ST. MARY'S UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Bank Credit to the Agricultural Sector In Ethiopia: A Trend Analysis

By
Nebiat Tekle

ADDIS ABABA, ETHIOPIA
February 2017

Bank Credit to the Agricultural Sector In Ethiopia: A Trend Analysis

A THESIS SUBMITTED TO INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES (IADS), SCHOOL OF GRADUATE STUDIES
ST. MARY'S UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN AGRICULTURAL ECONOMICS

By
Nebiat Tekle

Advisor
Milkesa Wakjira (PhD)

ADDIS ABABA, ETHIOPIA

St. MARY UNIVERSITY
SCHOOL OF GRADUATE STUDIES

BANK CREDIT TO THE AGRICULTURAL SECTOR IN ETHIOPIA: A TREND ANALYSIS

BY

NEBIAT TEKLE

EXAMINER APPROVAL SHEET

This is to certify that the thesis prepared by Nebiat Tekle entitled "Bank Credit Analysis to the Agricultural Sector In Ethiopia: A Trend Analysis" and submitted in partial fulfillment of the requirement for the degree of Masters of science in Agricultural Economics complies with the regulation of St. Mary University and meets the accepted standards with respect to originality and quality.

Approved by Board of Examiners

_____	_____
Advisor	**Signature**
_____	_____
Examiner (External)	**Signature**
_____	_____
Examiner (Internal)	**Signature**

Declaration

I declare that this MSc. Thesis is my original work, has never been presented for a degree in this or any other university and that all sources of materials used for the thesis have been duly acknowledged.

Student Name: Nebiat Tekle

Signature: _____

Name of the Institution: St. Mary's University

Date of Submission: February, 2017

ENDORSEMENT

This thesis has been submitted to St. Mary's University School of Graduate Studies for examination with my approval as a university advisor.

Dr. Milkesa Wakjira
Advisor

_____
Signature and Date

TABLE OF CONTENTS

ACKNOWLEDGEMENT

Firstly, I would like to express my sincere gratitude to my advisor Dr. Milkessa Wakjira for the continuous support of developing this thesis work. I would also like to acknowledge Tewodros Haile, Semere Wolde , Wondwosen Birhanu and Tedla Abebe for their humble support in providing me with necessary data, documents and related literatures; that helped me a lot in doing this research.

Many friends have helped me stay sane through these two years. Dawit, Yikalo, Kalkidan & Baharu; E-Banking Crew (Specially Betty S), their support and care helped me overcome setbacks and to give some focus on my graduate study. I greatly value their friendship and I deeply appreciate their belief in me. A very special thanks goes out to Abdulfetah Nuru, the one mentor who truly made a difference in my life. He provided me with direction, multi tasks, and technical support, became more of a mentor and friend, than a boss.

I would like to express my heart-felt gratitude to my family. You should know that your support and encouragement was worth more than I can express on paper.

ACRONYMS

ADF	Augmented Dickey-Fuller
BIS	Bank for International Settlements
CBE	Commercial Bank of Ethiopia
DBE	Development Bank of Ethiopia
GOE	Government of Ethiopia
GRD	Grand Renaissance Dam
LTD	Loan-to-Deposit (Ratio)
MFI	Micro Finance Institutions
MoFED	Ministry of Finance and Economic Development
NBE	National Bank of Ethiopia
OLS	Ordinary Least Squares
PP	Phillips-Perron
SSA	Sub Sahara Africa
SME	Small and Medium Enterprises

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

This study has to investigated the trend of all government and private bank credit to agricultural sector in Ethiopia using time series data from 1993 to 2015. Agricultural Credit-to-Agricultural Gross Domestic Product obtained using the statistical Hodrick-Prescott (HP) filter and the maximum agricultural credit to agricultural GDP ratio is 7.7%. On aggregate, state owned banks constitutes 93.56% of the total agricultural credit. Whereas, the remaining 16 private banks share the remaining 6.44% of the total agricultural credit portfolio as at June 2015. The private banks constitute 35% of the total outstanding credit in the economy, in sectorial distribution share only less than 7% was showed the agricultural credit outstanding portfolio. The Key finding in this study is that agricultural credit growth positively and significantly affected agricultural GDP and commercial banks, especially private Banks doesn't grant sufficient level of credit to agricultural sector when it compares to other sectors. Therefore, the study recommends that banks need to improve the agricultural banking products and services by providing timely and easily accessed medium to long term credit with lower interest policy and supervised credit facilities. Also the National bank of Ethiopia should adopt direct credit control, where preferred sectors like agriculture sector should be favored in terms of granting credits.

Keywords: Bank Credit; Agricultural Sector; Agricultural Credit; Trend; Ethiopia

1. INTRODUCTION

1.1. Background of the Study

Credit is one of the critical inputs for agricultural development. It is critical for farmers to undertake new investments, to purchase recommended inputs, to adopt new technologies and farming tools, to cover ongoing operational costs prior to harvest time and to maximize yield and surplus. (AGRA, 2015).

The importance of agricultural credit is further reinforced by the significant role of Ethiopian agriculture in the macroeconomic framework along with its significant role in poverty reduction, creating vast employment opportunities, its importance for the Country's export earning, and increasing national income.

For instance, in 2013, the agriculture sector contributed 43 percent to Ethiopia GDP whereas the service and the industry sectors contributed 45 percent and 12 percent respectively. The Agricultural sector generates over 70% export values and employs 85% of the total labor force. As the Ethiopian agricultural sector continues to be the main source of livelihood of the people, in the foreseeable future, a strong and efficient agricultural sector has a potential multiplier effect on nation's socio-economic development. (UNDP, 2014)

So in Ethiopia, the agricultural sector needs significant financial services for transformation of traditional agriculture sector to modern commercialization farming. In fact, the required growth of productivity in agriculture means that more capital must be invested in it. Farmers' need much more capital than they can afford to save and small and marginal farmers with meager savings require a higher input of capital, which is credit.

Contrary to this, access to credit in Ethiopia remains the lowest among the SSA countries. (Adeleke *et al*, 2013) Ethiopia lags far behind both in its potential and when compared to other countries in the SSA region. In addition to this, credit growth to the private sector seems stalled, and increased only marginally from 8.2 percent of GDP to 9.4 percent of GDP in 2015. Conversely, in SSA credit to the private sector grew fivefold over 2003–14, with an annual increase of 16 percent, doubling its size when measured as a percent of GDP (AGRA, 2015).

Ethiopia's financial sector is dominated by the banking sector (commercial banks) which currently represents more than 92.6 percent of total assets of the financial sector, excluding the assets of the Development Bank of Ethiopia (DBE) and National Bank of Ethiopia (NBE). Micro Finance Institutions (MFIs) constitute 5.2 percent and insurance companies 2.2 percent of the total financial sector assets (World Bank, 2015).

In his study Ebisa states that even if the agriculture sector contributes 43% to the GDP of Ethiopia, it gets smaller quantity of loans from Ethiopian private banks. Almost all the private banks focused on four major areas of investment; domestic trade and services, exports, manufacturing and construction neglecting the agricultural sector. (Ebisa, 2012)

The purpose of this study is therefore, to analyze the status, trend and performance of Bank's credit to the agricultural sector in Ethiopia with the aim of generating some information on credit allocation of banks for the agricultural sector in comparison to other economic sectors. So that it helps the policy makers to realize observe and revise the credit system to enable all sectors get their fair share of financial inclusion.

1.2. Statement of the Problem

According to UNDP estimate, the outstanding credit to the Ethiopian economy reached 168.35 billion birr and majority of the credit went to the industry sector (39.9%) followed by trade (29.1%), housing and construction (11.8%), and agriculture (9.4%). Despite in 2013 agriculture constitutes 43% of GDP, generated more than 70% of export values, and employed 85% of the total labor force and the major source of subsistence for most Ethiopian people. Banks' disburse the majority of credit to industry sector, which constitutes around 12% of the total GDP (UNDP, 2014).

The question now is that why the agricultural sector has been receive the least level of credit facilities from financial institutions while assuming a leading position in the overall contribution to the Country's GDP, export sector and creating huge employment opportunities.

This study therefore, examines the question of the level and trends of bank credit to agriculture sector in recent years and explore reasons behind for the happenings. A primary issue addressed by the question of the level of credit portfolio to agricultural sector and its trend is concerned.

1.3. Research Questions

The study focused on investigating the trend and adequacy of formal credit resources allocated to agricultural sector in Ethiopia vis-à-vis to other sectors. The major research questions in this regard are thus:

i. What are the trends of banks credit to the agricultural sector in Ethiopia over 25 years?
ii. What are the trends of government banks credit disbursement to agriculture sector in Ethiopia?
iii. What are trends of private banks credit allotment to agriculture sector in Ethiopia?
iv. What is the status and trends of banks credit disbursement to agricultural sector vis-à-vis to other sectors in Ethiopia?

1.4. Objectives of the Study

1.4.1. General Objective

The general objective of this study is to analyze the trends of bank's credit service to agricultural sector in the Ethiopian economy.

1.4.2. Specific Objectives

The specific objectives of the study include:

1. To analyze bank credit allotment to agricultural sector in Ethiopia;
2. To compare and contrast the level of credit allotment to the agriculture sector and other sectors in Ethiopia;
3. Analyzing and measuring the magnitude and contribution of credit to agricultural sector development in Ethiopia;
4. Investigate the casual link between credit and agricultural GDP (AGDP); and

5. To compare, examine and analyze government banks and private banks credit to agricultural sector in Ethiopia;

1.5. Significance of the Study

The study is intended to empirically analyze trends of private and government banks credit allotment to agricultural sector. The finding of the study thus may help policy makers, financial institutions and other stake holders to understand the economy credit allotment among the main socio economic sectors and may recommend where policy intervention is needed to increase the facility of credit allotment to agriculture sector.

Moreover, the study also contributes to the existing body of literatures by exploring the trend of banks' credit to agricultural sector, as there are not adequate trend analyses done so far on the banks credit allotment specifically to agriculture sector.

That is, available literature remains confined to the significance of credit to agriculture, sources of delivery, access, disparities, government policies, and so on. In this literature, there prevails a large gap as far as to address the flow, status, trend and composition of agricultural credit and the level of agricultural credit compared to other sectors is concerned.

1.6. Scope and Limitation of the Study

First of all, only banks credit to agriculture is analyzed in this study. Having in mind that agricultural credit can also be disbursed also by micro finance institutions (MFI) and informal credit services the study did not take into consideration the aspect of financial credit arise from MFIs and other informal credit sources.

Second, there is no regional distribution of institutional credit across the country. Agricultural credit across farm-size categories was also not considered due to lack of credit information reports and also unavailability of credit disbursement by farm size.

Third, the study also didn't analyze the agricultural sub sector credit disparities. The reason being, the secondary data that was extracted from NBE only indicated the level of credit in

aggregate and there was no such kind of reporting mechanism to identify the amount of agricultural credit that allotted to different sub-sectors of agriculture.

Therefore, the limitations of this study points out to new directions of research. Future data cleaning and research in this area should use the value of agricultural credit not only limited to banks. In addition, there should have been a reporting mechanism at the country level which showed the amount of outstanding credit and new disbursements in agricultural sub sectors, by land size and regions to make much more analytical researches.

1.7. Organization of the Thesis

The thesis is organized into five main chapters. The first chapter focuses mainly on the background, statement of the problem, objective of the study, scope and limitation of the study, and significance of the study. Relevant literatures related to the study are reviewed in chapter two. Chapter three, deals with research methodology which includes a brief description of the study, data collection methods, and analytical techniques. In chapter four, the results of the study are presented that deals with descriptive statistics and econometric models presentation and discussion. Finally, chapter five presents the summary, conclusion and recommendations of the study.

2. REVIEW OF RELATED LITERATURE

2.1. The Concept of Banking, Credit & Agricultural Credit

History of banking and finance goes back to the early stage of the human civilization, when it was growing in the cradles of different cultures. At the very hour, when the early people learned to exchange commodities, these two concepts were born. (finance, 2008)

Traces of banking can be found in the early history of Egypt, Babylonia, and Greece. The temples at these places practiced the early form of banking in the form of approving loans. These temples provided gold and silver which were deposited for safekeeping, as loans to the borrowers and charged high interest rates on those items. The private banking which was started in 600 B.C. was modified by the Greeks, Romans and Byzantines. Medieval banking was leaded mainly by the Jews and Levantine. (John, 1997)

Next, emerged some particular purpose oriented banks like the Bank of Venice (1171) and the Bank of England, which looked after the loans to the government, and the Bank of Amsterdam (1694) was formed to receive the gold and silver deposits. With the development in the business sector, the banking sector also developed proportionately and the eighteenth and nineteenth century experienced the rapid growth in this sector. (Finance, 2008)

From different historical sources the first foundations of the banking service in the world were put by goldsmiths and silversmiths. They have a safe box to put & they were the most trusted they used to receive gold, silver and various jewelries to put with them. Therefore, an individual or merchant puts his wealth under their custody, for their service they charge a small amount of money and give the customer a receipt to guarantee their acceptance. Then they started using, money paying instrument what we now call this document as ‘check’. (John, 1997)

A broader definition of a bank is any financial institution that receives, collects, transfers, pays, exchanges, lends, invests, or safeguards money for its customers. This broader definition includes many other financial institutions that are not usually thought of as banks but which nevertheless provide one or more of these broadly defined banking services. These institutions include finance companies, investment companies, investment banks, insurance companies,

pension funds, security brokers and dealers, mortgage companies, and real estate investment trusts. (Encarta, 2009)

2.1.1. The concept of Credit

Some of the earliest monetary loans have been documented in the Bible. Other cultures, including the Romans and ancient Greeks, have ample evidence of a thriving lending industry that dates back thousands of years. But the oldest records go all the way back to Assyria and Babylonia where merchants of the time made grain loans to farmers and traders. The mechanisms in place were pretty sophisticated, even by modern standards, with lenders accepting both deposits and acting a little like a bureau de change. (finance, 2008)

The main European economies didn't really catch on the power of lending until around the 13th century when the all-powerful churches realized the financial benefits of raising much needed revenue in the form of interest. Even though money lending is a very old practice, it didn't really evolve much until the middle Ages. At this point in history a rapid change was seen in the ways money could be borrowed. (John, 1997)

Good old indentured loans were used in Europe from the Middle Ages through the 1800's; the indentured loan was a mechanism that allowed the landed gentry and rich tradesmen to borrow money for the purchase of land or a house. In return for the necessary finances, the lender would be expected to work off their debt by working on the lender's estate.

Early Italian pioneers were setting up stalls in local markets from which they would lend money. An interest rate was applied to the loan and the borrower was expected to pay back the outstanding monies at set intervals. In fact, the word "bank" is derived from "banca" the benches, on which the moneylenders sat when trading. The only problem with this type of loan was the wild variation in interest rates which were set by each lender and not controlled by a central authority. (finance, 2008)

Point of interest: if a lender decided he wasn't making enough money he would smash his bench ("banca rupta") and look for another job. This phrase translates into "bankrupt", although the implications are somewhat different nowadays.

Fast forward a few hundred years and breathe a sigh of relief: money lending is now subject to far greater controls. In most countries, a central bank or financial authority regulates money lenders and the chances of losing your kneecaps to a loan shark are only slight. One of the more sensible controls placed on banks and lending is the amount that can be loaned to an individual. In days gone by there was no limit and you can probably guess the problems some people ran into as they tried to service huge debts. (John, 1997)

2.1.2. Agricultural Credit

Every modern business is operated on own capital or borrowed capital. Similarly, farming also requires capital. The need for farm credit in increasing production and effective utilization of farm resources is quite clear. Agricultural credit is an important financial support that a small farmer can get in order to bridge the gap between his income and expenditure in the field. Agricultural credit is an essential ingredient in the growth strategy of agricultural sector. Farming not only requires credit in the form of improved seeds, fertilizer and modern implements but also requires liquid capital for financing the harvesting, haulage of produce and other similar farm operation also (Khan *et al*, 2011).

In agriculture, all categories of farmers need credit; small and marginal farmers need most. They constitute the majority of farming population. They are multi-occupational, productive and efficient. They are good re-payers of loan. They generally have inadequate access to productive assets and very insignificant access to formal source of credit. As a result, they pass through a process of losing their scanty resources and joint the pool of poor people. (Finance, 2008)

Access of small and marginal farmers to credit can significantly help them to avoid sliding down the poverty ladder. Providers of the credit have not generally addressed the credit need of the small and marginal farmers because of their priority of funding to the poor and because of some perceived problems which include, among others, (a) risk of investment in agriculture; (b) Seasonality of agricultural production; (c) poor loan repayments performance of agriculture lending; and (d) technical nature of agriculture production system. As far the institutional credit is concerned, the small and landless farmers find it very difficult to avail it due to lack of availability of collateral and complex procedure to be followed. There is, therefore, a dire need to

start a credit program to benefit the maximum number of poor communities without any complicated collateral system (Khan *et al*, 2011).

