therefore the hypothesis is null hypothesis; there is no cointegretion equation in the model and alternative hypothesis; there is cointegretion equation in the model.

3.2.6 Vector Error Correction Model (VECM)

Economic variables have short run behaviour that can be captured through dynamic modelling. If there is long run relationship among the variables, an error correction model can be formulated that portray both the dynamic and long run interaction between the variables. In the previous discussion, we show that if two variables that are non-stationary in levels have a stationary linear combination then the two variables are cointegrated. Cointegration means the presence of error correcting representation. That is, any deviation from the equilibrium point will revert back to its long run path. Therefore, an ECM depicts both the short run and long run behaviour of a system. Engle and Granger (1987)

Error correction model (ECM)

For a long-run association, variables have to be integrated at the same order. Cointegration depicts that there exist a possible convergence in the long-run among series. Series reach their equilibrium level in the long-run by adjustment with time. The VECM procedure is employed with error correction term (ECT). The ECT coefficient is required to be negative and statistically different from zero indicating the functionality of the error correction mechanism. It shows the speed of adjustment of the variable toward their long run values.

3.2.7 The Granger Causality test

The most common approach for testing if there is a causal relationship between two variables is granger causality. The model is proposed by Granger (1969) to answer the question of whether *x* causes *y* and see how much of the current *y* could be explained by previous values of *y* and then to see whether adding lagged values of *x* could improve the explanation. The mathematical representation of Granger causality is as follows:

$y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots + \alpha_1 y_{t-1} + \beta_1 x_{t-1} + \ldots\ldots + \beta_1 x_{t-1} + \mu_t$.....12

$x_t = \alpha_0 + \alpha_1 x_{t-1} + \ldots\ldots + \alpha_1 x_{t-1} + \beta_1 y_{t-1} + \ldots\ldots + \beta_1 y_{t-1} + \mu_t$.....13

For all possible pairs of (*x, y*) in time series the Granger equation. The reported F-statistics are the Wald statistics for joint hypothesis:

$\beta_1=\beta_2=\ldots = \beta_l = 0$, Granger-cause *y* in the first regression and that *y* do not Granger-cause in the second regression.

The study also performs the Granger causality test between the foreign aid and agricultural growth, to determine whether foreign aid causes agricultural growth. The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another (Granger, 1981). Testing causality, in the Granger sense, involves using F-test to test whether lagged information on foreign aid provides any statistically significant information about agricultural growth in the presence of lagged agriculture growth. If not, foreign aid does not Granger-cause agricultural growth. For this study, agricultural foreign aid and other variables in the model are expected provide any statistically significant information about agricultural growth in the presence of lagged agricultural growth. If not, agricultural foreign aid and other variables in the model do not Granger-cause agricultural growth, as the case may be.

3.2.8 VAR Diagnostic Tests

Once the VAR models are estimated some diagnostic tests which are important in order to make sure that the results obtained from VAR estimation can be used for forecasting or policy purposes. These post estimation tests are mostly performed on the residual of the VAR and they include: the LM test for residual autocorrelation, Jarque-Bera test for residual normality, test for VAR stability and Breusch-Pagan-Godfrey test for the presence of heteroscedasticity in the VAR's residuals. In addition to the above diagnostic tests, the stability of long run estimates has been tested by applying the cumulative sum of recursive residual (CUSUM) and the cumulative sum square of recursive residual (CUSUMQ) test. In order to reject the null hypothesis, we can decide by looking the p-values associated with the test statistics. That is the null hypothesis is rejected when the p-value are smaller than the standard significance level (I.e 5%).

Heteroscedasticity Test

The test for heteroscedasticity investigates whether the variance of the errors in the model are constant or not. Breusch-Pagan-Godfrey test is used to check whether the residuals are homoscedastic or not. In this case the hypothesis is; null hypothesis says the residual are not hetroscedastic that is homoscedastic. And the alternative hypothesis says the residual are hetroscedastic. The test regression is run by regressing each cross product of the residuals on the cross products of the regressors and testing the joint significance of the regression. If the test statistic is significant, that is, P value is less than 0.05; the null hypothesis of homoscedasticity and no misspecification are rejected.

Autocorrelation test

Autocorrelation on the other hand is the presence of correlation between members of series of explanations ordered in time and also signifies that there is a violation of the CLRM assumption, serial independence of errors. Such violation will make the statistical inference OLS not BLUE (Best Linear Unbiased Estimator) for the error terms will disturb a different variable where it should not. Presence of autocorrelation may also indicate that there is Miss-specification of Models, Inertia, Outliers, and Manipulation of Data. Most time series models are highly infested with autocorrelation, thus, it will be assumed that this violation is highly present in the model that was presented in this paper.

Stability Test

The test of stability is used to know about the changing behaviour of the parameter. There are two ways to test in this paper which is cumulative sum (CUSUM) and cumulative sum of square (CUSUMQ). Cumulative sum test (CUSUM) is the test helps to show if coefficients of regression are changing systematically. Cumulative sum of square test (CUSUMQ) is helpful to showing if the coefficient of regression changing suddenly. So the purpose of both test are to know about the changing behaviour of the parameter. The hypothesis should follows, null hypothesis the parameter is stable (desirable). Alternative hypothesis is the parameter is not stable (not desirable). Its guideline to accept or reject is as follows. One if we find blue line between or within the redline we accept the null hypothesis (desirable) and reject the null hypothesis (not desirable). Two if blue line cross redlines we reject the null hypothesis and accept the alternatives.

3.3 Research Approach

This study try to assess the impact of Foreign aid on agricultural growth by using the VAR model Since the objective of this paper is to assess the impact of foreign aid on Agricultural growth, attempts are made to include variables to further improve the above model and to be in line with the objective. The main purpose of this empirical model is to estimate the short- and long-run effect of agricultural growth determinants, in which foreign aid is considered as one of those determinants. The model used in the current paper is based on aforementioned growth theories including Harrod- Domar, neoclassical, and endogenous growth model. It is consistent among those growth theories that foreign aid is an important determinant of economic growth and also it is important for agricultural growth. The regression model will take the following form;

$$LAGGDP = \beta_0 + \beta_1 \mathrm{L}FORAID + \beta_2 \mathrm{L}LOAN + \beta_3 \mathrm{L}ARLAND + \beta_4 Lgexp + \beta_5 LCINV\ EST + \beta_6 LLBR + \varepsilon \text{.....14}$$

Where: AGGDP is the net agricultural growth in Ethiopia measured as the performance of crop production and allied activities which is animal farming and hunting and forestry. FORAID is the official development assistance (actual disbursement flows) to support agricultural production to address food security issues, farmers' income and the general wellbeing of producers in Ethiopia. LOAN, domestic and foreign loan to agriculture, measured, β1 ….. β4 are coefficients of each variable in the model and ε represents the error term. All the variables are expected to have positive effects on agricultural growth in the country. The study mostly focuses in finding out foreign aid on agricultural growth of Ethiopia. The leading tool for regression, testing for the overall significance, testing for CLRM violations, and remedies for CLRM violations of the model will be the state of the art statistical programs.

