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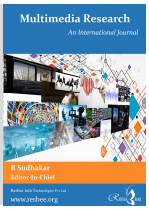


# The Role of Agricultural Input Credit on Production of Maize: A Case Study in Shebedneo District, Sidama Region, Ethiopia

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**Abstract:** Smallholder farmers' inability to procure agricultural input is one of the main causes of low agricultural productivity and production. But in recent years, the government and NGOs have tried their level best to access credits to farmers both in cash and agricultural inputs, especially fertilizers. In this study, an attempt is made to examine the role of agricultural input credit on the production of maize from a single-visit survey of the case study in Shebedino District, Sidama Region, Ethiopia. More than ever, the study tried to find out the sources of input credit for rural farmers. The major problems that hinder the use, repayment, provision, and collection of input credit for farmers and from farmers. The importance of input credit on maize production and the trends in input credit provision and repayment in Shebedino District. Hence, primary data was collected from 91 farm households drawn from three kebeles using purposive and simple random sampling. Secondary data was collected from the Shebedino District agricultural and OMO microfinance offices and different written documents. The data was analyzed using both the descriptive and econometric analysis methods. OLS models were employed to examine the role of agricultural input credit in the production of maize. The survey findings showed that there is a direct relationship between agricultural input credit and maize output performance. Loan provision in Shebedino District was increasing but the rate was not regular through the years and the repayment rate in the district was decreasing through the years. The finding also showed that educational level and savings have a positive or direct relationship with the usage and repayment of input credit among the farmers. As the findings revealed, the problems that can affect the provision and collection of agricultural inputs credit or taking and repaying the loan are low agricultural productivity, low infrastructural faculties, and low extension service. low saving and attitude of rural farmers towards the input credit service for these, providing more extensional services and infrastructural facilities side by side with credit service to rural farmers is better for increasing their productivity and it is also better if more educated people invest in agricultural activity and increase saving behavior among rural farmers to increase their income and country development.

**Keywords:** Agricultural input credit, Multiple linear regression model, Production of maize, Shebednio District, and Ethiopia

***Nomenclature***

| Abbreviation | Expansion |
|---|---|
| **AIDB** | Agricultural Industrial Development Bank |
| **AISCO** | Agricultural Input Supply Corporation |
| **BORAD** | Bureau of Rural Agricultural Development |
| **CBE** | Commercial Bank of Ethiopia |
| **DAS** | Development Agencies |
| **DBE** | Development Bank of Ethiopia |
| **ESC** | Ethiopian Seed Corporation |
| **FAO** | Food and Agricultural Organization |
| **GDP** | Gross Domestic Product |
| **MOA** | Ministry of Agriculture |
| **NBE** | National Bank of Ethiopia |
| **NGO** | Non-Governmental Organization |
| **SNNPR** | South Nation Nationality and People of Region |
| **MDG** | Millennium Development Goal |
| **MLE** | Maximum Livelihood Estimation |
| **OLS** | Ordinary Least Squares |


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# 1. Introduction

Agriculture is a fundamental instrument for sustainable development, poverty alleviation, and enhanced food security in developing countries [14]. It is a vital development tool for achieving the MDG, one of which is to halve the share of people suffering from extreme poverty and hunger by 2015 (WB 2015). In Africa, Agriculture is an option for spurring growth, overcoming poverty, and improving food security (WB 2015).

In Ethiopia, agriculture plays an important role accounting for 45% of the GDP and providing employment for 85% of the population [15]. It also accounts for 90% of export revenue and satisfies 70% of the raw material requirements of the country's industries. However, Ethiopia's agriculture is characterized by its very low productivity, with average grain yields of tons per hectare in the year 2013–14 [7]. The use of agricultural inputs was promoted through the extension package program of the MOA.

The financial components of the program were and still are supported by the Commercial Bank of England (CBE) as well as other leading institutions in providing credits to imputers, distributors, and uses of agricultural inputs [16].

From its launch in 1995 until 2000, the extension package program experienced increased annual interest from farmers in rained agricultural production areas and proved Ethiopia's capacity to reach national food sufficiency. This led in 2000 and 2001 to cereal production generating buffer stocks. However, the production increment was not accompanied by any necessary mechanism to ensure market price between November 2000 and May 2002. A further asset of the rural population occurred as further complied with returned the credit and loans contracted or the purchase of these inputs' packages [10].

In addition to this, during the Dengue regime, the financial sector was highly regulated under the government with an interest rate ceiling, and Quantrill restricted the operation of financial institutions, public cooperatives, and enterprises, which were the main benefits of the low-interest rate, which remained below it in 1980. Despite the guarantee, there is still a significant amount of unpaid or long-overdue loans of 37.4 million birr as of 1990 (annual report on Ethiopian Economy of 1998). The Shebedino woreda in Sidama zone is the study area. They are mainly dependent on agriculture. The dominant farming practice of Shebedino woreda is characterized by traditional farming [17]. The most suitable product in Shebedino woreda is maize, and since the household farmers of Shebedino woreda produce it out of farmer consumption and based on traditional agricultural methods, tools for these agricultural inputs are important to the farm.