2.1.3. Trend of Agricultural Credit in Africa

Credit can be obtained for agricultural purposes from formal and informal sources. The informal type of agricultural credit refers to credit from moneylenders, friends, relatives and the like. Whenever small farmers need emergency loans or small investment funds, they often resort to moneylenders. In the formal setting of most developing countries, including Nigeria, commercial banks and other specialized agencies are charged with the responsibility of providing credit to farmers. (Assefa, 2004)

Nigerian Agricultural, Cooperative and Rural Development Bank (NACRDB) is a typical example of a specialized bank established for the purpose of advancing agricultural credit. Land Bank is also a statutory body with a mandate South Africa Government to support the development of the agricultural sector in the country. The share of the commercial banks' lending to agricultural sector in the selected Africa countries is presented in Table 2.1-1 Available data show that the agricultural sector in Nigeria, Kenya and Mali benefited substantially from commercial banks' lending up to the late 1990s. It is however discouraging that downward trend was recorded in the allocation of commercial banks credit to agriculture in aforementioned countries in the last decades. It should be noted however, that Mali agricultural sector has continued to receive a good percent of the country's commercial banks' portfolio. (Adeleke *et al*, 2013)

(Percentage of Total Portfolio) Years	Nigeria	Kenya	Mali	Lesotho	Egypt	Rwanda	Sudan
1995	17.49	48.80	10.12	Na	Na	Na	Na
1996	19.63	13.82	7.21	Na	Na	Na	Na
1997	7.25	14.85	9.68	Na	Na	Na	Na
1998	9.96	48.85	22.14	Na	Na	Na	Na
1999	9.62	19.33	11.71	Na	Na	Na	Na
2000	8.07	6.57	11.30	Na	Na	Na	Na
2001	7.01	6.01	14.35	Na	Na	Na	Na
2002	6.27	6.07	11.51	Na	3.70	Na	8.10
2003	5.13	6.20	11.70	Na	4.30	Na	6.30
2004	4.46	6.00	8.49	Na	3.70	Na	9.60
2005	2.46	6.25	19.03	Na	4.70	Na	17.10
2006	1.96	5.38	55.67	Na	7.30	Na	12.00
2007	3.11	4.08	24.72	Na	5.30	Na	13.90
2008	1.36	3.60	19.75	0.31	5.20	4.02	12.40
2009	1.50	3.08	27.96	1.90	4.90	4.97	13.94
2010	1.70	3.03	21.12	8.17	2.90	5.24	11.01
2011	3.50	7.58	22.11	Na	1.90	3.38	12.35

Table 2-1 Share of Commercial Bank Lending to the Agricultural Sector, 1995–2011

Source: Adeleke *et al*, 2013

2.1.4. A Brief History of Banking in Ethiopia

According to Mauri, there are five principal events, which may conveniently be taken as dividing Ethiopian modern banking history into periods. The first event was establishment in 1906 of the Bank of Abyssinia, marking the advent of banking into the country. The second event was Italian occupation in 1936, when, following liquidation of the Bank of Ethiopia, a broad colonial banking network, extended to encompass all Italian possessions in the Horn of Africa (Eritrea, Ethiopia and Somalia) and closely linked with the metropolitan financial system, was set up in the country.

The third event was, in 1943, establishment of the State Bank of Ethiopia, marking the rebirth of the Ethiopian independent banking. This occurred during World War II after liberation of the country.

The fourth event was the revolution of 1974, which wiped out the monarchy, nationalized companies and shaped a “socialist banking” two-tier model “suited” to Ethiopia, the whole credit

system being based on the central bank and three state-owned financial institutions, each of them enjoying monopoly in its respective market.

The fifth event was the collapse of socialist regime followed by a financial sector reform and liberalization according to Monetary and Banking Proclamation of 1994. (Mauri, 2003)

The agreement that was reached in 1905 between Emperor Minilik II and Mr.Ma Gillivray, representative of the British owned National Bank of Egypt marked the introduction of modern banking in Ethiopia. This period witnessed the establishment of the country's first bank. Called the Bank of Abyssinia, or in Amharic "Ye-Ityopya Bank", it was an affiliate of the National Bank of Egypt, and was founded in 1905. Following the agreement, Bank of Abyssinia was inaugurated in Feb.16, 1906 by the Emperor. The Bank was totally managed by the Egyptian National Bank. Ten years later, in 1915, the bank began issuing bank notes. The issue of this paper money was another notable event in the country's history. (NBE,2002)

Generally, in its short period of existence, Bank of Abyssinia had been carrying out limited business such as keeping government accounts, some export financing and undertaking various tasks for the government. Moreover, the Bank faced enormous pressure for being inefficient and purely profit motivated and reached an agreement to abandon its operation and be liquidated in order to disengage banking from foreign control and to make the institution responsible to Ethiopia's credit needs. Thus by 1931 Bank of Abyssinia was legally replaced by Bank of Ethiopia shortly after Emperor Haile Selassie came to power. (NBE,2002)

On December, 1963 a new bank proclamation issued. The Ethiopian Monetary and Banking law that came into force in 1963 separated the function of commercial and central banking creating National Bank of Ethiopia and commercial Bank of Ethiopia. Moreover, it allowed foreign banks to operate in Ethiopia limiting their maximum ownership to be 49 percent while the remaining balance should be owned by Ethiopians. (NBE,2002)

In 1964, there were two other banks in operation namely Banco di Roma S.C. and Banco di Napoli S.C. The first privately owned bank, Addis Ababa Bank Share Company, was established on Ethiopians initiative and started operation in 1964. On the other hand, there was a bank called Agricultural Bank that provides loan for the agricultural and other relevant projects established

in 1945. But in 1951 the Investment Bank of Ethiopia replaced it. In 1965, the name of the bank once again hanged to Ethiopian Investment Corporation Share Company. However, proclamation No.55 of 1970 established the Agricultural and Industrial Development Bank Share Company by taking over the asset and liability of the former Development Bank and Investment Corporation of Ethiopia. (Mauri, 2003)

Following the declaration of socialism in 1974 the government extended its control over the whole economy and nationalized all large corporations and by proclamation No.184 of August 2, 1980 all the banks in the economy merged to form the sole Commercial Bank of Ethiopia in the country till the establishment of private commercial banks in 1994. (NBE,2002)

Following the demise of the Dergue regime in 1991 that ruled the country for 17 years under the rule of command economy, the EPRDF declared a liberal economy system. In line with this, Monetary and Banking proclamation of 1994 established the national bank of Ethiopia as a judicial entity, separated from the government and outlined its main function. (NBE,2002)

Monetary and Banking Proclamation No.83/1994 and the Licensing and Supervision of Banking Business No.84/1994 laid down the legal basis for investment in the banking sector. Consequently, shortly after the proclamation the first private bank, Awash International Bank was established in 1994 and currently there are a total of 16 private banks are actively engaged in the economy. (NBE, 2002)

2.1.5. Agricultural Finance in Ethiopia

The development of the financial sector in Ethiopia has a long history and included an array of banking and non-banking institutions. The financial system comprised of commercial banks, development banks, specialized financial institutions, cooperatives, insurance companies, etc. The organizational structure, management and ownership of these financial institutions as well as their performance have been changing under the different regimes.

With respect to the development of financial institutions that cater for agricultural finance the establishment of the Agricultural Bank of Ethiopia in 1945 was a pioneer. Following the creation of the Ministry of Agriculture in 1943 the Agricultural Bank of Ethiopia was established to

accelerate agricultural development by assisting small landholders whose farms had been devastated during the Italian occupation through loans for purchase of seeds, livestock and implements and to repair or reconstruct their homes and farm buildings (Assefa, 1987 cited in Assefa, 2004).

Regarding agricultural finance, the share of agriculture reflected the importance attached to it in the development Plan of the Emperor. Subsistence and large-scale & mechanized agriculture together were to receive about half of the bank credit. Subsistence agriculture was to be transformed through (a) the introduction of improved tools & implements, modern techniques, and better seeds; (b) credit, price and tax policies; and (c) land reform and agricultural services. Accordingly, farmers were to be assisted to produce more marketable surpluses, and thereby develop the subsistence agricultural sector into a monetized one.

Credit for farm tools & implements was to be extended (by the Development Bank of Ethiopia) not directly but through the then Grain Corporation or Farmers' Cooperatives. These institutions were to receive credit funds and then buy the implements and supply them to farmers on credit (to be repaid in kind) or lease or sell them on credit if they are expensive - such as selectors, threshing machines, winnowers, etc. (to be repaid in cash). It was explicitly stated that credit was to be provided only in goods & services the reason being to ensure that it is used only for productive purposes. These practices were expected to raise production as a result of rapid application of efficient implements and lead to commercialization of peasant agriculture due to increased marketable agricultural output. Priority for credit among farmers was to be determined by the co-operatives (with advice from extension agents). (Assefa, 2004)

However, this seems to ignore the well-known problem of fungibility of funds. An analysis of the total loans disbursed by the DBE showed that the most of the loan was directed towards the industrial sector. Between 1951 and 1969, of the total loan disbursed by the DBE, industrial loans absorbed about 58 percent of the loans while agriculture made up the balance. Banks were also to extend credit to commercial farms (for modern tools, fattening, etc.) and fishing co-operatives at favorable terms. The Plan also gave emphasis to the importance of promotion and mobilization of domestic savings. Co-operatives, in addition to marketing farmers' products and supplying [credit to] agriculture, were envisaged to be involved in collection of surplus funds

from farmers (i.e. savings mobilization). Loans and advances by borrowing institutions over the ten-year period between 1981 and 1990 show that on average the government sector took 36.4 percent of the total, while 50.3% went to public enterprises while the private sector's share was only 8.3% of the total loans and advances made by the banking system during the period. More than 89 per cent of AIDB agricultural loans went to state farms while the rest went to agricultural co-operatives, with the private peasant sector receiving negligible share. Discrimination against the private sector was not limited to credit access. The interest rate schedule explicitly discriminated against the private sector. (Assefa, 2004)

2.2. Theoretical Literature

Credit is an important aspect of financial intermediation that provides funds to those economic entities that can put them into the most productive use. Theoretical studies have established the relationship that exists between financial intermediation and economic growth. For instance, Schumpeter (1934), Goldsmith (1969), McKinnon (1973) and Shaw (1973), in their studies, strongly emphasized the role of financial intermediation in economic growth. In the same vein, Greenwood and Jovanovich (1990) observed that financial development can lead to rapid growth.

In a related study, Bencivenga and Smith (1991) explained that development of banks and efficient financial intermediation contribute to economic growth by channeling savings to high productive activities and reduction of liquidity risks. They therefore concluded that financial intermediation leads to growth. Based on this assertion, this study examines the extent to which intermediation or credit to agricultural sector of the economy has available in Ethiopian economy. This means that a financial institution can affect economic growth through a growth in economic sector developments by efficiently carrying out its functions, among which is the provision of credit.

2.3. Empirical Literature

Credit plays a major role in the transformation of traditional agriculture into a modern large-scale commercial type which enhances agricultural development. It is necessary for purchasing inputs needed for effective adoption of modern agricultural techniques. Many economists have identified the lack of basic assets major constraint to agricultural development They stated the need for credit or the purchase of farm inputs such as improved seed varieties, breeds of livestock, fertilizers, insecticides, pesticides, and modern implement, among others. They also stressed the suitability of terms of credit as a necessary condition for fostering agricultural development. Regarding of credit availability to agricultural sector analysis the following section presents an empirical review of some research study results that are related to Agricultural Credit. (Abayomi and Salami, 2008)

They stated the need for credit or the purchase of farm inputs such as improved seed varieties, breeds of livestock, fertilizers, insecticides, pesticides, and modern implement, among others. They also stressed the suitability of terms of credit as a necessary condition for fostering agricultural development. Regarding of credit availability to agricultural sector analysis the following section presents an empirical review of some research paper results that are related to Agricultural Credit.

Empirical Analysis of Agricultural Credit in Africa: Any Role for Institutional Factors? By Adeleke Salami and Damilola Felix Arawomo (2013)

The African Development Bank researchers Adeleke and Damilola examined the extent of agricultural credit in African countries. They analyzed the factors responsible for the low level of agricultural credit in Africa, with a special consideration given to institutional factors. The finding of the study revealed that access to credit at the right time and in sufficient quantities are necessary conditions for success for farmers and agribusiness entrepreneurs along agricultural value chain in Africa. However, over the last 3 decades, these conditions were never met in the continent. It is in this context that it investigated in their paper the extent of agricultural credit and the factors responsible for the low level of agricultural credit in Africa. In this regard, the paper estimated the agricultural credit model using the panel data covering 1990-2011 generated for ten countries selected across the five sub-regions in the continent.

They provide a recommendation that the agricultural banks in the continent (in countries where it exist) should ensure a reduction in lending rate. Formation of Cooperative Societies, Thrift and Credit societies among the farmers in the continents should be encouraged in order to solve the problem of credit denial by banks on the account of collateral securities. Institutions should be strengthened to enhance reduction in corruption and enforce accountability across the continent. Efforts towards poverty reduction and implementation of the MDG policy should be intensified. Provision of agriculture based infrastructural facilities like good roads, tractors and others will complement and enhance judicious use of agricultural credit in Africa.

A Review of the Performance of Agricultural Finance in Ethiopia: Pre-and Post-Reform Periods by Assefa Admassie (2004)

The study assessed the performance of agricultural finance in Ethiopia by dividing the periods in to pre-reform period and post reform period. The pre-reform period assessed the imperial period and also the Dergue period in agricultural financing performance. On the other hand the post-reform period analyze the Agricultural financial performance after 1992 where the financial liberalization in Ethiopia began.

The study states that financial institutions in Ethiopia, both state and private owned ones first emerged with management autonomy during the imperial period. But, after the structural reorganizations and nationalizations of financial institutions in 1976, the sector has lost its institutional autonomy. The lack of autonomy has been an obstacle to the effective management of the institutions and had seriously hampered competition. The financial sector reform that started in 1992 had far reaching implications on the performance of the system. The new rural financial market development approach assigned a different role to the government with less direct interventions in credit allocation and credit delivery. The author concludes that the credit not only solve the problems of food crisis but also increase the economic growth, saving, employment, and industries etc. in the country. A more efficient rural financial system would help accomplish the dual objectives of boosting agricultural production and alleviating rural poverty. Today's rural finance solutions require a combination of credible short-term solutions and a long- term integrated systems development approach.

Financing Small Farmer Development in Ethiopia by Haileleul Getahun (2001)

Haileleul undertake a study on the area of availability of financial service, specifically agricultural credit, to small farmers. He finds that the percentage of small farmers receiving institutional credit are very small. Large farmers have thus far been the main beneficiaries of institutional credit. Financial lending institutions have rigid policies and are reluctant to deal with subsistent farmers. They have always required that small borrowers pledge some collateral, usually land, as loan security, and small farmers have no security to offer.

Excluding the majority of peasant farmers from participating in the saving/credit program simply because they do not have physical collateral is quite illogical. On the other hand, small farmers have to buy current inputs, such as seed, fertilizer and herbicide .in order to produce a marketable surplus and thereby contribute to the development process of the country. Equally important is mobilization of savings.

He recommends that the Federal government of Ethiopia, along with the financial institutions of the country need to develop a more rational lending/saving policy where poor farmers and peasants would have relatively greater access to loans. Loan-saving scheme between informal groups and formal institution should be promoted. More banking personnel should be trained and located in rural branches, and recruitment is needed of more qualified agricultural staff for viable farming projects.

Access to Credit and the Impact of Credit constraints on Agricultural Productivity in Ethiopia: Evidence from Selected Zones of Rural Amhara by Tilahun Dessie Zewdie (2015)

The main goal of this paper is to show the agricultural credit access landscape and investigate the impact of credit constraints on agricultural productivity in Ethiopia by using a household survey data from rural Amhara collected in 2013. The study revealed that 66.17 percent of households are credit constrained which shows how the rural credit market landscape in Ethiopia is highly imperfect. By using an endogenous switching regression model, the study tried to show the effect of demographic and other socioeconomic variables on credit constraint status of households and simultaneously the impact of credit constraints on agricultural productivity.

Finally, the paper uncovered the existence of a huge productivity loss due to various types of credit constraints. The cumulative impact is estimated to be 17.94 percent, i.e. an additional per hectare income of 1,410.17 Ethiopian birr productivity gain if all types of credit constraints happen to be eliminated.

The author concludes that in order to create a prosperous rural society free of poverty and its byproducts, the country need to formulate appropriate measures to develop the agricultural sector in which the life of the rural poor help them build better risk management skills, effective management information, accounting and auditing systems. And also strict supervision and clear message about the credit for smallholder farmers should be disseminated backed up by strong legal enforcement mechanisms for defaulters.

Assessment of 'Why Private Commercial Banks in Ethiopia Neglected the Agriculture?' Evidence from 10 Selected Private Banks by Tarekegn et al

The study used ten selected private banks to investigate the reasons why private banks in Ethiopia neglected agriculture. The private banks that have been serving at least four years in the banking business were purposively selected for the study. To achieve the desired objectives, primary data- using questionnaire and semi structured interview and secondary data were used. The collected data were analyzed the by OLS regression model. Accordingly, the result of the regression reveals that; size, profitability, capital efficiency, competition with the public owned banks and backed collateral were the most significant factors for the reason why private banks in Ethiopia neglected agriculture.

According to the study, credit utilizing capability of the borrower is a moderately significant factor. Since, agriculture is the largest lion share sector in contributing to GDP growth and priority sector in Ethiopia, keeping the other indicators of creditworthiness constant, it is enviable if private banks consider the ecological characteristics around borrowers' business than to be generally reluctant toward the sector. Under developed crop and weather index insurance is also one of the major reasons.

The econometric regression analysis result in the study also revealed, the objective to be large (size of the bank), capital performance, profitability of the bank, competition with the public owned banks and lack of backed collateral are the significant factors for the reason why private banks in Ethiopia neglected the agriculture. They advise if the government should encourage insurance companies to extend their insurance product or service to agriculture and they also recommend National Bank of Ethiopia put a minimum percent of loan to agriculture in its directives.