3.4 Definition of Variables and Expected Signs

- **Agricultural growth (AGGDP).** The agricultural GDP is the ratio of agriculture sector from total GDP. Agricultural growth or GDP by economic activities of agriculture sector at constant price for each year. It used as the dependent variable in order to obtain the impact of foreign aid on agricultural growth and expressed in million of birr.

- **Foreign Aid (FORAID).** Official development assistance or foreign aid that that are given to specific sector or for agriculture for the purpose of agriculture growth and it is used as the independent variable which have direct causal relationship with agricultural growth. And expressed in million of birr.
- **Loan to Agriculture (LOAN);** Annual disbursement of loan to agriculture. This are the domestic loan which are given to Agriculture growth or other allied activities of agriculture input by the government or by farmer cooperative union or by saving and borrowing micro finance institute and so on. It is expressed in million of birr. It is directly affect agricultural sector productivity.
- **Arable land (ARLAND);** Arable land is, it is a land capable of being ploughed and used to grow crops and expressed as percent of total land area.
- **Government expenditure;** A government spends money towards the supply of goods and services that are not provided by the private sector but it important for the nation's welfare. Government spending goes to the nation's defence, infrastructure, health and welfare benefits. By this context in this study the government expenditure is the government spends for specific sector agriculture, which is farm and allied activity in the form of infrastructure and so on.
- **Capital investment (CINVEST);** capital investment that are flow from domestic and foreign which have commenced for agriculture.
- **LABOUR (LBR)** the labour force which is

  The expected result is to find a positive relationship between foreign aid and agricultural growth on average, as indicated by most prior research on this subject. Further anticipate, however, that aid will have a detrimental effect on agricultural growth. Furthermore the research expected arable land and loan to positively influence.

Table 1; Appropriate Expectation

Indicator	Variable Name	Sign
Agricultural gdp growth	**AGGDP**	Dependent variable
Foreign aid	**FORAID**	(±)
loan to agriculture	**LAON**	(+)
Arable land	**ARLAND**	(+)
Government expenditure	**GEXP**	(+)
Capital investment	**CINVEST**	(+)
labour	**LBR**	(+)

CHAPTER FOUR

4. RESULTS AND DISCUSION

4.1 Introduction

The aim of this chapter is to present the empirical results of the model analysed and to discuss the results obtained when the data for Ethiopia were applied (for the period 1974/75 to 2015/16). This part examines the link between foreign aid and Agricultural growth in Ethiopia. Describes and examines the trends in foreign aid flows to Ethiopia and attempts to show the link between flow of aid and Agricultural growth variables considered and also present the results of the VAR estimation and associated tests to determine the impact of foreign aid on Agricultural growth to Ethiopia. Finally, the chapter shows the results of the Granger Causality test.

4.2 Descriptive statistics of the variable

Before engaging any regression analysis it is essential to have a feel of our dataset that is what does our sample convey, Summary statistics is essential for parametric and non-parametric test, quantitative and qualitative test, whether sample is normally distributed, provide information on measure of central tendency (mean, median and mode), measure of dispersion (range, variance, standard deviation, percentile, quartiles, deciles etc.), measure of normality which is kurtosis (measures the degree of sharpness) and skewness (measures of the degree of asymmetry).

The table 1 below show that the descriptive statistics value of the variable which consists of both dependent and independent variables for 42 observations. The study uses agricultural growth (Aggdp) as dependent variable and foreign aid (foraid), arable land (Arland), government expenditure in these sector and loan given to agriculture (Loan) as independent variable.

Table 2; Descriptive summary statistics

	Aggdp	Foraid	Arland	Cinvest	Gexp	Labour	Loan
Mean	3.542334	1287.280	11.922	13224.80	899.75	85.321	1582.3
Median	4.615894	876.9800	11.850	622.00	336.96	88.648	358.40
Maximum	18.75887	3885.540	15.340	505373	3745.5	91.999	14175
Minimum	-20.8856	115.0900	9.850	0.0000	18.860	68.985	83.10
Std. Dev.	8.183635	1184.616	1.6096	78788	1204.4	7.0720	3014.3
Skewness	-0.63835	1.054286	0.2926	6.1649	1.3459	-0.8989	2.8724
Kurtosis	3.834713	2.774201	2.0336	39.013	3.3354	2.5136	10.854
Jarque-Bera	3.974830	7.682483	2.1805	2475.3	12.572	5.9255	161.77
Probability	0.137049	0.021467	0.3361	0.0000	0.0018	0.0516	0.000
Sum	145.2357	52778.48	488.81	542217	36890	3498.1	64874
Sum Sq.Dev.	2678.875	56132638	103.63	2.48E	580241	2000.5	3.63E
Observations	41	41	41	41	41	41	41

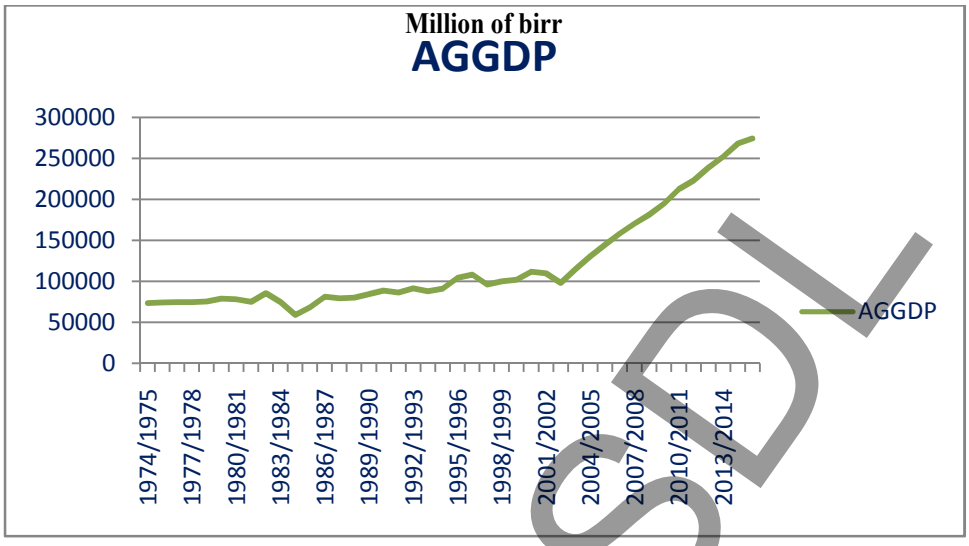
Source; Own computation (2018)

From the above summary statistics table, the observation of all variable (dependent and independent) are equivalent or not different i.e 42 observations. The mean value of the dependent variable is equals 3.542334 which show the average growth rate of agricultural is 3.542334 percent with standard deviation 60201.32. It has also minimum and maximum value of -20.8856 and 18.75887 percent respectively. This indicates the agricultural growth performance of Ethiopia from 1974 to 2015 ranges from minimum to maximum. It shows that there is positive and negative agricultural growth in Ethiopia. Foreign aid is one of independent variable and the mean value of 1333.624 million birr and standard deviation 1208.012. Its minimum and maximum value 115.09 and 3885.54 million birr respectively this is good progress of foreign aid flow to agriculture sector. The remaining of other independent variables like loan given to agricultural growth and arable land are interpreted by the above trend.