The statement of the problem was "The Ethiopian economy is dominated by agriculture, which accounts for over 50% of GDP, 90% of export earnings, and 88% of the labor force. It also supplies food to urban areas and raw materials to the manufacturing sectors". A variety of crops have different growth seasons in different parts of Ethiopia. It consists of maize, coffee cotton, and oilseed. The main cash and industrial crops include maize, coffee, cotton oil, and vegetables. It is estimated that crop production and livestock husbandry account for over 86% of the agricultural GDP. (GA 2013)

The constraints of maize production in Ethiopia include both biotic (weeds, plants, pathogens, and wild animals) and biotic (drought, flood, nutrients, soil type). It is found that weed infestation is of supreme importance among the biotic factors that are responsible for low maize grain yield. Worldwide maize production is hampered up to 40% by competition from groups of this crop. Generally, weeds reduce crop yields by competing for light nutrient water and carbon dioxide, as well as interfering with harvesting and increasing the cost involved in crop production.

Producers take lower-risk, low-output options given the risks and certainty of the credit market, technology, information gap, literacy diversion, and other related problems present in Ethiopia [18]. This is a case of rural poor farmers being trapped in a vicious circle of low income, low savings, and low capital formation. low agricultural productivity. This, in turn, leads to a failure to purchase better seeds, fertilizer, farm animals, and tools to adopt new technology, which leads to low investment in Ethiopia.

Therefore, there is an inadequate role of input credit in the productivity of maize, and this study is an attempt to investigate the role of input credit in productivity. Previous studies have been done in different areas of Ethiopia on the role of agriculture input credits in the productivity of maize. This research is different from the others. This Research is studied in different areas where no research has been done to fill this gap and will be conducted to answer the following research questions.

- What are the problems that hinder farmers from using agricultural inputs to credit maize production?
- What does the trend look like in the provision and collection of agricultural input credit?
- What is the role of agriculture input credit in the productivity of maize?

The main objective of the study was to determine the role of agricultural input credit in the production of maize in Shebedino woreda. Specific objectives include: -

- To identify trends in provision credit in Shebedeino woreda.
- To identify the role of agricultural input credit in the productivity of maize.
- To identify major factors that hinder input credit utilization.

In this paper, an OLS method was used to find the agricultural input credit. Then, through purposive and simple random sampling techniques, the sample respondent is selected. Further, data is collected from the respondents and estimated to identify the role of agricultural input credit. The results are then processed for the development of farmers through policymakers and researchers.

The organization of this paper is in this order: Section 2 presents the literature review, and Section 3 presents the methodology. The method of Data analysis was explained in Section 4. Section 5 covers the model SPS fiction. Section 6 mentions the model estimation. Section 7 explains the definition of variables. Section 8 presents the result and discussion; Finally, Section 9 concludes the paper with the recommendation.

## 2. Literature Review

The term credit is defined in different ways by different authors. The author [11]mentioned the provision of credit, especially about agriculture, defined credit as "A condition which enables an individual to extend his control as distinct from his ownership of resources".

Credit is viewed as essentially our concept. In the process of borrowing money, farmers obtain the economic power to carry out a particular course of action [3]. According to William Claims (2007), agricultural credit is a wider view of the context of prevailing food gain and the reduction of poverty among the rural poor. It is the view of initiatives aimed at increasing the flow of investment in agriculture production in developing countries. Agricultural credit might be considered timely but it is an urgent concern. Different literature defines agricultural input.

In 2009, Berhanu G. *et al.* [8] have conducted a study on smallholders, institutional service, and commercial transformation in Ethiopia based on the OLS estimation method. The result showed that the use of improved seeds, fertilizer, and household involvement in the extension program, literate households, and access to credit are positively related to crop productivity. Distant plots from homesteads were negatively related to crop production.

In 2007, Samuel *et al.* [12] have conducted a study on the commercialization of smallholder agriculture in selected teff-growing areas of Ethiopia using cross-sectional data based on the OLS estimation method. The result was that the literacy of the household head, land, labor, and credit had a positive and significant effect on the farm output of teff. The age and sex of the head of the household had an insignificant effect on farm output.

In 2011, Menale *et al.,* [2] have conducted a study on sustainable agricultural practices and agricultural productivity in Ethiopia, underscoring the significance of plot and household characteristics, as well as conventional agricultural inputs (seeds, labor, chemical fertilizer, and oxen) that influence crop productivity. Technology adoption (fertilizers and improved crops) enhances the productivity of agriculture.

In 2000, Andre *et al.,* [4] have estimated the determinant of the total value of grain output in the Maher season by using cross-sectional data based on MLE. The result showed that fertilizer has the largest effect on the total value of grain output, next to the size of the land cultivated.