The Effects of Post 1991 Era financial sector deregulations in Ethiopia: An Inspirational guide for agribusiness by Ebisa Deribie (2012)

The author studies the effects of post 1991 financial sector deregulations effect to agricultural businesses. The study mainly analyzes the availability of credit to agricultural sector after the 1991 financial sector reform. The researcher shows that after the fall of the socialist regime in 1991 the financial sector of the country witnessed a major shift of paradigm. Numerous private banks, insurances and micro financial institutions were established. Though the agriculture sector plays an important role in the Ethiopian economy it attracted a small amount of loan from banks particularly from private banks. This situation in turn inhibits the development of agribusiness sector.

The Author concludes the study by stating that, after the fall of the socialist government the new pro-capitalist regime introduced many financial liberalizations and restructuring measures to strengthen the financial sector by placing legal and regulatory frameworks. Due to the changes in the policies a number of private commercial banks, insurance companies and MFIs were established in the country sharing the former dominance of state owned financial institutions. The participation of private sectors in the economy has brought competition in the financial sector of the country. In the future the dominance of state owned financial institutions seem to cease though still the private banks look far chasing the public banks. As it is mentioned elsewhere the government of Ethiopia gives much emphasis to agriculture sector as it is of course the mainstay of the economy. Therefore, private financial institutions should finance this priority sector by critically considering the credit worthiness of borrowers.

Agricultural finance potential in Ethiopia Constraints and opportunities for enhancing the system by Woldai et al. (2010)

AEMFI[1]conducted a diagnostic research on Ethiopian agricultural finance in 2010 and the diagnostic identified a set of root causes for these constraints that are grounded the agricultural finance. The study discovered that the financial service offerings to agricultural sector players in Ethiopia face gaps in terms of access to financial services, product quality, and quantity. In terms of access, only few financial institutions serve rural areas in Ethiopia, leading to low levels of financial inclusion. In terms of product quality, gaps exist for all major product categories, including credit, savings, insurance, and payments, and all major types of agricultural players, including producers, traders, and manufacturers of all sizes.

The diagnostic suggests a set of nine potential further interventions around four critical themes to further boost the provision of agricultural finance. Improving incentives and regulatory environment to increase financial services in the rural sector. Setting the right incentives for financial institutions to serve the rural sector. These encompass fiscal incentives (e.g., tax reduction for banks active in rural areas or co-investments with financial players), temporary monopolies for serving the rural sectors, well-designed credit guarantee-schemes with first-loss-absorption schemes or other conditional incremental funding.

Agricultural Finance – Trends, Issues and Challenges by Dr. Frank Höllinger (2011)

Frank reviews the trends, issues and challenges of agricultural finance and found there is a strong need to sustainably modernize agriculture in developing countries, combined with increased value addition in the processes following primary production. The paper provides an overview of the current state of rural finance, summarizing recent advances and highlighting the remaining gaps and challenges. This is followed by a brief overview of the changing approaches to rural finance over the past few decades and a snapshot of the current status and recent trends in different regions. There has been some important progress in rural finance over the past 20 years.

1 Association of Ethiopian Micro-Finance Institutions

The author noted that Banks and MFIs have largely avoided the agriculture sector, as long as other more lucrative and less risky uses for their funds were available. Expansion of sustainable agricultural lending has mainly been confined to small countries with highly competitive urban microfinance markets (e.g. Nicaragua, Bolivia), functioning public banks (e.g. Thailand, Viet Nam) and highly innovative service providers driven by specific missions. The main challenge today is to intensify efforts in scaling-up proven approaches for rural and agricultural finance. Concerning collateral, banks are usually required by prudential regulations to apply appropriate collateral coverage for their loans, often 125% of the loan value or more. The inability of many farmers and rural SMEs to meet such collateral requirements prevents many worthwhile investments from being financed. Moreover, legal and administrative procedures for perfecting and enforcing security interests in rural assets need to be streamlined, along with measures to enhance contract enforcement in general. These measures generally require considerable legal and regulatory reforms as well as substantial investments in institutional infrastructure and administrative systems, which can only be implemented gradually and over a long time period.

3. RESEARCH METHODOLOGY

3.1. Research Design

The study focuses on the causal relationships at some degree and used the trend analysis and growth estimation methods were deployed to estimate the agricultural credit pattern.

3.2. Method of Data Collection

The study employed secondary data. Annual time series data were collected from the National Bank of Ethiopia Statistical Bulletin for the period of ten years (2004-2014). Sectorial distribution of all private and government banks data also taken from National Bank of Ethiopia. Annual Gross Domestic Product (GDP), GDP Growth rate, GDP by economic activity and percentage distribution of GDP by economic sector data were obtained from Ministry of Finance and Economic Development National Economic Accounts Directorate report of National Accounts Statistics were used (2003 and 2007 (EFY) reports).

The World Bank open data to global development data, the World Bank database for country development indicators and FAO's aqua stat data query site used for extracting data's. The World Bank climate change knowledge portal also used for extracting average monthly temperature and rainfall for Ethiopia.

In addition to the above mentioned, published documents and literatures related to the objective of the study were also used. In terms of approach, the study employed quantitative approaches.

3.3. Method of Data Analysis

This study utilized the descriptive and econometrics methods to analyze the data. The descriptive method is used to find facts of the study that involves adequate and accurate interpretation of findings.

3.3.1. Descriptive Analysis

Several statistical methods such as mean, standard deviation, graphical comparisons and percentage changes were used for measuring trends of bank credit to agriculture sector and to compare with bank credit to other sectors. As the main objective of this study relies best on the descriptive analysis of the data, the following descriptive statistics analyzed:

- Bank's Agricultural Credit Growth Pattern
- Growth rate of Bank Credit to Agriculture Sector
- Agricultural Credit to Deposit Ratio
- Agricultural Credit to AGDP Ratio
- Disparities in Sectorial Distribution of Credit
- Private Banks Credit Allocation to Agricultural Sector
- Government Banks Credit Allocation to Agricultural Sector
- Ratio of Agricultural Sector Credit to Total Credit

3.3.2. Econometrics Analysis

The study employed a time series econometric approach. Unit root tests are conducted first since the stationary property of a series is the premise for the other techniques. The cointegration test measures the relationships between agricultural credit and time in the long run while the other test (Granger-causality) is utilized to examine the short-run aspects.

The method that will be employed to establish a relationship between bank credit and agricultural output is the ordinary least square method (OLS). Nevertheless, before estimating the model, the properties of the variables will be substantiated in terms of stationarity and long term relationship. The econometric tools that will be used for these verifications are the Augmented Dickey-Fuller test for stationarity and Johansen co-integration test for long term relationship given that the variable are integrated of the same order, especially order one I (1).

3.4. Model Specification

3.4.1. Trend Analysis of Agricultural Credit and Total Credit

Using Ordinary least square method log transformed Agricultural Credit and log transformed Total Credit on a constant and time trend. The linear model we will estimate is given by:

$$LAGCR = \mu_0 + \mu_{1t} + \mu_t$$

Where;	LAGCR	-	Log of Agricultural Credit
	μ_0	-	Constant
	μ_{1t}, μ_t	-	Time Trend

3.4.2. Auto Regressive Growth Model

An autoregressive growth model is defined as a growth model that takes into account the serial correlation of the error terms in the growth model.

3.4.3. Elasticity of Bank's Agricultural Sector Credit to Total Advances

The linear-log and log-linear regression models are used for predicting elasticity of credit to agricultural sector. It gave much better results than the original model fitted to the unlogged variables, and it yielded an estimated of the elasticity of total credit with respect to agricultural credit.

Log-linear

$$log(Y) = a + bX$$

And the elasticity is given by:

$$\epsilon = be^{a+bX}\frac{X}{Y} = bY\frac{X}{Y} = bX$$

Linear-log

$$Y = a + b * log(X)$$

And the elasticity is:

$$\epsilon = \frac{b}{X}\frac{X}{Y} = \frac{b}{Y}$$

In this case of Linear-Log Regression Model, the slope coefficient of β in the model implied that, on the margin, β is the change in Y caused by a 1% increase in X.

3.4.4. Regression

Conventionally, agricultural output function depends upon the inputs like land, labor, capital and quantities of other inputs such as water, fertilizer, pesticides etc. However, in this study agricultural output is used as dependent variable and output is assumed to be a function of availability of credit, labor force, cropped area, water and all those inputs which are purchased with the help of credit such as seeds, fertilizers, tractors and tube wells. But, instead of taking seeds, fertilizers, tractors and tube wells, only credit was taken as this is used to buy all these inputs. Based on the above discussion the model showing the impact of credit on agricultural output has been developed as below:

$$\boldsymbol{LAGDP_t = \beta_1 LCL_t + \beta_2 LLF_t + \beta_3 LCD_t + \beta_4 LRNFL_t + \mu_t}$$

Where;

LAGDPt	Log of agricultural GDP
LCLt	Log of cropped land in million hectares;
LLFt	Log of labor force in million;
CDt	Log of credit disbursement from all Banks in Ethiopia in million Birr;
LRNFLt	Log of rainfall;
β_i	Coefficient of the explanatory variable
μ	Error term;
t	Time;

In the above model, agricultural output was used as a dependent variable and it is assumed to be the function of cropped area, labor, agricultural credit and water. While other inputs like improved seeds, fertilizers, tractors, and tube wells that may be purchased by using credit money were dropped and agricultural credit was used as one of the explanatory variables. Agricultural credit, in fact, indirectly affects the agricultural output through purchasing these inputs. Therefore, this study has included credit as an explanatory variable in the model on the argument of Carter (1989) and Iqbal *et al*. (2003) and Afzal (2005).

3.5. Method of Data Estimation Technique

3.5.1. Stationarity and Nonstationarity

Time series data consist of observations, which are considered as a realization of random variables that can be described by some stochastic processes. The concept of "Stationarity" is related to the properties of these stochastic processes. In this study, the concept of "Weak Stationarity" is adopted; meaning that the data are assumed to be stationary if the means, variances and covariance of the series are independent of time, rather than the entire distribution.

Nonstationarity in a time series occurs when there is no constant meanμ, no constant varianceσ_t^2, or both of these properties. It can originate from various sources but the most important one is the unit root.

3.5.2. Unit root tests

Many time series exhibit trend or non-stationary behavior. These characteristics are especially evident in the financial time series. If a series is non-stationary, and unless it combined with other non-stationary series to form a stationary cointegration relationship, then the regressions involving the series can cause the spurious regression.

Many approaches can be performed to examine the stationarity of time series data. But the most popular approaches are Augmented Dickey-Fuller (ADF) test, Phillips-Perron test (PP), Kwiatkowski, Phillips, Schmidt, and Shin (KPSS, 1992) test (Ya Xu, 2010). Because of the fact that the ADF and PP tests usually give us the same conclusion, this study only perform the ADF test.

3.5.3. Testing for Cointegration

Theoretically, integrated variables of order one, I (1), may have a cointegration relationship, it is thus crucial to test for the existence of such a relationship. If a group of variables are individually integrated of the same order and there is at least one linear combination of these variables that is stationary, then the variables are said to be cointegrated.

The cointegrated variables will never move far apart, and will be attracted to their long-run relationship. Testing for cointegration implies testing for the existence of such a long-run relationship between economic variables.

3.5.4. Johansen Approach

The concept of cointegration is developed by Engle and Granger. If two or more series are themselves non-stationary, but a linear combination of them is stationary, then the series is said to be cointegrated.

Generally, two approaches are broadly applied to test cointegration. One is Engle-Granger test which is only used to a single series. An alternative is the Johansen approach that is suitable for a multivariate case. The Johansen setup permits the test of hypotheses about the long-run equilibrium between the variables.

3.5.5. Granger Causality Tests

The most well-known test, suggested by Engle and Granger (1987) (sometimes known as the EG test) is to run a static regression (after first having verified that y_t and x_t both are I (1))

$$y_t = \theta` x_t + e_t$$

Where x_t is one- or higher-dimensional. The asymptotic distribution of μ is not standard, but the test suggested by Engle and Granger was to estimate $\hat{\theta}$ by OLS and the test for unit roots in

$$\hat{e}_t = y_t - \hat{\theta}` x_t$$

Note, that since the unit root tests test the null-hypothesis of a unit root, most cointegration tests test the Null of no cointegration. Unfortunately, the limiting distribution of for example the t-test, does not have the limiting distribution tabulated by Dickey and Fuller. The limiting distribution does, however, resemble the Dickey-Fuller distribution even though it need a separate table for each dimension of the repressor.

4. RESULT AND DISCUSSIONS

4.1. Descriptive Analysis

4.1.1. Volume of Agricultural Credit by Ethiopian Commercial Banks to Different Sectors

In the beginning the decomposition analysis of agricultural credit delivered by banks in Ethiopia is presented for the period of 1993 – 2015.

According to National Bank of Ethiopia (Appendix-A & B), bank's credit sectorial distribution is broadly divided under twelve sector categories. The examination of the tables' points out that Industry followed by International Trade and Domestic Trade constitutes about 60% of the total outstanding credit distribution of Banks'.

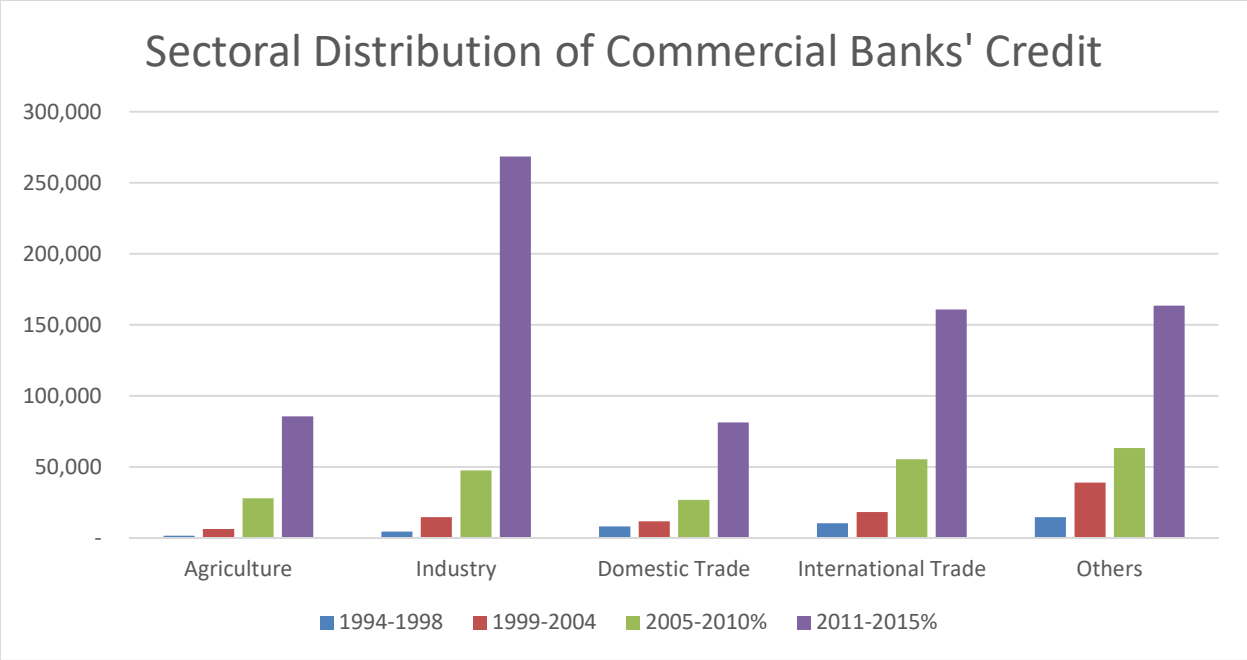


Figure 4.1Sectorial Distribution of Commercial Banks Credit

Source: Author's own computation

Industry sector is the most benefited sector regarding credit availability in Ethiopian Credit Sectorial distribution. The sector has been gaining importance in credit allocation from 1995 – 2015.

It showed increments from an outstanding credit balance of 7% of the total credit proportion in 1995 to about 40% in 2015. Also for the last four consecutive years the Industry Sector has got more credit allocation than any of the other sectors, 30% of the total outstanding credit in Ethiopia.

Credit allocation for international trade sector divided in to two sub sectors. International trade import Sub Sector and International Trade Export Sector. As a whole the allocation of credit to International trade sector was showing lessening from 29% in 1993 to 20% in 2015. The data showed that the allocation of credit to international trade sector exceedingly going to import Sub Sector than to Export Sector even if the credit allocation of both sub sectors showed falling in recent years.

Focusing attention on agriculture sector, during the 1990s the sector only acquired less than 4% of the total credit allocation. Then, from 2000 – 2012 the agriculture sector credit allocation showed enhancements, an increment from 4% to about 16%. Though from 2012 ongoing credit allocation of the sector continuously declines. By the end of 2015, the share of agricultural credit drop about half of its share was in 2012, 8.5%. (Authors Own Computation)

It means that Banks are evading lending more to other sectors to minimize risk and instead lending to industry and other sectors who have a strong collateral and less business risk of uncertainty.

Concentrating on the year on which the allocation of credit to agriculture sector starts to decline, 2012, there was a new government regulation approved on the banking sector to enforce commercial bank's that to purchase a government bond for Grand Renaissance Dam (GRD) amounting 27% of every 1 birr the bank disburses as credit.