The line graph of Appendix 11 shows trends of agricultural growth and others independent variable which is foreign aid, loan given to agriculture, government expenditure in agriculture sector and arable land. As shown below the dependant variable agricultural growth have a

better growth trend and also from the independent variable foreign aid and arable land have a better growth description than the rest independent variable.

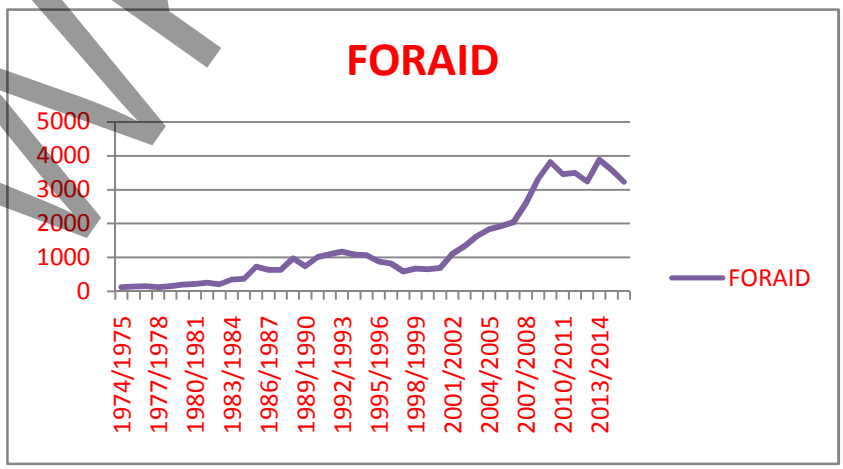
Figure 1, Trends of agricultural GDP growth



Source: Ministry of Agriculture (MOA); National bank (NBE)

Nevertheless, specifically the trend of agriculture growth in Ethiopia over the past 4 decades has a good progress as it is shown in figure 1. The growth of agriculture up to 1984/1985 is stagnant and for two instantaneous years it gives as downward trend. After 1986/87 have increasing trend but it have up and down trends in some extents. Finally after 2003/2004 increase sharply up to 2015/2016.

Figure 2 Trends of foreign aid growth



Source NBE and MOFEC

Foreign aid growth has the same growth trend in some extents with agricultural growth which is up to 1983/1984 the growth trend is inactive and from 2000/2001 up to 2009/2010 shows incremental trends in Ethiopia.

4.3 Econometrics analysis

4.3.1 Unit Root Test Results

Non-Stationarity of time series data has often been regarded as a problem in empirical analysis. Working with non-stationary variables lead to spurious regression results, from which further inference is meaningless. Hence, the first step in time series econometric analysis is to carry out unit root test on the variables of interest. The test examines whether the data series is stationary or not. To conduct the test Augmented Dickey – Fuller (ADF) test are used with and without a trend. The null hypothesis in these tests claims that the series under investigation has unit root. On the other hand, the alternative hypothesis claims that the series is stationary. The result of the unit root test for the variables at level was presented in table below.

Table 3; Unit root test results for variables at level by ADF

Variables		Intercept		With intercept and trend		None	
		t-statistic	p-valeu	t-statistic	p-valeu	t-statistic	p-valeu
LAGGDP		2.196454	0.9999	-0.729592	0.9623	3.545992	0.9992
LFORAID		-1.324082	0.6093	-1.878047	0.6476	2.313302	0.9942
LLOAN		-0.796464	0.8093	-2.618643	0.2746	0.947218	0.9057
LARLAND		-1.045427	0.7275	-0.909299	0.9449	0.286804	0.7640
LGEXP		-1.808680	0.8060	-2.227754	0.4623	5.6503	1.0000
LCINVEST		-4.644881	0.0632	-4.555738	0.142	-0.8595	0.3367
LLBR		6.590046	1.0000	1.041508	0.9998	-2.28047	0.1236
CRITICAL VALEU	1%	-3.600987		-4.243644		-2.639210	
	5%	-2.935001		-3.544284		-1.951687	

Source: Eveiws 8 stastical output of ADF test at level.

The ADF test statistics as depicted in Table 1, illustrates that all variables are non stationary at levels with the three different specifications. That is, the test conducted fails to reject the null hypothesis of unit root in the three different specifications. A series have a unit root and

it is non stationary at 1% and 5% level of significance. Therefore, to avoid spurious regression all these variables have to be differenced to transform them to stationary. In the second stage, the order of integration of the non stationary variables were performed proceeding in the same way by means of ADF tests applied to all series in first differenced form. The result of the test was presented below.

Table 4; ADF Unit Root Test Results for Variables in first difference by ADF

Variables		**With intercept**		**With intercept and trend**		**None**	
		t-statistic	**p-value**	**t-statistic**	**p-value**	**t-statistic**	**p-value**
LAGGDP		-6.280818*	0.0000	-7.47726*	0.0000	-2.285658**	0.0179
LFORAID		-7.217873*	0.0000	-7.22666*	0.0000	-3.033949*	0.0033
LLOAN		-10.96978*	0.0000	-10.8400*	0.0000	-10.87424*	0.0000
LARLAND		-3.514070**	0.0126	-3.92301**	0.0201	-3.538492*	0.0008
LGEXP		7.090875*	0.0000	-6.981591*	0.0000	-2.098102**	0.0360
LCINVEST		-9.511259*	0.0000	-9.260955*	0.0000	-9.540459*	0.0000
LLBR		-1.606409	0.0012	-5.769302	0.0001	-0.700124*	0.0409
CRITICAL VALEU	**1%**	-3.69407		-4.243644		-2.639210	
	5%	-2.935001		-3.544284		-1.951687	

Source: Eveiws 8 stastical output of ADF test at first difference

Notes: (a) The asterisks *, ** indicates significance at 1% and 5% levels respectively;

The first differences of the variables are investigated for a unit root test and the test result proved that all of them are stationary in the three different specifications. Therefore, it can be conclude that all variables are integrated of order one. Therefore the first difference of all variables is used for estimation. Depending on the ADF test equation used, all four variables exhibit a non-stationary process and integrated of order one. The result suggests using the variables in first difference. However, to incorporate the long run relationship among the variables, cointegration test is required.

4.3.2 Optimal Lag Length

The determination of autoregressive lag length for a time series is especially important in economics studies. The four selection criteria which is the final prediction error (FPE), Akaike's information criterion (AIC), Schwarz's information criterion (SBIC) and the hannan and Quinn information criterion (HQIC) are used to select the optimum lag length. While, checking up to three lag orders to include the 5% significance level suggest that lag 1 would be the correct lag length. Therefore this study used the above test criterion to choose the appropriate lag length for agricultural growth model. The four selection criterion suggests one lags is optimum In this case, the lag length identified by four selection criterion is considered (i.e. one lags). The report of this result is shown in table 5. Thus, it can be taken to estimate Johansen test of cointegration, VAR and VECM models. After finding the optimal lag length it is now possible to conduct the cointegration test.

Table 5 Lag length Selection for Bivariate Model

VAR Lag Order Selection Criteria

Endogenous variables: LAGGDP LARLAND LCINVEST LFORAID LGEXP LLBR LLOAN

Lag	LogL	LR	FPE	AIC	SC	HQ
0	102.1990	NA	1.19e-11	-5.288833	-4.980927	-5.181366
1	360.9161	402.4488*	1.09e-16*	-16.93978*	-14.47653*	-16.08004*
2	403.4323	49.60227	2.17e-16	-16.57957	-11.96098	-14.96756

4.3.3. Johansen's Cointegration Test

From the stationarity tests discussed in the previous section it was found that all of the variables are non-stationary in levels and integrated of the same order. Therefore, with this result, one can proceed in formally testing for cointegration. The cointegration test procedure requires that the optimal lag lengths must be found before testing. Therefore, an unrestricted VAR was estimated for lag lengths at a maximum of one lags. In Johansen**'s** test of cointegration, the study have six independent variables such as foreign aid (FAID) allocated for agricultural sector, Loan given to agricultural sector (Loan), Arable land (Arland) capital investment (cinvest), labour(lbr) and government expenditure (gexp) so here all variables are non stationary but when it is converted to first difference they become stationary. To

determine the number of cointegretion equation in VECM there are three types of methods which is Johansen's "trace" statistic method, Johansen's maximum Eigen value statistic method and Information criterion. All the three methods are based on Johansen's maximum likelihood (ML) estimator of the parameters of a cointegrating VEC model

Table 6; Johansen cointegretion test result

Unrestricted cointegretion Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.771578	142.3306	125.6154	0.0032
At most 1	0.601586	89.17435	95.75366	0.1302
At most 2	0.495201	56.04483	69.81889	0.3762
At most 3	0.390784	31.43539	47.85613	0.6430
At most 4	0.177116	13.59440	29.79707	0.8626
At most 5	0.156427	6.576543	15.49471	0.6273
At most 6	0.012494	0.452612	3.841466	0.5011

Trace test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.771578	53.15625	46.23142	0.0079
At most 1	0.601586	33.12952	40.07757	0.2451
At most 2	0.495201	24.60944	33.87687	0.4119
At most 3	0.390784	17.84099	27.58434	0.5084
At most 4	0.177116	7.017854	21.13162	0.9532
At most 5	0.156427	6.123931	14.26460	0.5974
At most 6	0.012494	0.452612	3.841466	0.5011

Max-eigenvalue test indicates 1 cointegratingeqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

Source: Eveiws 8 stastical output of Johansen's Cointegration Test

From the above result in the table 5 of trace statistics test, None* is the first hypothesis it means there is cointegrated equation. That means there is one cointegrated equation in the model. The probability is less than five percent it is 0.0079 percent or because of trace statistics (142.3306) is greater than the critical value (125.6154). At most 1 *, is indicates that there is no cointegrated equation in the model because the probability is greater than five percent it is 0.1302 percent or because of trace statistics is greater than the critical value. In this case we cannot reject the null hypothesis. And At most 2 is also indicates that there is no cointegrated equation in the model because the p-value are greater than 5%. This is the result of Trace test it indicate that there is one cointegrated equation in the model at 0.05 levels. Maximum Eigen value test have the same implication with the trace test that means there is one cointegrated equation in the model.

Evidence from above cointegretion test depicts that both the trace and Eigen value statistics is reveals that the null hypothesis of no cointegrating vector is rejected at the 5% level of significance. The result further showed that there is one cointegrating vectors among the variables of interest at the 5% level of significance. This is turn stipulate that there is long run relationship among the variable which are foreign aid (foraid), loan given to agricultural sector (loan), government expenditure for agriculture and arable land (arland). Or the entire variable eventually is not move together. If there is no cointegrated equation in the model we can run unrestricted VAR model but in this model there is one cointegrated equation in the model so we can run VECM model.

Cointegrating Equations (Normalized)

Normalized cointegrating coefficients (standard error in parentheses)

LAGGDP	LARLAND	LCINVEST	LFORAID	LGEXP	LLBR	LLOAN
1.000000	1.708480	0.094562	-0.013452	0.317017	0.061150	-0.042842
	(4.68180)	(0.52870)	(0.88657)	(1.29510)	(27.8341)	(0.64016)

$$LAGGDP = 1.708LARLAND - 0.013LFORAID + 0.317LGEX - 0.042842LLOAN + 0.094LCINV\ EST + 0.061LLBR$$

The above long run equation from the regression result shows four of the variables are with their expected sign which is arable land, government expenditure, capital investment and labour and significant determinants of the dependent variable and two variable are not with their expected sign which is loan given to agricultural sector and foreign aid. In the long run, the relationship between agricultural growth and foreign aid is negative and insignificant both at 1% and 5% level of significance. It means the long run estimates for Ethiopia suggest that for every one percentage increase in foreign aid translates into decrease in agricultural growth by 1.34 percent.

From the result, Foreign aid is found insignificant impact of agricultural growth in the country and its coefficient is negative. However arable land capital investment, labour and government expenditure on agricultural sector has positive and highly significant impact on agricultural Growth of Ethiopia in the long run. The one percent increase in government expenditure on agricultural sector should increase the agricultural growth by 31.7% on average. And also arable land has positive impact in agricultural growth of Ethiopia in the long run. Capital investment in agricultural sector have positive and significant impact on agricultural growth of Ethiopia a one percent increase in capital investment increase agricultural growth by 9.4%. Labour has also positive and significant impact in agricultural growth a one percent increase in labour increase agriculture by 6.1%. .But the other variable which is loan given for agriculture have negative impact in the long run as a result indicates. A one percent increase in loan given to agricultural growth or for other allied activities in this sector would give the decline in agricultural growth by 4.2% on average. So we accept the null hypothesis and reject the alternative hypothesis. It means foreign aid which is directly flow to agricultural sector has no impact on agricultural growth of Ethiopia. This result is consistence with the result reached by clement and Isac (2013) in Nigeria.