As a result, a close examination of Appendix-A and Appendix-B showed that except for agricultural sector credit allocation all of the eleven sectors advent either an increment or a very slight decline on their outstanding credit allocation. However, the proportion of agricultural sector credit allocation dramatically declined by half. These showed, considering the allocation of credit as a whole showed increment and also on other sectors doesn't show vivid variation, the agriculture sector is the only sector affected by the new bill purchase regulation.

Bearing in mind that the total increment on yearend outstanding credit balance is significant, the total outstanding credit showed a 97% increment in 2015 from 2012. But calculating the same for agricultural total outstanding credit allocation, it showed that agricultural sector only incremented by only 9%. On the contrary, the Industry sector credit allocation were increased by more than doubled, showed merely tripling, an increment of 157%. This also showed that agricultural sector is not benefiting from the credit allocation even since 2012 onwards.

4.1.2. Banks' Agricultural Credit Growth Pattern

In order to analyze a growth rate pattern of a given time series data, the variable must be log transformed for econometric analysis purpose.

A trend analysis of log-transformed data series for Bank's Agricultural Credit (LAGCR) and Total credit (LTOTCR) was calculated and the result is shown in Figure 4.1. In general, the two variables have trended in the same direction over the period under review.

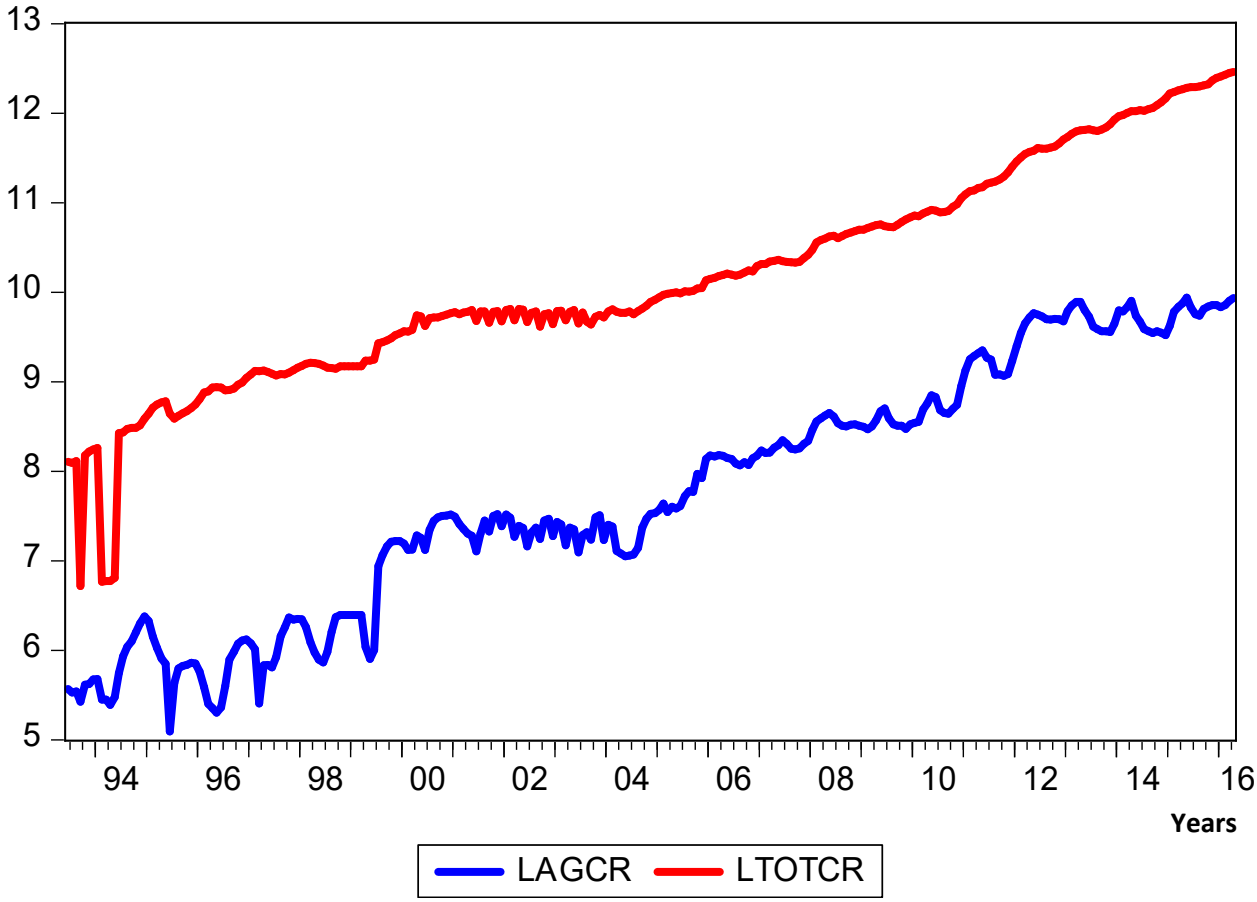


Figure 4.2Trends of Agricultural Credit and Total Outstanding Credit

Source: Author's own computation

The graph (Figure 4.1) showed quite an insightful trend between LTOTCR and the supply of credit extended to the agricultural sector over the years, both going in the same direction with an increasing trend.

4.1.3. Agricultural Credit to Deposit Ratio

The loan-to-deposit ratio (LTD) is a commonly used statistic for assessing a bank's liquidity by dividing the banks total loans by its total deposits. This number, also known as the LTD ratio, is expressed as a percentage. If the ratio is too high, it means that banks might not have enough liquidity to cover any unforeseen fund requirements; if the ratio is too low, banks may not be earning as much as they could be. The statewide ratios compare all loans to all deposits for all banks in Ethiopia showed that averaged almost 57.80% based on 13 years' data from 2003 – 2015.

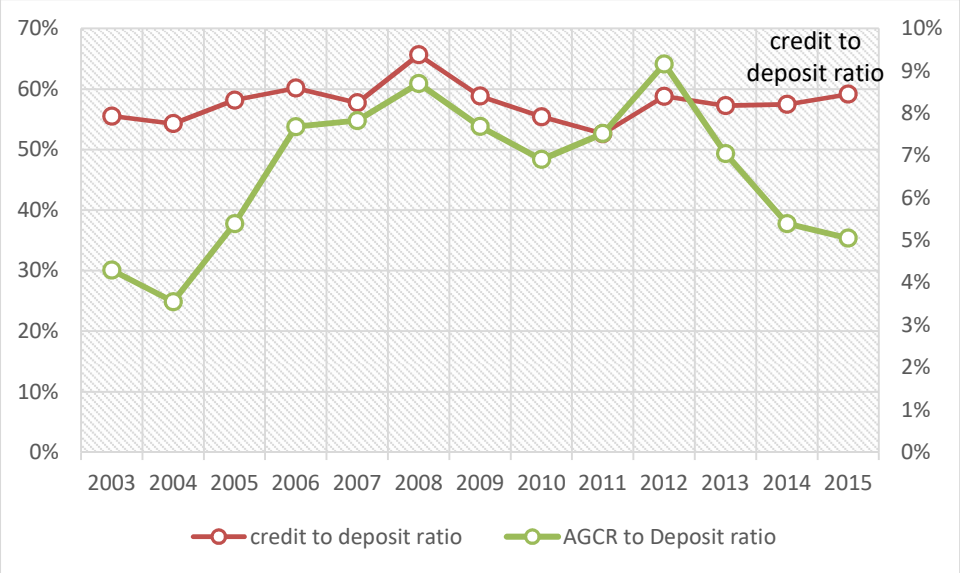


Figure 4.3Loan to Deposit Ratio and Agricultural Credit to Deposit Ratio

Source: Author's own computation

Assuming LTD ratio calculated based on total loan to total deposit calculation, we can see the agriculture to deposit ratio trend through time. The result showed that the Agricultural credit-to-deposit ratio more fluctuated than that of LTD Ratio. Agricultural credit-to-deposit ratio recorded between 3.5% and 9.17% during the sample period, where LTD ratio records between 52.6% and 65.6%.

Table 4-1 LTD Ratio

	LTD Ratio	AGCR to Deposit ratio
Average	57.80%	6.64%
Minimum	52.64%	3.56%
Maximum	65.66%	9.17%
Median	57.74%	7.05%

Source: Author's own computation

4.1.4. Agricultural Credit to AGDP Ratio

The debt-to-GDP ratio compares a country's sovereign debt to its total economic output for the year. Its output is measured by GDP (Gross Domestic Product.) This ratio is a useful tool for investors, leaders, and economists. It allows them to gauge a country's ability to pay off its debt. A high ratio means a country isn't producing enough to pay off its debt. A low ratio means there is plenty of economic output to make the payments.

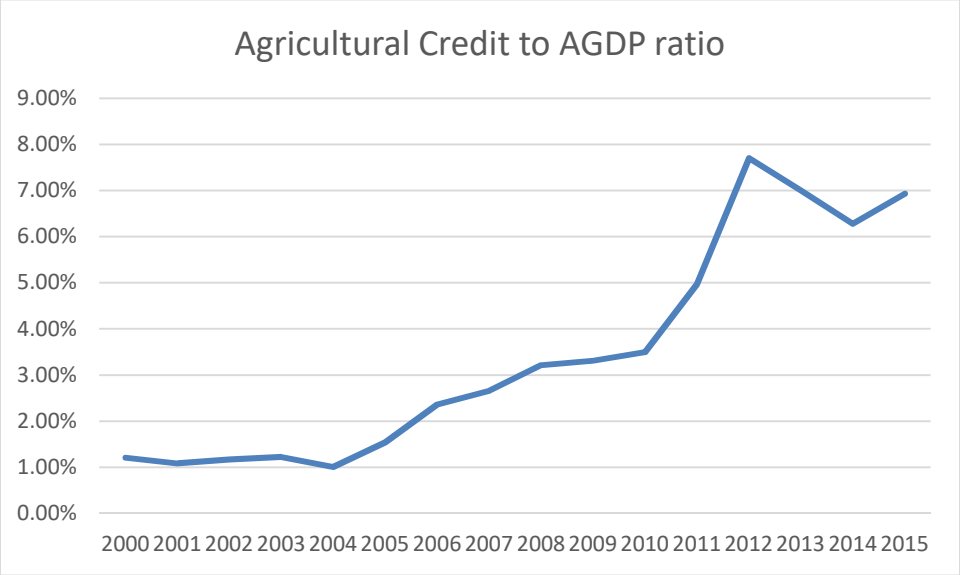


Figure 4.4Agricultural Credit to AGDP Ratio

Source: Author's own computation

Excessive credit growth is often considered to be an indicator of potential risks in the financial sector. Several studies have found that indicators of excess credit growth are powerful in providing advance signals of financial crises. While not all credit booms end with a period of

financial stress, severe financial crises are almost always preceded by a rapid increase in credit. By itself, however, the rate of growth is an unreliable indicator as credit may be expanding for a range of reasons, including productivity growth in the economy.

The Bank for International Settlements (BIS) recommends the credit-to-GDP gap as a useful early warning indicator of future periods of financial system stress. In cross-country empirical studies, the gap measure was found to increase substantially three to five years before a financial stress event.

A study by the World Bank found that if the debt-to-GDP ratio exceeds 77% for an extended period of time, it will drag down economic growth. Every percentage point of debt above this level will cost the country 1.7% in economic growth. It's even worse for emerging markets. There, each additional percentage point of debt above 64% will slow growth by 2% each year. (World Bank, 2010)

The credit-to-GDP gap is the difference between the credit-to-GDP ratio and its long term trend. By comparing the actual credit-to-GDP ratio with its long-term trend obtained using the statistical Hodrick-Prescott (HP) filter, we can then estimate whether or not the credit level is excessive. The credit-to-GDP gap suggests credit growth can be considered ‘excessive’ when the ratio rises significantly above its long-term trend, creating a large positive ‘gap’.

This study tries to calculate credit-to-GDP analysis on the sectorial level. As the main emphasis of the research is on Agricultural credit the study uses the same process of calculation for analyzing Agricultural Credit-to-AGDP ratio.

Year	Agricultural Credit	AGDP	AGCR/AGDP ratio, %	AGCR/AGDP trend, %	Deviation from trend,	CCB Rate
2000	1.23799	102.1	1.2125%	1.2125%	0.000%	0.000%
2001	1.21756	111.9	1.0881%	1.0881%	0.665%	0.000%
2002	1.2865	109.8	1.1717%	1.1371%	0.283%	0.000%
2003	1.20293	98.3	1.2237%	1.1918%	-0.130%	0.000%
2004	1.16212	115	1.0105%	1.0872%	-0.809%	0.000%
2005	2.01824	130.5	1.5465%	1.3183%	-0.739%	0.000%
2006	3.41797	144.8	2.3605%	1.8407%	-0.391%	0.000%
2007	4.21837	158.5	2.6614%	2.2946%	-0.556%	0.000%
2008	5.4812	170.3	3.2186%	2.8120%	-0.464%	0.000%
2009	6.00971	181.2	3.3166%	3.1904%	-0.832%	0.000%
2010	6.81959	195	3.4972%	3.5024%	-1.117%	0.000%
2011	10.57526	212.6	4.9743%	4.2456%	-0.106%	0.000%
2012	17.1656	222.9	7.7010%	5.7685%	2.155%	2.155%
2013	16.72344	238.8	7.0031%	6.6319%	0.991%	0.000%
2014	15.815	251.8	6.2808%	6.9495%	-0.197%	0.000%
2015	18.57978	267.9	6.9353%	7.3361%	-0.008%	0.000%

Table 4-2 Agricultural Credit-to-AGDP Gap

Source: Author's own computation

The credit-to-GDP gap is the difference between the ratios of credit-to-GDP to the calculated trend expressed as a percentage. A large, positive credit-to-GDP gap indicates an excessive credit growth in relation to GDP growth that creates enhanced risks to the financial system. As the result depicted that the maximum Agricultural credit to Agricultural GDP ratio is 7.7% and this result is by far lower that the World Bank study tipping point of 64% as above-mentioned.

The difference between the credit-to-GDP gap and its trended future value doesn't have a significant difference, rather it showed that in most of the sample period it is around zero and even negative.

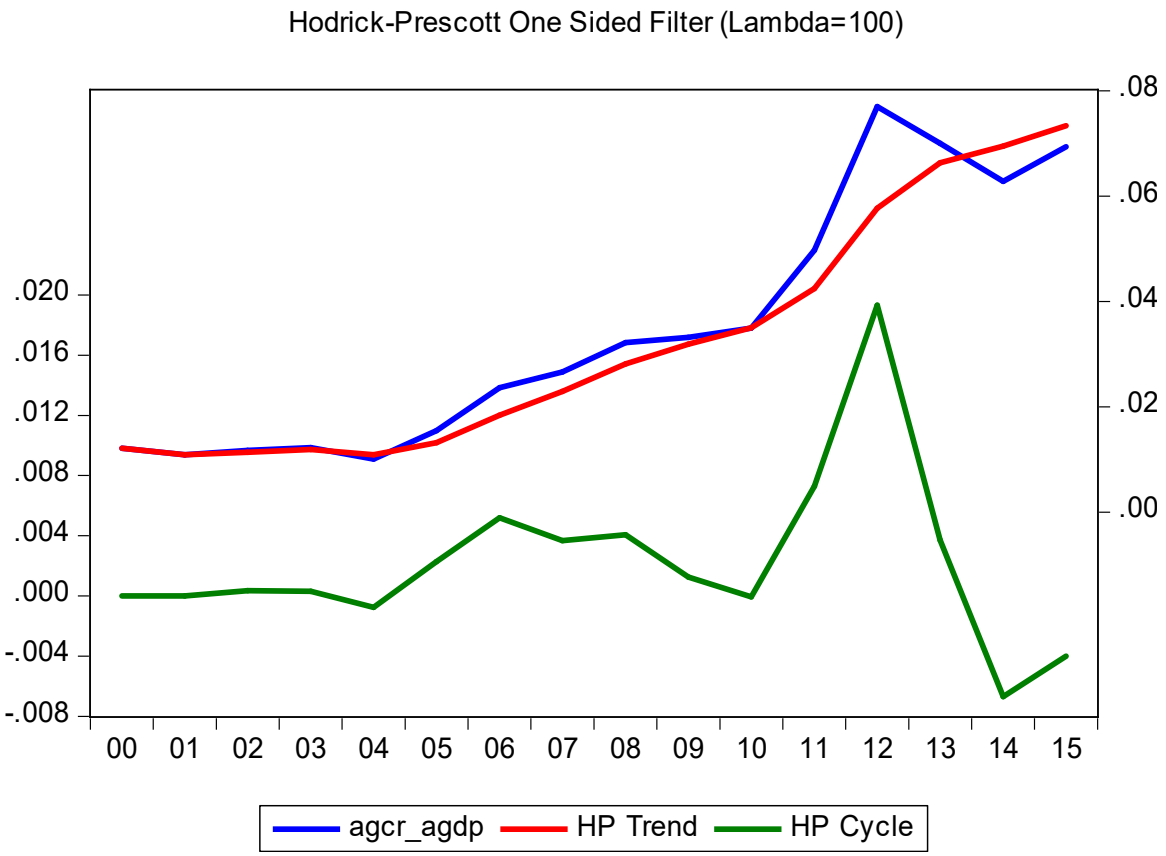


Figure 4.5Hodrick-Prescott One Sided Filter

Source: Author's own computation

4.1.5. Disparities in Sectorial Distribution of Credit

- **CREDIT DISPARITIES IN GROWTH RATE**

Based on the National Bank of Ethiopia data on sectoral distribution of credit for the period from 1993-2015, (22 years) period is classified into four sub periods (1993-1998, 1999-2004, 2005-2010 and 2011-2015). Accordingly, the average growth rate of total outstanding credit were 24.4%, 11.63%, 20.8 & 32.11% for the mentioned four periods.