Table 7; Vector error correction model (VECM) and Short Run Elasticities

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.696316	0.049262	0.060207	0.0024
C(2)	-0.343474	0.179196	-1.916749	0.0655
C(3)	-1.001175	4.720742	-0.212080	0.8336
C(4)	0.010780	0.150885	0.071448	0.9435
C(5)	-0.706376	0.774726	-0.911776	0.3697
C(6)	-0.982007	1.557709	-0.630417	0.5335
C(7)	-3.613511	36.04860	-0.100240	0.9209
C(8)	-0.067742	0.230625	-0.293733	0.7711
C(9)	0.112412	0.151678	0.741122	0.4648

R-squared	0.177961	Mean dependent var	0.023070
Adjusted R-squared	-0.056908	S.D. dependent var	0.418450
S.E. of regression	0.430192	Akaike info criterion	1.358602
Sum squared resid	5.181821	Schwarz criterion	1.750447
Log likelihood	-16.13414	Hannan-Quinn criter.	1.496746
F-statistic	0.757704	Durbin-Watson stat	2.214978
Prob(F-statistic)	0.006683		

Source:Eveiws 8 Vector Error Correction (VECM)

C (1) is speed of adjustment towards long run equilibrium and is vector error correction model for the first difference of foreign aid for agriculture. At this point the error correction coefficient speed of adjustment must be negative and significant. The sign of C(1) indicates that the existence of long run causality from all the independent variable which is foreign aid, arable land, government expenditure on agriculture and loan given to agriculture. It means that the dependent variables have or have not long run influence on dependent variables. So the error correction coefficient is C (1) is -0.696316 and the probability is 0.0024 it is significant and the sign is also negative. It is the error correction mechanism the system converges to long run relationship.

The lagged error correction term (ECMt-1) included in the model to capture the long run dynamics between the co integrating series is negative and between zero and one. The coefficient of this error correction term also implies that in one year the real growth of agriculture Product adjusts itself by 69.6%. In other Words, it suggests that ΔLAGGDP is corrected by around 69.6% per annum. F statistics is 0.006683 means all independent variable are jointly can influence the dependant variable. The short run result for the agricultural growth equation shows that two of the variables are within their expected sign and the rest two are not with their expected sign like the long run impact. Foreign aid has a negative impact on agricultural growth in the short run.

The following table shows the significance of the independent variable to explain dependent variable which is agricultural growth.

Table; 8; OLS Estimation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.840784	17.79259	-0.553083	0.0000
LARLAND	1.602729	2.170794	-0.738315	0.0000
LCINVEST	0.015119	0.106602	-0.141822	0.0132
LFORAID	-0.792567	0.392779	2.017848	0.0518
LGEXP	0.239152	0.539261	-0.443481	0.0003
LLBR	2.649477	8.062142	0.328632	0.0000
LLOAN	-0.251408	0.240824	1.043949	0.3041

R-squared	0.766830	Mean dependent var	0.665930
Adjusted R-squared	0.763342	S.D. dependent var	0.466707
S.E. of regression	0.403720	Akaike info criterion	1.181437
Sum squared resid	5.378660	Schwarz criterion	1.476991
Log likelihood	-16.62874	Hannan-Quinn criter.	1.288300
F-statistic	3.186455	Durbin-Watson stat	1.263414
Prob(F-statistic)	0.000000		

Source eview 8

From the characteristics of best regression model the first one is the R-square value should have to be high normally it should be greater than 60%. So in this model the R-square it is good or the data is fitted nicely. And when we see arable land it is significant variable to explain agricultural growth because the p-value are less than 5% it is 0.0000 and also government expenditure to agriculture sector for the purpose of agricultural growth is significant variable to explain agricultural growth in these model because the p-value are less than 5% it is 0.0003 and also the other two variables which is capital investment on agricultural growth labour force which participate in agriculture are both significant to explain agricultural growth of Ethiopia. Foreign aid and loan given to agricultural sector are insignificant to explain agricultural growth in Ethiopia because the p-value are not less than 5% it is 0.0518 and 0.3141 respectively. The P-value of F-statistics is 0.00000 it means less than 5% so F-statistics is significant. The implication of F-statistics being significant is all the independent variables arable land, foreign aid, government expenditure and loan given to agricultural growth are jointly can influence the dependant variable which is agricultural growth.

4.4 VAR Diagnostic test result

As it is discus before this post estimation tests are mostly performed on the residual of the VAR and they include: the LM test for residual autocorrelation, Breusch-Pagan-Godfrey for Heteroskedasticity Test, Breusch-Godfrey Serial Correlation LM Test and test for VAR stability

Table 9; Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.291005	Prob. F(1,27)	0.1417
Obs*R-squared	2.893966	Prob. Chi-Square(1)	0.0889

Source:Eveiws 8serial correlation LM test

From the second characteristics of best regression model there is no serial correlation in the residual. Breusch-Godfrey Serial Correlation LM Test used in the model if there is or no cereal correlation in the residual. The hypothesis follows; null hypothesis is residual are not

serially correlated and the alternative is residual are serially correlated. In observed R-squared the P-value of the result are greater than 5% which is 0.0889. So accept the null hypothesis and reject the alternative hypothesis. It means the residual of these model is not serially correlated which is desirable.

Table 10; HetroskedasticityTest: Breusch-Pagan-Gudfrey

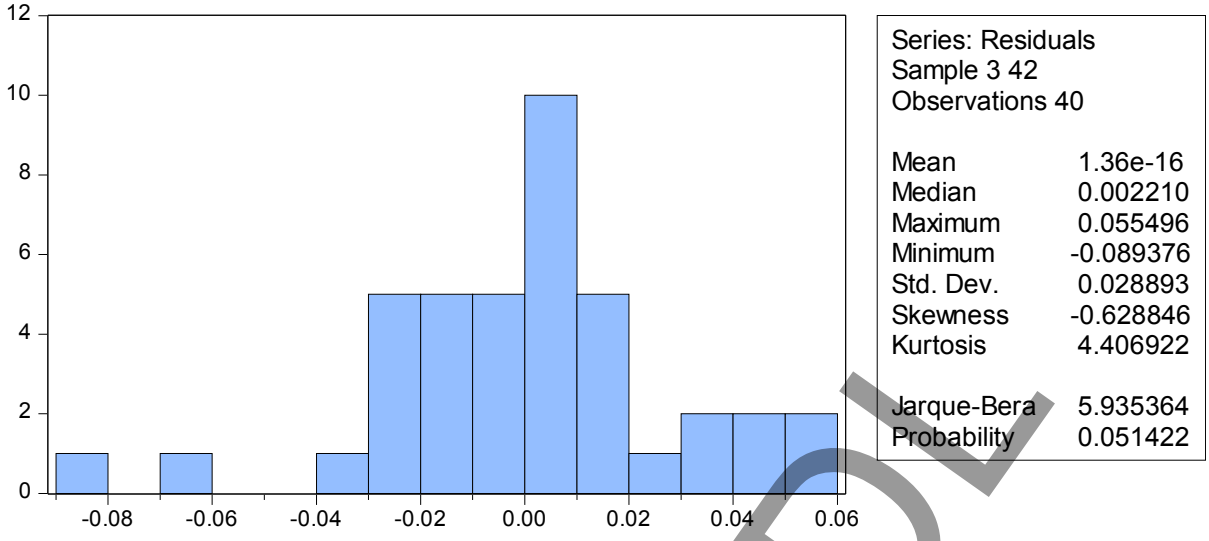
Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.300500	Prob. F(14,22)	0.9880
Obs*R-squared	5.939604	Prob. Chi-Square(14)	0.9680
Scaled explained SS	3.273376	Prob. Chi-Square(14)	0.9985