Outstanding credit of Agricultural credit records above the Total Credit average growth for second period and third period, on the other hand it registers below the average during the first and fourth period.

This implies for the fiscal years ended from 1999–2010, outstanding credits for agricultural credit were increase by greater growth than the total credit. This showed during the same period Agricultural sector have relatively better credit access than other sectors.

During 2005 – 2010 Outstanding Credit to Agricultural Sector records the biggest growth rate when it compared to other sectors. During this period outstanding credit to Agricultural Sector records 36.83% where the total outstanding credit average growth rate was as low as 20.81%. Agricultural sector average growth rate were almost double of the total credit growth rate.

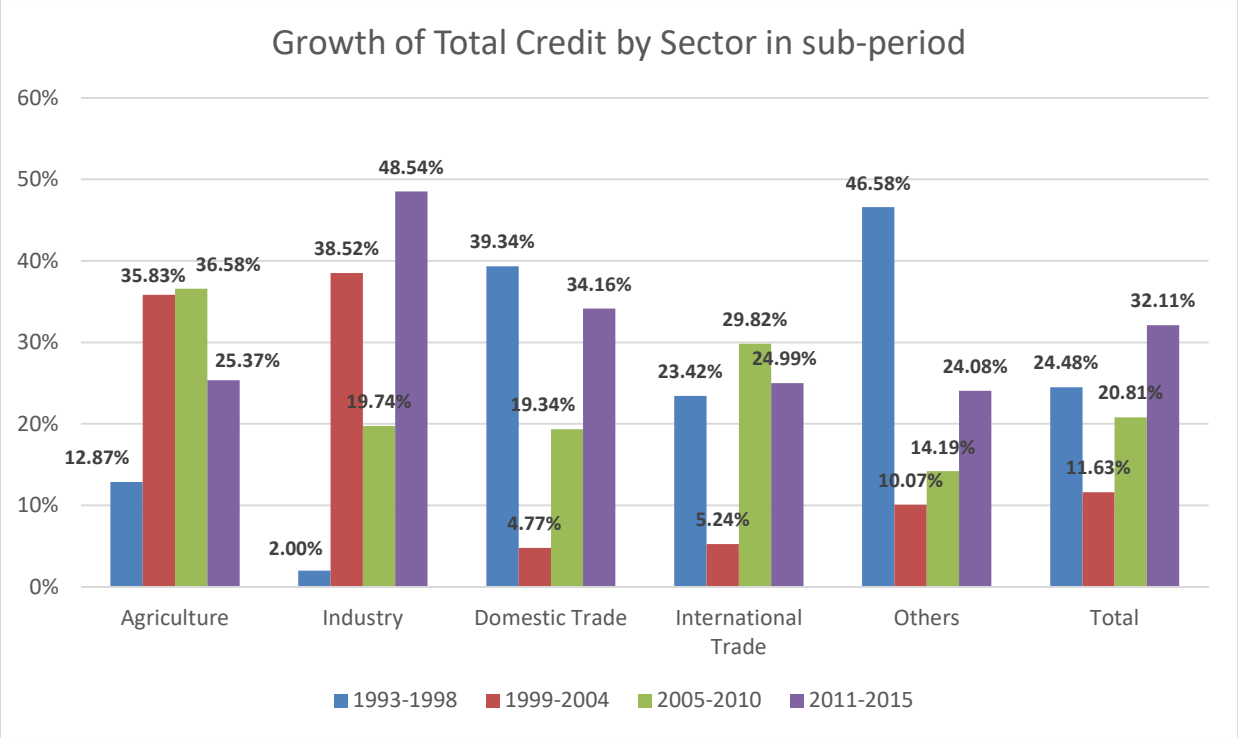


Figure 4.6Total Credit Growth Rate by Sector

Source: Author's own computation

However, the finest period for agricultural sector in availability of credit were came to end during the last period, 2011 – 2015. Average growth of outstanding credit for Agricultural sector records 25.3%, low when we compared to the total credit growth rate of 32.11% during 2011-2015.

From 2012 onwards, the industrial sector is the most benefited sector regarding the availability of credit. The sector receives almost half of the total available credit of commercial banks'

solitarily. Next domestic and international trade sectors receives relatively good credit allocation than agricultural sector.

- ## CREDIT DISPARITIES IN PERCENTAGE SHARE

Further analysis is taken on the share of sectors outstanding credit out of the total outstanding credit. First the share of each sector for the period 1993-2015 calculated and the average percentage share of credit for different sectors was measured. Accordingly it is found that agricultural credit receives an average share of 8.9% out of the total outstanding credit.

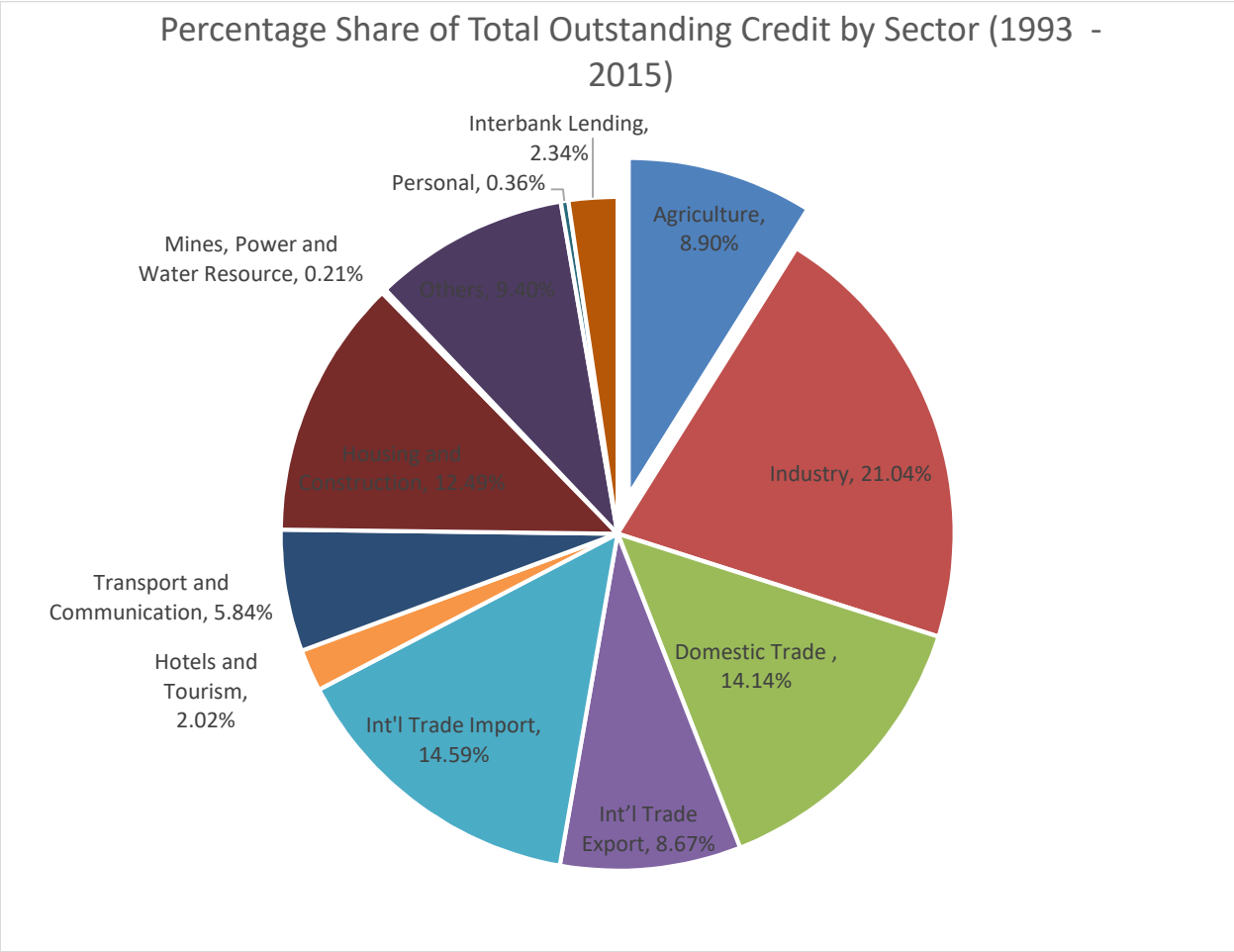


Figure 4.7 Percentage Share of Outstanding Credit by Sector

Source: Author's own computation

Out of the total outstanding credit allocation to different sectors, Industrial sector have the highest credit disbursement followed by International Trade – Import, Domestic trade sector, international trade-export and Housing & Construction Sector. If we take both import and export sub-sectors of International trade sector aggregately, this sector would be first ranked having 24.2% of the credit allocation of the country.

Hence, despite its contribution to GDP and the number of employment opportunity it creates, the agricultural sector ranked 5th in percentage share of outstanding total credit in the economy. In absolute terms the figure is indicated in the Table 4.3 below.

- **CREDIT DISPARITIES IN AMOUNT**

Sector/Year	1993-1998	1999-2004	2005-2010	2011-2015
Agriculture	1,636.52	6,511.71	27,965.08	78,859.08
Industry	4,553.49	4,840.51	47,665.81	256,378.59
Domestic Trade	8,226.91	11,861.30	27,017.03	75,256.52
International Trade	10,572.78	18,264.33	55,585.32	146,503.94
Others	14,687.91	39,015.31	63,406.16	148,726.95
Total	39,677.61	90,493.16	221,639.40	705,725.08

Table 4-3 Total Outstanding Credit by Sectors (1993 – 2015)

Source: Author's own computation

Considering the analysis of credit allocation to different sectors in the economy, still the Industrial Sector have the highest credit allocation followed by International Trade. As shown above in Table 4-3 agricultural credit only get one tenth (1:10) of the total outstanding credit. During 2011-2015 more than 36% of the total outstanding credit went to Industrial sector and only 11% shared by agricultural sector.

4.1.6. Private Banks Credit Allocation to Agricultural Sector

According to the National Bank of Ethiopia data of credit allocation, private banks started to lend loan and advances to the agricultural sector since 2000s. Before that there was no agricultural credit balance among the established private banks.

The credit allocation of private banks to the agricultural sector after 2000s showed an increasing trend from 2000-2007, decreasing trend from 2008-2011 and again an increasing trend from

2012-2015 (Figure 4-8). On the other hand, the total outstanding credit balance showed an increasing trend throughout the period.

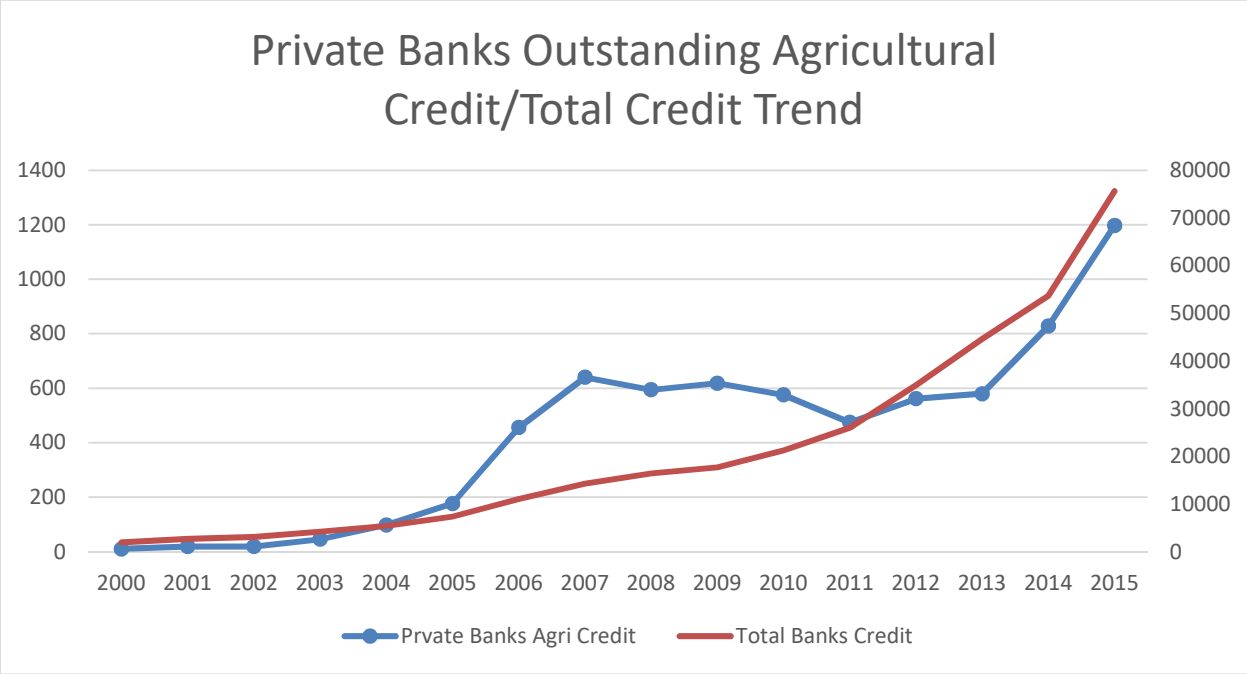


Figure 4.8Agricultural Vs Total Outstanding Credit Balance of Private Banks

Source: Author's own computation

Moreover, private banks performance regarding the average outstanding level of credit allocation to agricultural sector per year was compared by calculating the ratio of total outstanding credit with number of years that the Banks were in business. (Figure 4-10)

Based on this, Dashen Bank assumed leading position followed by Awash International Bank and Nib International Bank, respectively. Cooperative Bank of Oromia ranked fourth out of the sixteen private banks credit allocation to the agricultural sector despite its late presence.

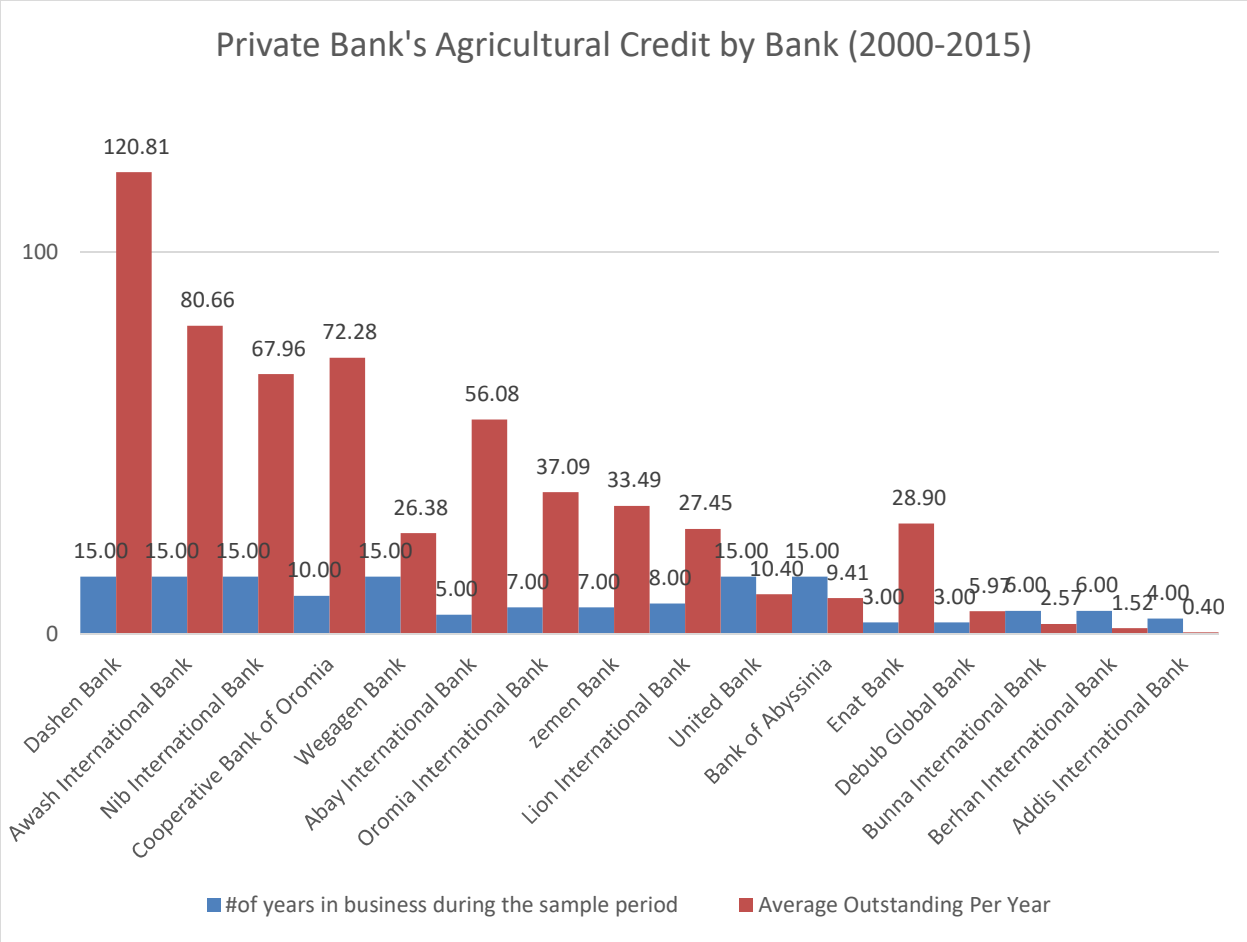


Figure 4.9 Agricultural Credit by Private Banks

Source: Author's own computation

4.1.7. Government Banks Credit Allocation to Agricultural Sector

In the economy there are three government banks namely, Development Bank of Ethiopia, Commercial Bank of Ethiopia and Construction and Business Bank (CBB). Currently Construction and Business bank merged with CBE and CBB never disbursed credit facility for agricultural sector.