*Source:Eveiws 8;*Hetroskedasticity Test: Breusch-Pagan-Gudfrey

The test of Hetroscedasticity is conducted in this study to now weather the variance of the constant of the residual is constant or varying .this theoretically assumed that the variance of the error term is assumed to be constant or var($\in_t$) =δ^2 this is also homoscedasticity assumption. The third characteristics of best regression model are no Hetroscedasticity in the residual or Hetroscedasticity is not desirable in the model. That means the model should not have Hetroscedastic or the model are Homoscedastic. To test hetroscedasticity problem this paper used observe R-square in the Heteroskedasticity test of Breusch-Pagan-Godfrey of corresponding p-value in the above table. In this model the corresponding p-value are 0.9680 it is greater than 5%. So we can't reject the null hypothesis rather we accept null hypothesis. So null hypothesis says residual are not Hetroscedastic or it is homoscedastic. That is desirable for this model. The following histogram shows the normality of the residual.

Figure 3: Histogram Normality test

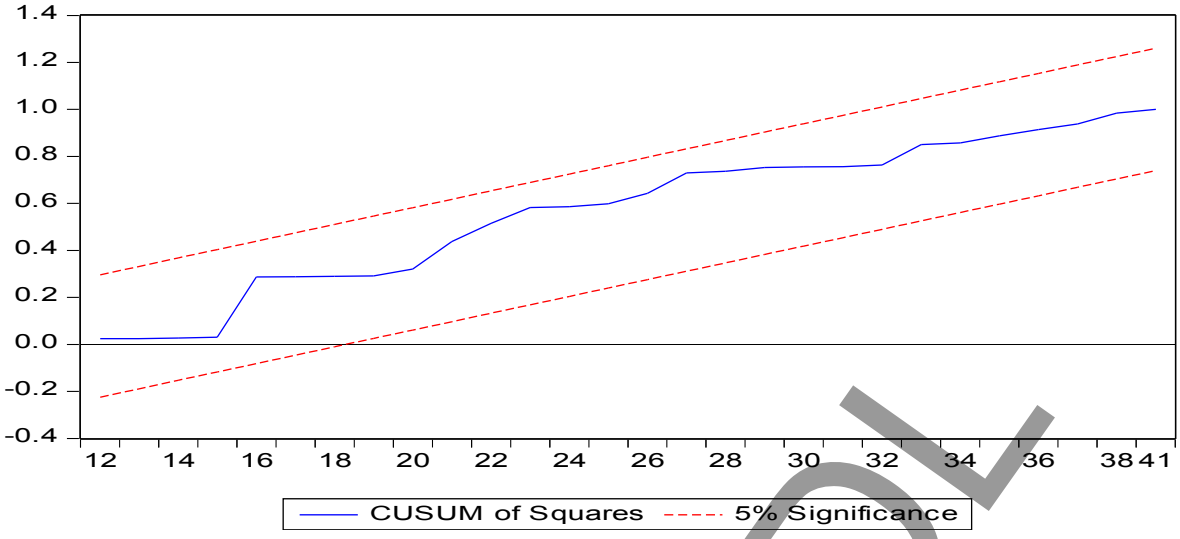


In the normality test; the residual is normally distributed to fulfil the feature of best regression model so the hypothesis follows; Ho; residual are normally distributed and HA; the residual are not normally distributed. To see this by histogram normality test the result shows that by jarque-bera and corresponding probability. The P-value is greater than 5% which is 0.051422. So we can't reject null hypothesis, which means the residual are normally distributed in the model.

Stability test

The stability of the long run coefficient is tested by the short run dynamics. Once the error correction model has been estimated the cumulative sum of recursive residual (CUSUM) and CUSUM of square (CUSUMQ) is applied to assess the parameter stability in econometric model so this paper used CUSUMQ statistics. The result indicates the absence of any instability of the coefficients because the plot of the CUSUMQ statistics falls in the critical bounds of the 5% confidence interval of parameter stability as the figure 4 below shows

Figure 4: Stability of the model –CUSUMQ test



Source: Eviews 8 stability test

The figure 2 and 3 displays the stability of the model using CUSUM and CUSUMQ test at 5% significance level. From these figure it shows that the model of the data are stable because blue line of the model is good for CUSUMQ. This shows that the CUSUMQ test through recursive residual test has passed the stability test at 5% level of significance.

4.5 Granger Causality Test in VECM

This paper also sought to investigate the causality between foreign aid and agricultural growth. Empirically, the existence of causality can be determined using the Granger Causality technique. A test for causality is performed on variables of interest to detect the presence and direction of causality between pairs of variables.

Table 11: Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
LFORAID does not Granger Cause LAGGDP	41	4.75989	0.0354
LAGGDP does not Granger Cause LFORAID		0.00541	0.9417

Table 11 presents the results of the Granger Causality Test on LFORAID and LAGGDP for Ethiopia. The results show that, LFORAID Granger causes LAGGDP at 5% level of significance but LAGGDP doesn't granger causes LFORAID. The empirical result confirms the existence of significant unidirectional causality from LFORAID to Agricultural growth. However, the converse was not statistically significant.

CHAPTER FIVE

5. CONCLUSION AND POLICY IMPLICATION

5.1 Conclusion

The main objective of this study is to analyse the impact of foreign aid on agricultural growth in Ethiopia during the specified period. To determine the long run and short run relationship among the variables, vector error correction model was applied. Before applying the vecm model, all the variables are tested for their time series properties (stationarity properties) using ADF test. From the findings above, it can be concluded that Agricultural growth in Ethiopia is being negative and insignificantly driven by foreign aid. This study empirically examined the negative contribution of foreign aid to agricultural sector growth in Ethiopia. The study also queries if there exists a long-run relationship among the variables in the study. Prior to the establishment of a long-run relationship, the stationarity properties were also tested with the conventional unit root testing approaches of ADF. The unit root results, which reveals that all variables were non-stationary at their level form. And after first differencing, all the variables became stationary at several critical levels with different lag selection criterion. As it is discussed before the results of the co-integration and the Johansen cointegration tests show that there is a long-run association between the Ethiopian agricultural growth and foreign aid given to agriculture sector. Johansen cointegration test displays the existence of one cointegrating vectors, which depict the existence of a long run relationship among the variables of interest in this study. That is, in the long-run all the variables will converge together. The ECTM explains the speed of adjustment of the variables to their long run equilibrium value. The outcome of the ECT was negative which is expected indicating how far we are from the equilibrium value and also statistically different from zero which show the efficiency of the VECM approach. This study reveals that the speed of adjustment of the model was over 69 percent.