Until 2008, the outstanding credit portfolio for agricultural credit was almost same for both CBE and DBE. However, starting 2009, CBE disbursed a very large amount of credit to the agricultural sector and triple the outstanding balance of 2008 by fiscal year 2015. (Figure 4-10)

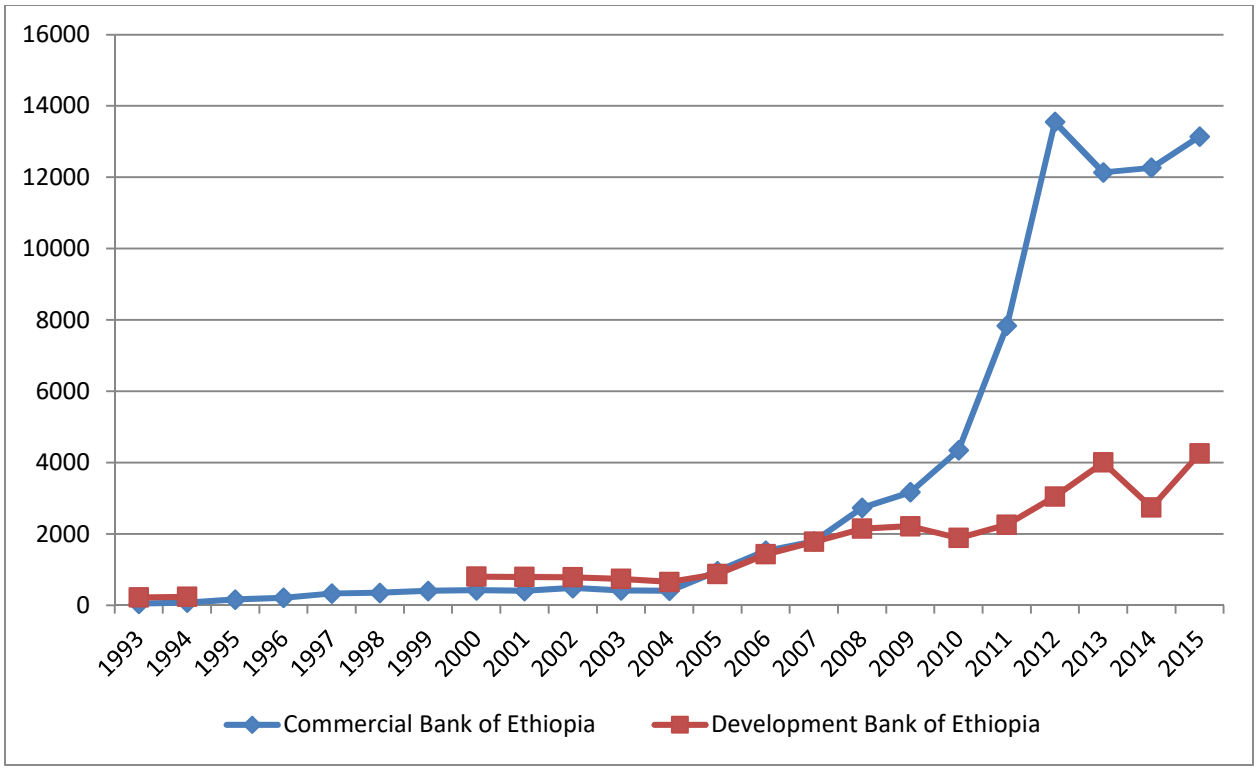


Figure 4.10 Government Banks Agricultural Credit Trend

Source: Author's own computation

4.1.8. Government vs. Private Banks Agricultural Sector Credit

CBE is the biggest lender for agricultural sector with 13.1 billion birr outstanding credit balance. This is around 70.66% of the total agricultural credit. Development Bank of Ethiopia, another state owned bank had an outstanding credit balance of agricultural sector computed at 4.2 billion, (22.89%) share of the total agricultural credit.

On aggregate, state owned banks constituted 93.56% of the total agricultural credit, whereas, the remaining 16 private banks share was 6.44% of the total agricultural credit portfolio. Despite private banks constitute 35% of the total outstanding credit in the economy, its agricultural credit outstanding portfolio showed only less than 7%.

4.1.9. Ratio of Agricultural Sector Credit to Total Credit

The ratio of agricultural credit to total credit has been on a fluctuating trend since 1993. It showed a declining trend from 1993-1996, 1998, 2001, 2003-2004, 2008-2010 and 2012-2015 respectively. The Agricultural sector showed a sharp decline since 2012 when compared with other sectors. The latest downward trends are observed largely because Banks channeled credit mainly to short term industrial and less risk sectors due to the newly GRD bond bill directive.

Figure depicts the ratio of credit extended to the agricultural sector to total outstanding credit in the two decades ending in 2015. The agricultural sector received low supplies of credit relative to total credit to all sectors.

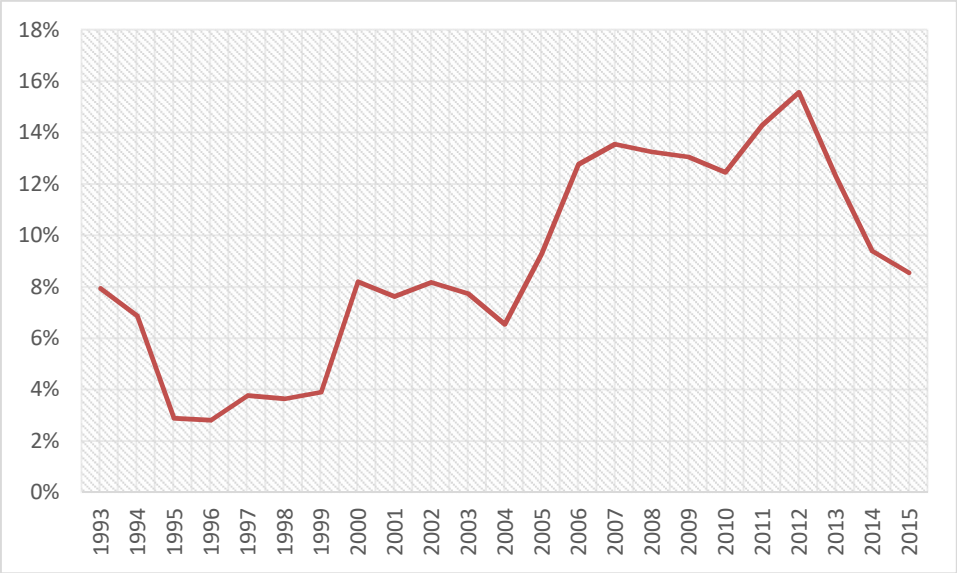


Figure 4.11 Agricultural Credit to Total Credit Ratio

Source: Author's own computation

As it is clearly seen in the above graph, most of the time, agricultural credit to total credit ratio lies under 10% range. The recent year's activities were showed that a pick of an all-time best during the sampled period ratio rate of around 15% in 2012. However, after 2012 a continuous direct decrease at an increasing rate is observed on the sectoral outstanding credit.

4.2. Econometrics Analysis Results

4.2.1. Growth rate of Bank Credit to Agriculture Sector

In this sub section a growth rate on total bank credit to agricultural sector and total outstanding credit growth rate were analyzed. There are a number of potential ways of constructing an average growth rate for a particular period. This study focuses on three alternatives: (a) least squares growth rates; (b) a differenced logarithmic model; and (c) the average monthly growth rate.

First it is calculated an average monthly growth rate of Agricultural Credit as follows,

$$(1)\quad \text{AGCRGROWTH} = \frac{\text{AGCR} - \text{AGCR}(-1)}{\text{AGCR}(-1)}$$

The result gave us average monthly growth rate of AGCR in each of 274 months of the 23 years data. Note, AGCR (–1) means the first lag of the AGCR that is $AGCR_{t-1}$

Then it is calculated an average monthly growth rate of Total Credit as follows:

$$(2)\quad \text{TOTCRGROWTH} = \frac{\text{TOTCR} - \text{TOTCR}(-1)}{\text{TOTCR}(-1)}$$

One common approach to measuring growth rates is the Least Squares or Ordinary Least Squares (OLS) approach. In fact, Kakwani (1997) notes that this is the most commonly used procedure for estimating growth rates. In order to find the growth rate of Bank credit to Agriculture Sector, we will transform data series of Bank's Credit to Agricultural Sector (AGCR) and Total Outstanding Credit (TOTCR) into natural logarithm, i.e. OLS approach based on the compound growth formula. Next it will create a new variable DLAGCR, which is first differenced of logarithmic Agricultural credit, i.e. a differenced logarithmic model. The result showed a monthly approximate growth rate of Banks' Agricultural Credit for each month. By the same token, we create a new variable DLTOTCR, which is first differenced of logarithmic Total Credit.

We then analyze the descriptive result of Agricultural Credit (AGCR) Growth Rate and DLAGCR and also Total Agricultural Credit Growth rate and DLTOTCR using EVIEWS statistical software package.

	DLAGCR	AGCRGROWTH	DLTOTCR	TOTCRGROWTH
Mean	0.017614	0.027440	0.016024	0.038062
Median	0.009582	0.009628	0.015784	0.015909
Maximum	0.934251	1.545307	1.615028	4.028029
Minimum	-0.75404	-0.529536	-1.494622	-0.775667
Std. Dev.	0.135211	0.153947	0.187878	0.326479
Sum	4.720492	7.353938	4.294392	10.20064
Sum Sq. Dev.	4.881309	6.327841	9.424623	28.45906
Observations	268	268	268	268

Table 4-4Descriptive Statistics of Growth Rate

Source: Own computation using EVIEWS

According to the result of the study, a monthly total outstanding credit balance of agricultural sector from 1993-2016, had a mean value of monthly 1.59% growth rate. The average growth rate of outstanding credit of agricultural sector, on the other hand showed a mean of 2.57% growth rate.

As per the result, agricultural credit showed a maximum of 1.54% growth rate at a time and a .52% decline, total outstanding credit records a maximum of 4.02% increments and .77% decline at a given period as a maximum and minimum.

4.2.2. Analysis of Trends in Log of Outstanding Credit and Agricultural Sector

First the trend for log Agricultural Credit created and regress LAGCR on a constant and time trend. The linear model that is used to estimate is given by:

$$LAGCR = \mu_0 + \mu_{1t} + \mu_t$$

Trend extrapolation is best computed in Eviews using ordinary least squares regression techniques and the regression result is given by Table 4.5.

Dependent Variable: LAGCR
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.379275	0.034581	155.5541	0.0000
T	0.017133	0.000217	78.87663	0.0000

R-squared	0.957965	Mean dependent var	7.743642
Adjusted R-squared	0.957811	S.D. dependent var	1.392167

Dependent Variable: LTOTCR
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.007033	0.051542	155.3507	0.0000
T	0.015165	0.000324	46.84090	0.0000

R-squared	0.889342	Mean dependent var	10.09974
Adjusted R-squared	0.888937	S.D. dependent var	1.278865

Table 4-5 Regression of LAGCR and LTOTCR on a Constant & Trend

Source: Own computation using EVIEWS

Each coefficient multiplies the corresponding variable in forming the best prediction of the dependent variable. The coefficient measures the contribution of its independent variable to the prediction. From the regression result the model can be stated as:

$$\text{LAGCR} = 5.379275 + 0.017133\text{t} + \mu_t$$

$$\text{LTOTCR} = 8.007033 + 0.015165\text{t} + \mu_t$$

This can be interpreted as in adding additional one month the total outstanding credit would increase by 1.5116% and total outstanding credit to agriculture sector would increase by 1.7133%.

As the above table indicates that the regressor are 95.79% and 88.9% significant. The coefficient of T in the regression implies that an increment in time t by one period (month) results 1.71% increment on credit to agricultural sector and 1.51% increments on the total available credit.

R-square value of 0.96 indicates that almost 96% the model is explanatory on the LAGCR case and 88.89% for TOTCR. The Durbin-Watson Statistic showed less than 2 for both dependent variable regression, implies that there is evidence of positive serial correlation among the variables and time period.

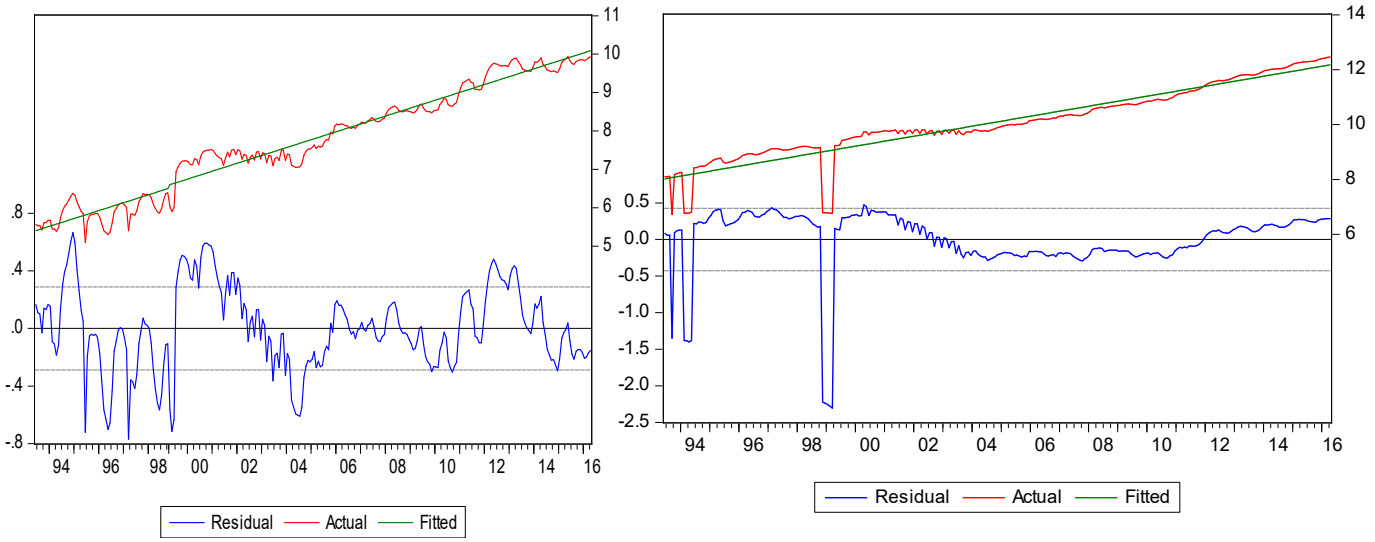


Figure 4.12 Actual Fitted Residual Graph of LAGDP & LTOTCR

Source: Own computation using EVIEWS

Figure 4.2 showed a time series plot of agricultural credit and total outstanding credit over the period 1993 to 2016 (275 Months) with the fitted linear trend line.

4.2.3. Autoregressive Growth Model

An autoregressive growth model is defined as a growth model that takes into account the serial correlation of the error terms in the growth rate of the outstanding agricultural.

The result depicted in table 4.6 showed that t-variable has a significant effect on log(Agricultural Credit) with a p-value of 0.0000.

The result of the equation can be written as:

$$LAGCR = 5.398784 + 0.016975T + [AR1] = 0.888185$$

Dependent Variable: LAGCR
Method: ARMA Maximum Likelihood (OPG - BHHH)

Sample: 1993M06 2016M04
Included observations: 270
Convergence achieved after 16 iterations
Coefficient covariance computed using outer product of gradients

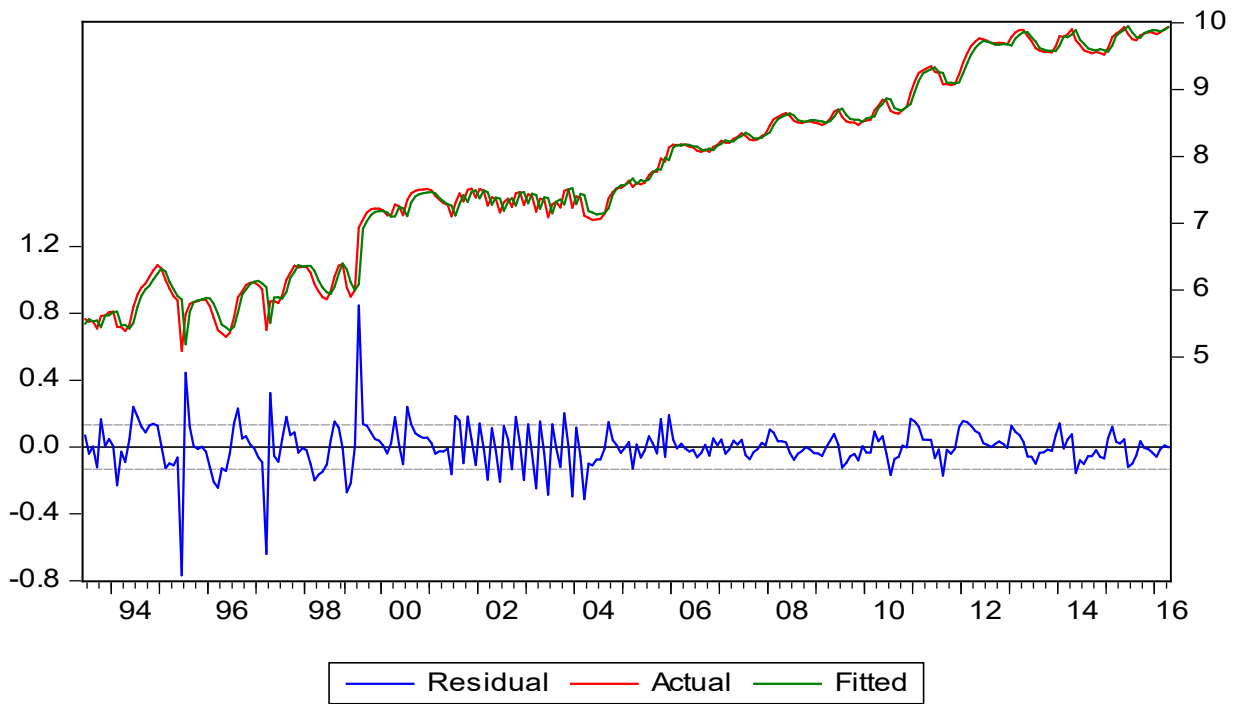
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.398784	0.152050	35.50670	0.0000
T	0.016975	0.001213	13.99998	0.0000
AR(1)	0.888185	0.030892	28.75091	0.0000
SIGMASQ	0.017244	0.000744	23.18988	0.0000

R-squared	0.991076	Mean dependent var	7.768677
Adjusted R-squared	0.990976	S.D. dependent var	1.392679
S.E. of regression	0.132300	Akaike info criterion	-1.182293
Sum squared resid	4.655843	Schwarz criterion	-1.128983
Log likelihood	163.6096	Hannan-Quinn criter.	-1.160886
F-statistic	9847.450	Durbin-Watson stat	1.817333
Prob(F-statistic)	0.000000		

Inverted AR Roots	.89

Table 4-6 Auto Regressive Growth Model Result

Source: Own computation using EVIEWS



4.2.4. Elasticity of Bank's Agricultural Sector Credit to Total Advances

The study also analyzed how the amount of credit to the agricultural sector impacted by the total advance amount. In analyzing the elasticity of Credit to the agricultural sector, all the main balances of Bank's credit were taken to consideration such as outstanding balance, disbursed amount and collected amount. For this analysis, the cumulative value of the abovementioned balances taken, i.e. 275 months of observations are taken dated from June 1993 to April 2016 for the calculation.

The linear-log and log-linear regression models are used for predicting elasticity of credit to the agricultural sector. It produced much better results than the original model fitted to the unlogged variables, and it yielded an estimated elasticity of total credit with respect to agricultural credit using Log-Linear as shown below.

$$log(Y) = a + bX$$

And the elasticity is given by:

$$\epsilon = be^{a+bX}\frac{X}{Y} = bY\frac{X}{Y} = bX$$

Specifically, in case of Log-Linear Regression Model, the slope coefficient of β in the model implied that, on the margin, the percentage change in Y from a unit increase in X.

Linear-log

$$Y = a + b * log(X)$$

And the elasticity is:

$$\epsilon = \frac{b}{X}\frac{X}{Y} = \frac{b}{Y}$$

In this case of Linear-Log Regression Model, the slope coefficient of β in the model implied that, on the margin, β is the change in Y caused by a 1% increase in X.

Dependent	Independent	Constant	β	Equation
Log Total Outstanding Credit	Outstanding Agriculture Credit	9.234532	0.000174	LTOTOUT=9.23+0.000174AGCR
Log Total Disbursed Credit	Disbursed Agriculture Credit	6.163564	0.001729	LTOTDIS=6.163564+0.001729 AGRDIS
Log Total Collection of Credit	Agricultural credit collection	6.023142	0.001858	LTOTCOL=6.023142+0.001858AGCOL
Total	Log	-226425.3	35718.13	TOTOUT=-226425.3 +35718.13LAGCR

Outstanding Credit	Outstanding Agriculture Credit			
Total Disbursed Credit	Log Disbursed Agriculture Credit	-2044.669	872.0684	LTOTDIS=-2044.669+872.0684LAGRDIS
Total Collection of Credit	Log Agricultural credit collection	-1871.938	765.1720	LTOTCOL=-1871.938+765.1720LAGCOL

Table 4-7 Elasticity of Bank Credit to Agricultural Sectors

Source: Author's own computation

As shown in the above table the definition of the result of log-linear regression result of elasticity showed that in every one million additional outstanding credit the total outstanding will be increased by 0.0174%. And even if agricultural credit showed no increment, the total outstanding loan will increase by 9.234532 million. On the other hand the result revealed that on the margin when agricultural credit increased by 1% the total outstanding loan will increase by 35718.13.

4.2.5. Test for Stationarity

Dickey and Fuller (1979, 1981) provide a method of determining the order of integration for individual series, viz.: ADF tests. DF Test does tests for the null hypothesis of a random walk or non-stationarity against a trend stationary alternative. For a given series, if the estimate of ρ is not significantly different from unity, then the null hypothesis of a random walk cannot be rejected.

Since the objective is to test the long-run and short-run relationship between credit and agricultural output using time series data, it is a precondition of the cointegration test for the data series to be integrated of the order of same, that is, I(1) in levels.

The summary Result of Augmented Dicky Fuller Test at level with intercept test is shown in table 4-8 below:

Variable	**ADF Test Level with Intercept**	**Decision**

Agricultural GDP(LAGDPt)	**-0.031412**	**Reject Null**
Agricultural Credit (LAGCRt)	**0.058187**	**Reject Null**
Cropped land in million hectares (LCLt)	**-1.230863**	**Reject Null**
Labor force in million (LFt)	**-0.140492**	**Reject Null**
Annual Rainfall (RNFt)	**-5.668025*** **	**Accept Null**

Table 4-8 Dicky Fuller Test Result

Source: Author's own computation

The ADF test for stationarity of natural log of agricultural GDP state the existence of non-stationarity since ADF calculated is greater than critical value at 5% level of significance indicating the existence of long run relationship between variables included in the model. The ADF test for stationarity of agricultural credit, cropped land and labor force also showed the existence of non-stationarity since ADF test static is greater than critical value at 10% level of significance indicating the existence of long run relationship with the mentioned variables and agricultural GDP.

4.2.6. Unit Root Test

The unit root test results are reported in Table 1 below. The ADF test fail to reject the null hypothesis of the presence of a unit root for all the data series. In levels, all variables were integrated of order 1 or I(1). Thus the null hypothesis of stationarity was rejected for all the four series except for annual rainfall. The series became stationary or I(0) in second differences. This paved way for tests for the long-run relationship between bank credit and agricultural output using the Johansen-Juselius cointegration test.

Variable	**ADF Test First Differenced**	**ADF Test Second Differenced**	**Decision**
Agricultural GDP(LAGDPt)	**-3.028097***	**-4.319556*** **	**Accept Null**
Agricultural Credit (LAGCRt)	**-4.551340*** **		**Accept Null**
Cropped land in million hectares (LCLt)	**-2.572536**	**-3.461325** **	**Accept Null**
Labor force in million (LFt)	**-1.670343**	**-3.331019** **	**Accept Null**
Annual Rainfall (RNFt)			

Note: ***, ** and * denote significance at 1, 5 and 10% levels, respectively.

Table 4-9 Summary of Unit Root Test Result

Source: Author's own computation

4.2.7. Model Estimation and Discussion

The study is mainly aimed to assess the economic contribution of availability of credit to agricultural GDP based on the data obtained from the relevant institutions. After correcting the data for Stationarity, the model estimated using EViews

- The regression result which indicates the relationship between agricultural credit and agricultural GDP indicates that to be statistically significant and positive in promoting the growth of AGDP.
- The rationale behind the importance of the amount of credit disbursed to agricultural sector is that in the model all other variables like …… are taken as a factor of credit.
- The regression result showed that a 1% increase in credit leads to 0.2% increase in AGDP citrus paribus.
- What is evident from these results is that credit has a positive and significant relationship with agricultural output

Dependent Variable: LAGDPT
Method: Least Squares
Sample: 2000 2014
Included observations: 15

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.208730	1.252321	0.965192	0.3572
LAGCRT	0.208464	0.052014	4.007837	0.0025
LCLT	0.019628	0.263627	0.074453	0.9421
LLFT	0.702747	0.484017	1.451905	0.1772
LMARFT	-0.100567	0.175660	-0.572510	0.5796

R-squared	0.982873	Mean dependent var	5.044548
Adjusted R-squared	0.976022	S.D. dependent var	0.324095
S.E. of regression	0.050186	Akaike info criterion	-2.884978
Sum squared resid	0.025186	Schwarz criterion	-2.648962
Log likelihood	26.63734	Hannan-Quinn criter.	-2.887492
F-statistic	143.4672	Durbin-Watson stat	2.198173
Prob(F-statistic)	0.000000		

Table 4-10 Regression Result

Source: Author's own computation

As indicated in the result of Chisasa *et al* (2013) this results are consistent with those of Iqbal *et al*. (2003:477), Sial *et al*. (2011:131) for Pakistan and Chisasa *et al* (2013)

Statistic	This Study (Ethiopia)	Chasisa *et al* 2013 (South Africa)	Sial *et al*. 2011 (Pakistan)	Iqbal *et al*. 2003 (Pakistan)
Credit	0.208464***	0.5932***	0.167*	0.0801**
Labour	0.702747	-0.0065	0.639**	0.7783***
Capital formation	Not used	0.4153***	Not used	Not used
Crop intensity	Not used	Not used	1.399*	0.5519
Croped Land	0.019628	Not used	Not used	Not used
Rainfall	-0.100567	-0.0431	1.063*	0.6259**
AR(1)	Not used	0.0002***	0.255**	0.5209**
MA(1)	Not used	Not used	0.979**	0.6832***
R2	0.982873	0.994	0.96	0.98
Adjusted R2	0.976022	0.993	-	0.98
F-statistic	143.4672	953.9	160.1	162.165
DW	2.198173	2.13	1.96	1.874

Table 4-11 Comparative studies

Source: Author's own computation

4.2.8. Cointegration test

The Johansen Trace cointegration test showed that there are two integrating equations at the 95% confidence level (p-value=0.05) suggesting that credit, labor, cropped land and agricultural output are cointegrated. The trace statistics showed that at least two integrating equations are available, although the Max-Eigen value suggest that at least one integrated equation is available. As far as there is no clear agreement among econometricians whether Trace value or Max-Eigen value to use this study uses trace value result. The Trace Statistic and the Max-Eigen Statistic are higher than the Eigenvalue and thus confirming that in the long run, bank credit, labor, cropped land, labor and agricultural output are cointegrated. The results are presented in Table 4.1 14

Sample (adjusted): 2001 2014
Included observations: 14 after adjustments
Trend assumption: Linear deterministic trend
Series: LAGDPT LAGCRT LCLT LLFT
Lags interval (in first differences):

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.919870	68.89377	47.85613	0.0002
At most 1 *	0.772373	33.55629	29.79707	0.0176
At most 2	0.598523	12.83561	15.49471	0.1210
At most 3	0.004216	0.059146	3.841466	0.8078

Trace test indicates 2 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 *	0.919870	35.33749	27.58434	0.0041
At most 1	0.772373	20.72067	21.13162	0.0570
At most 2	0.598523	12.77647	14.26460	0.0848
At most 3	0.004216	0.059146	3.841466	0.8078

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

Table 4-12 Cointegration Test Result

Source: Author's own computation

4.2.9. Granger Causality Test

Pairwise Granger Causality Tests
Date: 06/24/16 Time: 17:35
Sample: 2000 2014
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
LAGCRT does not Granger Cause LAGDPT	14	0.24951	0.6273
LAGDPT does not Granger Cause LAGCRT		10.8414	0.0072***
LCLT does not Granger Cause LAGDPT	14	16.4488	0.0019***
LAGDPT does not Granger Cause LCLT		0.63482	0.4425
LLFT does not Granger Cause LAGDPT	14	5.40308	0.0403**
LAGDPT does not Granger Cause LLFT		0.13451	0.7208
LCLT does not Granger Cause LAGCRT	14	21.8148	0.0007***
LAGCRT does not Granger Cause LCLT		0.44256	0.5196
LLFT does not Granger Cause LAGCRT	14	6.54184	0.0266**
LAGCRT does not Granger Cause LLFT		0.02667	0.8732

LLFT does not Granger Cause LCLT	14	0.73126	0.4107
LCLT does not Granger Cause LLFT		6.49460	0.0271**

Table 4-13 Granger Causality Test Result

As shown in the table above, the results revealed the presence of unidirectional causality flowing from agricultural GDP to bank credit, but there is no evidence of reverse causality. This means that unidirectional causality from economic growth to financial development. In the recent literature, the question of whether economic growth is enhanced in the presence of a strong and efficient financial mechanism has been examined in many contexts and the conclusion has usually been that it is. Also observed are unidirectional causality from (1) Cropped land to AGDP; (2) Labor force to AGDP; (3) Cropped Land to Labor force; (4) Cropped Land to Agricultural Credit; (5) Labor force to Agricultural Credit.

5. Summary, Conclusion and Recommendation

5.1. Summary

This study has shown the trend of commercial bank credit allotment to the agricultural sector in Ethiopian economy over a period of 23 years (1993 – 2015). The shares of agricultural credit in the bank's total credit, private bank's total volume of agricultural credit, government banks' total volume of agricultural credit, pattern of agricultural growth and AGDP growth have also been described in this study. Least Square growth model and auto regressive growth model was constructed and estimated via the Ordinary Least Square (OLS) techniques to ascertain the rate of growth of total credit in the economy and Credit to Agricultural sector.

An econometric growth model of least square and auto regressive growth model of outstanding agricultural credit and bank's total credit result showed that both constant and trend are significant in the model and positively related to both the total and agricultural outstanding credit. This means that, time significantly affect the outstanding credit availability of agricultural sector positively.

A ratio analysis of loan-to-deposit (LTD) ratio of agricultural credit, LTD ration of total outstanding credit and agricultural GDP (AGDP) to GDP ratio also calculated. The study tries to calculate credit-to-GDP analysis on the sectorial level. By using the statistical Hodrick-Prescott (HP) filter the study compares the actual credit-to-GDP ratio with its long-term trend obtained. We can then estimate whether or not the credit level is excessive. As a result, the maximum Agricultural credit to Agricultural GDP ratio is 7.7% and this result is by far lower that the World Bank study tipping point of 64% as above-mentioned.

The sectorial disparities of credit distribution also analyzed in terms of growth rate, percentage share and amount of outstanding credit and as a consequently it is found that agricultural sector receives very low agricultural credit facility when we compared to other sectors.

Elasticity of bank's agricultural sector credit to total advances was constructed using econometrics approach of log-linear and linear-log mode. The result showed that, in every one million additional outstanding credit the total outstanding will increase by 0.0174%.

On the other hand, the estimated OLS Model were constructed and estimated using AGDP as a function of agricultural sector credit, cropped land, labor force and annual rainfall. The variables were tested for stationarity, unit root using the Augmented Dickey-Fuller method and co-integration analysis was also carried out. The study found that credit supply to agricultural sector and other included variable has a long run relationship with Agricultural GDP i.e Cropped land, Rain fall, labor force.

5.2. Conclusion & Recommendation

Conclusively, the general lesson that emerges from this study is that continuous credit accessibility for agricultural sector in the economy has the capacity to induce the Agricultural performance. The provision of extending formal credit to agriculture should be the central to the concern of policy makers, planners and development economists, because the significance of agriculture sector in Ethiopia is not restricted to its contribution to GDP, employment and livelihood creation only, but on account of its complementarity with other sectors of the economy and its far reaching ability to impact poverty alleviation and rural development of the economy.

However, considering the related risk assumed to agricultural sector Banks are evading lending more to other sectors who have a strong collateral and less business risk of uncertainty. Even though the allocation of credit as a whole showed increment, without showing vivid variation, however, the proportion of agricultural sector credit allocation continues dramatically declining. These showed, considering the agriculture sector is the only sector affected by policy and regulation of the regulatory body. This indicates that there is an existence of unfair allocation of credit resources for the sectorial development.

The development of the agricultural sector in Ethiopia can be promoted by sufficient and low cost credit opportunities provided by banks and government. However, the study revealed that the contribution of banks in the economy on financing of agricultural sector is not adequate and more improvement in agricultural banking is required.

In order to encourage the provision of credit availability for agricultural sector and satisfy the need of small holder farmers, the following relevant policy intervention and recommendation should be necessary.

- The monetary authority should put in place adequate policies towards extending of the financial service to agriculture sector and reducing the cost of credit. Such policies should, however, be accompanied with other complementary strategies that enhance agricultural productivity.
- The National bank of Ethiopia should adopt direct credit control, where preferred sectors like agriculture sector should be favored in terms of granting credits. Banks should be willing or obligated to give both short and long-term loans for productive purposes, as this will eventually lead to economic growth.
- The banks need to improve the agricultural banking products and services by providing timely and easily accessed medium to long term with lower interest policy and supervised credit facilities. The banks should provide agricultural credit opportunities that are tailored towards to fit the expectations of agricultural investors.
- Stakeholders in agricultural, manufacturing and services sector mostly the government should put a mechanism to ensure effective implementation of credit granted by the agricultural sector.