The paper also empirically investigated the nature of the causal relationship between the foreign aid and Ethiopia agricultural growth by using the Granger causality test through the Vector Error-Correction Model over the period 1974/75 to 2015/16. Finally the study found that there is a negative and statistically insignificant impact of foreign aid on agricultural growth of Ethiopia. So foreign aid given for developmental purposes cannot be achieving its goal if aid is targeted for the agricultural sector of Ethiopia. So foreign aid in Ethiopian context for broad sector of our economy Agriculture has a negative impact both in the long

run and short run. And four of variables which is arable land and government expenditure capital investment and labour have positive and significant impact on agricultural growth of Ethiopia.

5.2 Policy implication

The results from this study have very important policy implications which necessitate the following policy recommendations. Foreign aid takes many forms and is intended to accomplish a variety of economic, political, and humanitarian objectives. Donors and recipients alike have a vested interest in the economic effectiveness of foreign aid. In Ethiopian context Foreign aid is one of an important source for Ethiopian economic growth by direct covering of annual budget of the country, giving to direct flow to the grand project of the country and for the direct food aid to the part of citizen which is under conflict, natural hazards and so on. But this foreign aid specifically in agricultural sector has negative and insignificant impact in Ethiopia. The results of this study indicate that such aid, since 1974, has not improved agricultural growth or it have a negative and insignificant impact on agricultural growth in Ethiopia. Perhaps the foreign aid which is flow to agricultural sector in cash or kind is not managed effectively or exposed for corruption it could be ineffective. And also this aid which is flow to the agriculture sector boosts the rural people which is depend on agriculture to self-sustaining problem or dependency.

A major policy implication of the results is that policy makers in Ethiopia should encourage increase percentages of capital investment arable land which is capable of being ploughed and used to grow crops and government expenditure which is directly given to agricultural sector in the form of infrastructure for farming and allied activity has a positive and significant impact on agricultural growth. Government of Ethiopia must as well improve the quality of Governance, drastically reduce corruption, and improve the system of accountability and managing expenditure or allocation of foreign aid flows in a manner that will ensure sustainable agricultural growth in Ethiopia.

5.3 Further Research Area

So Additional analysis is needed to explain why foreign aid is seems to be effective or have not impact in agricultural growth of Ethiopia and it is important to addres the weakness which have hindered its effectivnes in contributing to agricultural growth. Analyzing the impact of foreign aid on specific sector of agriculture with different methodology might better explore the foreign aid impact on agricultural growth.

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Appendix

Appendix 1: Summary Statistics of Agricultural growth, foreign aid for agriculture, arable land, loan given to agricultural sector and government expenditure in agricultural sector for the period 1974 to 2016.

	Aggdp	Foraid	Arland	Cinvest	Gexp	Labour	Loan
Mean	3.542334	1287.280	11.922	13224.80	899.75	85.321	1582.3
Median	4.615894	876.9800	11.850	622.0000	336.96	88.648	358.40
Maximum	18.75887	3885.540	15.340	505373.7	3745.5	91.999	14175
Minimum	-20.8856	115.0900	9.8500	0.000000	18.860	68.985	83.10
Std. Dev.	8.183635	1184.616	1.6096	78788.21	1204.4	7.0720	3014.3
Skewness	-0.63835	1.054286	0.2926	6.164977	1.3459	-0.8989	2.8724
Kurtosis	3.834713	2.774201	2.0336	39.01325	3.3354	2.5136	10.854
Jarque-Bera	3.974830	7.682483	2.1805	2475.344	12.572	5.9255	161.77
Probability	0.137049	0.021467	0.3361	0.000000	0.0018	0.0516	0.0000
Sum	145.2357	52778.48	488.81	542217.0	36890	3498.1	64874.
Sum Sq.Dev.	2678.875	56132638	103.63	2.48E+11	580241	2000.5	3.63E+
Observations	41	41	41	41	41	41	41

Appendix 2: Lag length Selection for Bivariate Model

VAR Lag Order Selection Criteria

Endogenous variables: LAGGDP LARLAND LCINVEST LFORAID LGEXP LLBR LLOAN

Exogenous variables: C

Date: 03/26/19 Time: 15:16

Sample: 1 41

Included observations: 36

Lag	LogL	LR	FPE	AIC	SC	HQ
0	102.1990	NA	1.19e-11	-5.288833	-4.980927	-5.181366
1	360.9161	402.4488*	1.09e-16*	-16.93978*	-14.47653*	-16.08004*
2	403.4323	49.60227	2.17e-16	-16.57957	-11.96098	-14.96756

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Appendix 3: Johansen contegretion Test

Date: 03/26/19 Time: 15:33

Sample (adjusted): 3 41

Included observations: 36 after adjustments

Trend assumption: Linear deterministic trend

Series: LAGGDP LARLAND LCINVEST LFORAID LGEXP LLBR LLOAN

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.771578	142.3306	125.6154	0.0032
At most 1	0.601586	89.17435	95.75366	0.1302
At most 2	0.495201	56.04483	69.81889	0.3762
At most 3	0.390784	31.43539	47.85613	0.6430
At most 4	0.177116	13.59440	29.79707	0.8626
At most 5	0.156427	6.576543	15.49471	0.6273
At most 6	0.012494	0.452612	3.841466	0.5011

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.771578	53.15625	46.23142	0.0079
At most 1	0.601586	33.12952	40.07757	0.2451
At most 2	0.495201	24.60944	33.87687	0.4119
At most 3	0.390784	17.84099	27.58434	0.5084
At most 4	0.177116	7.017854	21.13162	0.9532
At most 5	0.156427	6.123931	14.26460	0.5974
At most 6	0.012494	0.452612	3.841466	0.5011

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Appendix 4: Vector error correction model (VECM) and Short Run Elasticities

Dependent Variable: D(LAGGDP)