- As we discussed on the result and discussion chapter, there is long-run relationship between agricultural financing and Agricultural GDP growth in Ethiopia. There is need to increase the level and size of agricultural loan through the introduction of prioritizing sector and reduction of interest rate to allow for more economic development in the country.
- National Bank of Ethiopia must set a minimum ceiling rate on the total outstanding loans and advances for commercial banks, especially for private banks, where at least a minimum rate of total credit must have granted to the agricultural sector.
- Again National Bank of Ethiopia should put a controlling mechanism to distinct credit granted to agricultural production purpose and for export/international trade purpose. And the availability of agricultural subsidized loans by banks needs to be introduced in order to provide credit system with lower interest policy to agricultural investors.

REFERENCES

Adeleke Salami, Damilola Felix Arawomo, Steve Kayizzi-mugerwa, and C John. 2013. "Empirical Analysis of Agricultural Credit in Africa : Any Role for Institutional Factors ?" (192): 1–28.

AQUASTAT, FAO, United Nations, Accessed June 01, 2016 http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en

Assefa Admassie (2004). A Review of the Performance of Agricultural Finance in Ethiopia : Pre- and Post Reform Periods. *International Conference on "The Agrarian Constraint and Poverty Reduction: Macroeconomic Lessons for Africa", Addis Ababa, Ethiopia, 17-18 December, 2004.*, 22.

Afzal, M. (2005). Impact of Institutional credit on Agricultural output, unpublished mphil's thesis G.C. University, Lahore, Pakistan

AGRA. (2014). *Africa Agriculture Status Report*.

Bencivenga, V. R. and Smith B. D. (1991). Financial Intermediation and Endogenous growth. Review of Economics Studies. Vol. 58, P. 195-209.

Carter, M. (1989). The Impact of Credit on Peasant Productivity and Differentiation in Nicaragua. Journal of Development Economics

Chisasa, J., & Makina, D. (2013). Bank Credit And Agricultural Output In South Africa: A Cobb-Douglas Empirical Analysis. *The International Business & Economics Research*

Journal (Online), *12*(4), 387–n/a. Retrieved from http://search.proquest.com/docview/1418721314?accountid=38773

Ebisa Derbie (2012). The Effects of Post 1991 Era financial sector deregulations in Ethiopia : An Inspirational guide for. *Basic Research Journal of Agricultural Science and Review ISSN 2315-6880 Vol. 1(4) Pp. 81-87 October 2012*, *1*(October), 81–87.

Finance: History of Banking and Finance, Website retrieved from March 02, 2016 http://finance.mapsofworld.com/finance/finance-and-banking/history-of-banking-and-finance.html

Goldsmith, R. W. (1969). Financial Structure and Development. New Haves CT: Yale University Press.

Greenwood, J and Jovanovic, B. (1990). Financial Development, Growth and the Distribution of Income. Journal of Political Economics. 98:1076–1107.

Haileleul Getahun (2001). Financing Small Famer Development in Ethiopia. *International Conference on African Development Financing Small Famer Development in Ethiopia*.

Höllinger, D. F. (2011). *Agricultural Finance – Trends , Issues and Challenges*.

Iqbal, M., Ahamad, M. and Abbas, K. (2003). The Impact of Institutional Credit on Agricultural Production in Pakistan. The Pakistan Development Review

John F. Chown, (1997). Origins of American Banking

Khan, N., Shafi, M. M., Shah, M., Islam, Z., Arif, M., Javed, R., & Shah, N. (2011). Review of Past Literature on Agriculture Credit in Rural Area of Pakistan. *Sarhad Journal Of Agriculture*, *27*(1), 103–110.

Mauri, A. (2003). Origins and Early Development of Banking in Ethiopia. *SSRN Electronic Journal*, (January 2003). http://doi.org/10.2139/ssrn.667265

National Bank of Ethiopia, 2012 Website retrieved from March 04, 2016 http://www.nbe.gov.et/aboutus/index.html

Greenwood, J and Jovanovic, B. (1990). Financial Development, Growth and the Distribution of Income. Journal of Political Economics. 98:1076–1107.

Salami, A., Arawomo, D. F., Kayizzi-mugerwa, S., & John, C. (2013). Empirical Analysis of Agricultural Credit in Africa : Any Role for Institutional Factors ? *African Development Bank Group*, (192), 1–28.

Schumpeter, J. A. (1934). The Theory of Economic Development. Cambridge, Mass: Havard University Press.

Sial, M.H., Awan, M.S. & Waqas, M. 2011. Role of institutional credit on agricultural production: A time series analysis of Pakistan. International Journal of Economics and Finance

Tilahun Dessie Zewdie (2015). *Access to Credit and the Impact of Credit constraints on Agricultural Productivity in Ethiopia : Evidence from Selected Zones of Rural Amhara A Thesis Submitted to the Department of Economics presented in Partial Fulfillment of the Requirements for the De*. Addis Ababa University.

UNDP Global HDR（2014）

Woldey, A., & Peck, D. (2010). Agricultural finance potential in Ethiopia Constraints and Opportunities for Enhansing the System. *Association of Ethiopian Micro-Finance Institutions*, (July).

World Bank. (2010). Finding the Tipping Point

World Bank. (2015). SME Finance in Ethiopia : Addressing the Missing Middle Challenge. World Bank GroupClimate Change Knowledge Portal, The World Bank Group, Accessed June 01, 2016

http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisRegion=Africa&ThisCCode=ETH

World Bank (2016) - Open access to global development data, Accessed June 01, 2016 http://beta.data.worldbank.org/ and http://data.worldbank.org/

APPENDIXES

Appendix A: Sectorial Distribution of Loan and Advances from 1993 – 2015

Year	Agriculture	Industry	Domestic Trade	Int'l Trade Export	Int'l Trade Import	Hotels and Tourism	Transport and Communication	Housing and Construction	Mines, Power & Water	Others	Personal	Interbank Lending	Outstanding Lending by Sector
Jun-93	262.15	991.95	429.83	412.97	540.36	82.69	151.69	224.23	65.31	26.51	19.71	96.25	3,303.65
Jun-94	313.04	1,029.81	783.61	567.07	490.57	125.83	244.97	776.46	51.82	58.01	16.43	95.37	4,552.98
Jun-95	162.84	451.07	1,425.22	729.49	821.99	175.59	493.15	917.85	-	298.67	14.07	179.48	5,669.42
Jun-96	213.15	578.20	1,728.31	943.75	1,035.67	158.79	851.90	1,129.43	-	419.38	16.06	527.60	7,602.24
Jun-97	333.07	711.88	1,939.54	930.02	1,443.45	190.22	948.90	1,473.66	-	324.56	17.40	540.88	8,853.56
Jun-98	352.27	790.58	1,920.40	992.35	1,665.09	202.66	874.07	1,322.50	-	1,059.27	19.87	496.67	9,695.72
Jun-99	404.61	864.32	1,497.21	1,128.88	1,717.65	144.11	558.00	1,345.20	-	2,148.32	18.39	554.80	10,381.49
Jun-00	1,237.99	2,051.83	2,297.52	1,033.35	2,129.51	285.54	942.50	1,605.06	13.62	2,805.20	22.77	676.91	15,101.79
Jun-01	1,217.56	2,449.27	2,065.12	1,105.27	2,163.72	367.36	974.80	1,722.56	18.09	3,293.69	26.64	564.32	15,968.37
Jun-02	1,286.50	2,517.66	1,861.07	881.77	2,148.55	406.76	800.97	1,669.25	13.62	3,614.99	29.18	517.66	15,747.99
Jun-03	1,202.93	2,749.83	1,947.80	856.28	1,702.88	318.49	599.68	1,896.84	13.62	3,743.39	55.16	456.55	15,543.44
Jun-04	1,162.12	4,207.60	2,192.58	944.81	2,451.66	322.93	773.06	2,038.69	13.62	3,170.66	58.16	414.15	17,750.04
Jun-05	2,018.24	5,135.59	2,660.19	1,459.54	3,148.08	316.67	873.25	2,218.32	13.62	3,449.87	115.49	340.19	21,749.04
Jun-06	3,417.97	6,320.14	3,345.65	1,580.72	3,744.16	316.64	1,578.01	3,206.92	31.05	2,842.00	92.95	274.94	26,751.13
Jun-07	4,218.37	6,996.50	3,821.40	2,334.47	4,165.88	675.54	2,369.67	3,790.66	40.87	2,316.36	147.16	225.75	31,102.62
Jun-08	5,481.20	7,897.04	5,219.19	2,973.82	9,231.22	722.73	2,779.89	4,865.07	4.18	1,819.72	169.27	176.45	41,339.77
Jun-09	6,009.71	9,081.65	5,760.59	3,409.21	9,104.37	1,023.72	2,531.84	6,688.14	4.61	1,815.59	147.77	427.52	46,004.73
Jun-10	6,819.59	12,234.89	6,210.01	5,137.29	9,296.56	1,257.43	2,786.45	8,222.55	3.42	2,233.79	229.22	260.87	54,692.06
Jun-11	10,575.26	20,650.52	7,261.10	7,222.76	10,802.79	1,435.52	3,558.65	9,023.12	37.17	3,076.56	314.98	12.93	73,971.38
Jun-12	17,165.60	33,557.25	12,074.72	10,720.59	14,294.81	1,650.51	4,428.86	12,397.44	31.94	3,172.32	430.10	276.41	110,200.56
Jun-13	16,723.44	48,739.03	14,185.12	10,616.15	16,963.32	1,848.48	4,779.04	16,544.51	88.34	4,624.49	554.64	163.33	135,829.89
Jun-14	15,815.00	67,219.45	16,399.21	13,311.97	19,267.63	3,562.79	5,278.81	19,802.02	546.71	6,033.54		65.94	168,355.06
Jun-15	18,579.78	86,212.34	25,336.37	17,581.33	25,722.59	3,590.58	7,288.97	22,529.06	844.71	7,827.74		57.82	217,368.21
	114,972.39	323,438.4	122,361.76	86,873.86	144,052.51	19,181.58	46,467.13	125,409.54	1719.19	60,174.63	5,364.34	7402.79	1,057,535.14

Source: Own computation based on National Bank of Ethiopia

Appendix B: Percentage Share of Loan by Sector (Outstanding Balance) from 1993 – 2015

Year	Agriculture	Industry	Domestic Trade	Int'l Trade Export	Int'l Trade Import	Hotels and Tourism	Transport and Communication	Housing and Construction	Mines, Power and Water Resource	Others	Personal	Interbank Lending	Total
Jun-93	7.935%	30.026%	13.011%	12.500%	16.357%	2.503%	4.592%	6.787%	1.977%	0.802%	0.597%	2.913%	100.000%
Jun-94	6.876%	22.618%	17.211%	12.455%	10.775%	2.764%	5.380%	17.054%	1.138%	1.274%	0.361%	2.095%	100.000%
Jun-95	2.872%	7.956%	25.139%	12.867%	14.499%	3.097%	8.698%	16.189%	0.000%	5.268%	0.248%	3.166%	100.000%
Jun-96	2.804%	7.606%	22.734%	12.414%	13.623%	2.089%	11.206%	14.857%	0.000%	5.517%	0.211%	6.940%	100.000%
Jun-97	3.762%	8.041%	21.907%	10.504%	16.304%	2.148%	10.718%	16.645%	0.000%	3.666%	0.196%	6.109%	100.000%
Jun-98	3.633%	8.154%	19.807%	10.235%	17.173%	2.090%	9.015%	13.640%	0.000%	10.925%	0.205%	5.123%	100.000%
Jun-99	3.897%	8.326%	14.422%	10.874%	16.545%	1.388%	5.375%	12.958%	0.000%	20.694%	0.177%	5.344%	100.000%
Jun-00	8.198%	13.587%	15.214%	6.843%	14.101%	1.891%	6.241%	10.628%	0.090%	18.575%	0.151%	4.482%	100.000%
Jun-01	7.625%	15.338%	12.933%	6.922%	13.550%	2.301%	6.105%	10.787%	0.113%	20.626%	0.167%	3.534%	100.000%
Jun-02	8.169%	15.987%	11.818%	5.599%	13.643%	2.583%	5.086%	10.600%	0.086%	22.955%	0.185%	3.287%	100.000%
Jun-03	7.739%	17.691%	12.531%	5.509%	10.956%	2.049%	3.858%	12.203%	0.088%	24.083%	0.355%	2.937%	100.000%
Jun-04	6.547%	23.705%	12.353%	5.323%	13.812%	1.819%	4.355%	11.486%	0.077%	17.863%	0.328%	2.333%	100.000%
Jun-05	9.280%	23.613%	12.231%	6.711%	14.475%	1.456%	4.015%	10.200%	0.063%	15.862%	0.531%	1.564%	100.000%
Jun-06	12.777%	23.626%	12.507%	5.909%	13.996%	1.184%	5.899%	11.988%	0.116%	10.624%	0.347%	1.028%	100.000%
Jun-07	13.563%	22.495%	12.286%	7.506%	13.394%	2.172%	7.619%	12.188%	0.131%	7.447%	0.473%	0.726%	100.000%
Jun-08	13.259%	19.103%	12.625%	7.194%	22.330%	1.748%	6.724%	11.768%	0.010%	4.402%	0.409%	0.427%	100.000%
Jun-09	13.063%	19.741%	12.522%	7.411%	19.790%	2.225%	5.503%	14.538%	0.010%	3.947%	0.321%	0.929%	100.000%
Jun-10	12.469%	22.370%	11.354%	9.393%	16.998%	2.299%	5.095%	15.034%	0.006%	4.084%	0.419%	0.477%	100.000%
Jun-11	14.296%	27.917%	9.816%	9.764%	14.604%	1.941%	4.811%	12.198%	0.050%	4.159%	0.426%	0.017%	100.000%
Jun-12	15.577%	30.451%	10.957%	9.728%	12.972%	1.498%	4.019%	11.250%	0.029%	2.879%	0.390%	0.251%	100.000%
Jun-13	12.312%	35.882%	10.443%	7.816%	12.489%	1.361%	3.518%	12.180%	0.065%	3.405%	0.408%	0.120%	100.000%
Jun-14	9.394%	39.927%	9.741%	7.907%	11.445%	2.116%	3.136%	11.762%	0.325%	3.584%	0.625%	0.039%	100.000%
Jun-15	8.548%	39.662%	11.656%	8.088%	11.834%	1.652%	3.353%	10.364%	0.389%	3.601%	0.827%	0.027%	100.000%
Average	8.90%	21.04%	14.14%	8.67%	14.59%	2.02%	5.84%	12.49%	0.21%	9.40%	0.36%	2.34%	100.00%

Source: Own computation Based on National Bank of Ethiopia Data

Appendix C: Log-Linear Elasticity Result

Dependent Variable: LTOTOUT
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.234532	0.043724	211.2003	0.0000
OUTSTANDING_AGRICULTURE	0.000174	5.41E-06	32.06704	0.0000

R-squared	0.790209	Mean dependent var	10.14324
Adjusted R-squared	0.789441	S.D. dependent var	1.203372

Dependent Variable: LTOTDIS
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.163564	0.074963	82.22178	0.0000
AGRICULTURE_DISBURSEMENT	0.001729	0.000122	14.21331	0.0000

R-squared	0.425285	Mean dependent var	6.725825
Adjusted R-squared	0.423180	S.D. dependent var	1.390321

Dependent Variable: LTOTCOL
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.023142	0.079144	76.10312	0.0000
AGRICULTURE_COLLECTION	0.001858	0.000146	12.74489	0.0000

R-squared	0.373037	Mean dependent var	6.528634
Adjusted R-squared	0.370740	S.D. dependent var	1.431768

Dependent Variable: OUTSTANDING_TOTAL_CREDIT
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-226425.3	12600.63	-17.96937	0.0000
LAGOUT	35718.13	1601.637	22.30102	0.0000

R-squared	0.645609	Mean dependent var	50163.13
Adjusted R-squared	0.644311	S.D. dependent var	61886.42

Appendix D: Linear-Log Elasticity Result

Dependent Variable: TOTAL_COLLECTION
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 270

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1871.938	185.9194	-10.06855	0.0000
LAGCOL	765.1720	39.02952	19.60496	0.0000

R-squared	0.589180	Mean dependent var	1520.432
Adjusted R-squared	0.587647	S.D. dependent var	1740.112

Dependent Variable: TOTAL_DISBURSEMENT
Method: Least Squares
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2044.669	245.8357	-8.317217	0.0000
LAGDIS	872.0684	50.55202	17.25091	0.0000

R-squared	0.521551	Mean dependent var	1875.819
Adjusted R-squared	0.519799	S.D. dependent var	2243.220

Dependent Variable: OUTSTANDING_TOTAL_CREDIT
Method: Least Squares
Date: 06/27/16 Time: 22:05
Sample: 1993M06 2016M04
Included observations: 275

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-226425.3	12600.63	-17.96937	0.0000
LAGOUT	35718.13	1601.637	22.30102	0.0000

R-squared	0.645609	Mean dependent var	50163.13
Adjusted R-squared	0.644311	S.D. dependent var	61886.42
S.E. of regression	36908.87	Akaike info criterion	23.87754
Sum squared resid	3.72E+11	Schwarz criterion	23.90384
Log likelihood	-3281.161	Hannan-Quinn criter.	23.88809
F-statistic	497.3353	Durbin-Watson stat	0.015880
Prob(F-statistic)	0.000000		