Method: Least Squares

Date: 03/26/19 Time: 14:42

Sample (adjusted): 3 41

Included observations: 37 after adjustments

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.696316	0.049262	0.060207	0.0024
C(2)	-0.343474	0.179196	-1.916749	0.0655
C(3)	-1.001175	4.720742	-0.212080	0.8336
C(4)	0.010780	0.150885	0.071448	0.9435
C(5)	-0.706376	0.774726	-0.911776	0.3697
C(6)	-0.982007	1.557709	-0.630417	0.5335
C(7)	-3.613511	36.04860	-0.100240	0.9209
C(8)	-0.067742	0.230625	-0.293733	0.7711
C(9)	0.112412	0.151678	0.741122	0.4648

R-squared	0.177961	Mean dependent var	0.023070
Adjusted R-squared	-0.056908	S.D. dependent var	0.418450
S.E. of regression	0.430192	Akaike info criterion	1.358602
Sum squared resid	5.181821	Schwarz criterion	1.750447
Log likelihood	-16.13414	Hannan-Quinn criter.	1.496746
F-statistic	0.757704	Durbin-Watson stat	2.214978
Prob(F-statistic)	0.006683		

Appendix 5: HetroskedasticityTest: Breusch-Pagan-Gudfrey

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.300500	Prob. F(14,22)	0.9880
Obs*R-squared	5.939604	Prob. Chi-Square(14)	0.9680
Scaled explained SS	3.273376	Prob. Chi-Square(14)	0.9985

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 03/28/19 Time: 14:09

Sample: 3 41

Included observations: 37

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.451054	18.12926	0.135199	0.8937
LAGGDP(-1)	0.023986	0.114635	0.209238	0.8362
LARLAND(-1)	-2.826550	4.088738	-0.691301	0.4966
LCINVEST(-1)	0.016843	0.090407	0.186306	0.8539
LFORAID(-1)	0.027233	0.471896	0.057710	0.9545
LGEXP(-1)	0.190093	0.886332	0.214472	0.8322
LLBR(-1)	-2.948300	31.75953	-0.092832	0.9269
LLOAN(-1)	0.075712	0.153957	0.491772	0.6278
LAGGDP(-2)	-0.095970	0.124351	-0.771765	0.4485

LARLAND(-2)	1.713943	3.690501	0.464420	0.6469
LCINVEST(-2)	-0.044934	0.085625	-0.524783	0.6050
LFORAID(-2)	0.026700	0.469945	0.056814	0.9552
LGEXP(-2)	-0.443650	0.885917	-0.500781	0.6215
LLBR(-2)	2.218765	37.14932	0.059726	0.9529
LLOAN(-2)	0.121517	0.174706	0.695550	0.4940

R-squared	0.160530	Mean dependent var	0.140049
Adjusted R-squared	-0.373678	S.D. dependent var	0.196974
S.E. of regression	0.230861	Akaike info criterion	0.196934
Sum squared resid	1.172531	Schwarz criterion	0.850009
Log likelihood	11.35671	Hannan-Quinn criter.	0.427174
F-statistic	0.300500	Durbin-Watson stat	2.164588
Prob(F-statistic)	0.987997		

Appendix 6: Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.291005	Prob. F(1,27)	0.1417
Obs*R-squared	2.893966	Prob. Chi-Square(1)	0.0889

Test Equation:

Dependent Variable: RESID

Method: Least Squares

Date: 03/28/19 Time: 13:56

Sample: 3 41

Included observations: 37

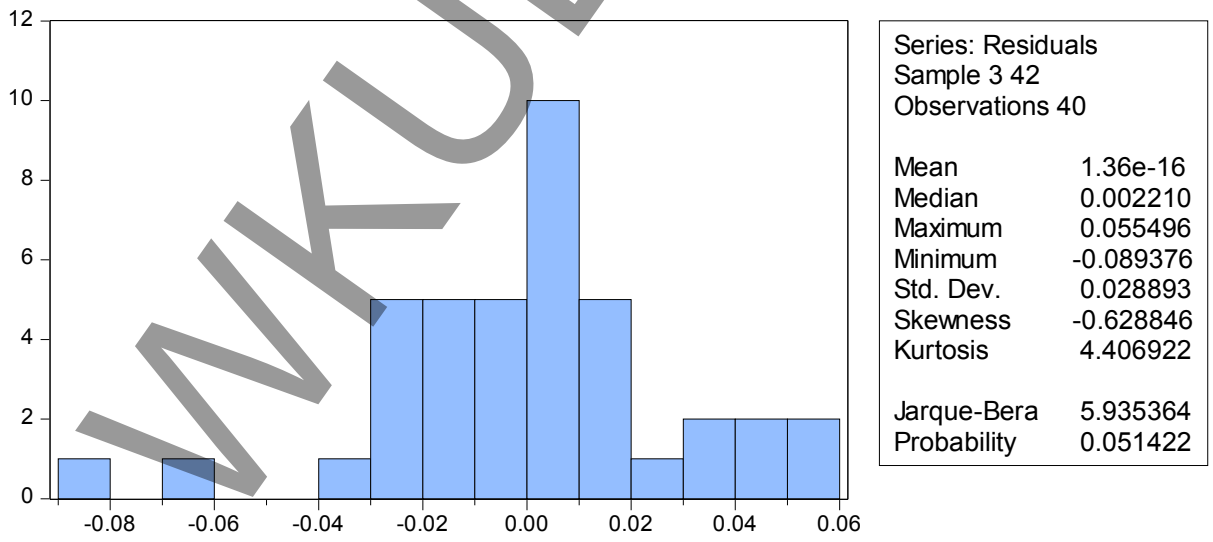
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.020161	0.049972	0.403444	0.6898
C(2)	0.616552	0.443420	1.390446	0.1757
C(3)	0.077109	4.615817	0.016705	0.9868

C(4)	0.040128	0.149886	0.267724	0.7909
C(5)	-0.100522	0.760366	-0.132202	0.8958
C(6)	-0.697254	1.591137	-0.438211	0.6647
C(7)	-4.228578	35.35578	-0.119601	0.9057
C(8)	0.101040	0.235159	0.429667	0.6708
C(9)	0.024705	0.149193	0.165589	0.8697
RESID(-1)	-0.763800	0.504623	-1.513607	0.1417

R-squared	0.078215	Mean dependent var	2.40E-17
Adjusted R-squared	-0.229046	S.D. dependent var	0.379394
S.E. of regression	0.420605	Akaike info criterion	1.331213
Sum squared resid	4.776524	Schwarz criterion	1.766596
Log likelihood	-14.62743	Hannan-Quinn criter.	1.484706
F-statistic	0.254556	Durbin-Watson stat	1.972418
Prob(F-statistic)	0.981588		

Appendix 8: Histogram Normality test



Appendix 9: Stability Test

Appendix 10: Pairwise Granger causality Test

Pairwise Granger Causality Tests
Date: 12/28/18 Time: 16:36
Sample: 1 42
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LFORAID does not Granger Cause LAGGDP	41	4.75989	0.0354
LAGGDP does not Granger Cause LFORAID		0.00541	0.9417

Annex 11 the data