In 2003, Anbes [5] have revealed that credit users were in a better position as compared to non-users. However, credit was not adequately extended and was not given to all activities as a package. It was probably because of an inadequate source of credit, an untimely supply of credit, a lack of extension services, problems with infrastructure, and others. In this study, farm size was found to have a strong negative impact on the agricultural credit use of the sample household, implying that the farmers who had a larger farm size were not agricultural credit users. This may be attributed to the substitutability between land and fertilizers as factors of production.

In 2005, Zemen [6] have revealed that four important factors affect the borrowers' timely repayment of their debt in the region. Zemen has used linear discriminate analysis to identify these important variables. The variables that differentiated the sample borrower from non-defaulters and defaulters were the size of the cultivated land, loan diversion behavior, membership condition, and amount of other credit borrowed during the study period. The findings of the study indicated that the larger the cultivated land per household, the smaller the occurrence of defaulters, and this result agrees with the assumption that the farmer with larger cultivated land will remain efficient and earn more income compared to the farmer with smaller cultivated land and associated poor earning capacity. So, farmer with large

cultivated land size has the productive resources to properly earn income and settle their debt service on time compared to farmer with smaller cultivated land size.

In 2015, Tilahun Dessie Zewdie [7] have Access to Credit and the Impact of Credit Constraints on Agricultural Productivity in Ethiopia. By using an endogenous switching regression model. The study tried to show the effect of demographic and other socioeconomic variables on the credit constraint status of households and simultaneously the impact of credit constraints on agricultural productivity. Finally, the study showed that varied credit restrictions cause a significant loss in output. If all credit restrictions are removed, the overall effect was projected to be17.94 percent or an increase in productivity of 1410.17 Ethiopian Birr per hectare. This necessitates a well-planned policy intervention that works with the dynamics of rural institutions and other geographic barriers.

In 2008, SIsayYehuala [8] have determinants of smallholder farmer's access to formal credit. The case of Metema woreda, North Gonda, and Ethiopialogit models were used for analyzing quantitative data. According to the research's findings, 56 (43.1%) of the tested farm households used formal credit, while the remaining 74 (56.9%) did not. It was also discovered that households led by women still have trouble getting credit and that there was a statistically significant variation in how easily credit was accessed by different wealth levels. Farmers accept group lending as a solution to the issue of collateral requirements for lending institutions, as a way to prevent the misappropriation of borrowed money, and as a way to reduce the risk of default. They also accept that MFIs offer saving services, but they strongly object to the exclusion of very poor farmers from group formation. Additionally, the shorter repayment time, earlier saving requirement, which was inconvenient for farmers, and smaller loan size

In 2016, Assifaw, L., and Adeba, G. [9] have used the logit model for analyzing quantitative data. According to the study's findings, 97 (65.5%) of the tested farm households did not use formal credit, leaving 51 (34.5%) of them doing so. It was also discovered that households led by women still have trouble getting credit and that there was a statistically significant variation in how easily credit was accessed by different wealth levels. Farmers are aware that group lending addresses the issue of collateral requirements for lending institutions, prevents the misuse of borrowed money, and reduces the danger of default. They were also aware that microfinance organizations offer saving services. The logistic regression model's maximum likelihood estimates reveal the number of times farmers interact with development agents, their physical distance from lending institutions, their family size, and the size of their farm.

## 2.1 Review

Table 1 portrays the methodology, advantages, and disadvantages of the existing method. We considered eight papers that used a different methodology for agricultural input credit. Each method has certain benefits and shortcomings that were explained in detail.

***Table. 1.*** *Review Based on Existing Methods*

| Author | Method | Advantage | Disadvantage |
|---|---|---|---|
| **Berhanu G., *et al* [8]** | Mulitpile linear regrssion model | More accurate and reliable results. | Credit access was considered as a main factor but other factors like weather conditions, pests, and others not considered. |
| **Samuel,*et al*[18]** | Mulitpile linear regrssion model | More accurate | Accuracy depends on the quality of the data in the model estimation technique. |
| **Andre,*et al.*, [3]** | Doubilehurdile model | Helped policymakers and extension agents to design effective interventions to improve credit use among smallholder farmers. | Does not briefly analyze why credit users were more effective than non-users. |
| **Zemen., [4]** | Mulitpile linear regrssion model | Showed important factors that affect borrowers. | Emphasize only factors that affect borrowers. |
| **Tilahun, D [5]** | Endogenous switching regression model | • More accurate and reliable results.<br>• Used unique estimation method. | A familiar estimation method was not used. |

| | | | |
|---|---|---|---|
| **SIsay [6]** | Logistic regression model | • Increased productivity and yield.<br>• This leads to moredetailed and sustainable agricultural formal credit practices. | • Focused only formal credit process.<br>• Used only on self-reported data from farmers. |
| **Assifaw, Land Adeba, G [7]** | Double-hurdle model | Helped policymakers to design targeted interventions. | Focused only formal credit process. |
| **Anbes. [8]** | Theoretical model using data | • Helped policymakers target policies toward increasing credit access to poorer farmers who rely heavily on credit for fertilizer adoption.<br>• Gave insightful information onthe relationship between public work programs,loan availability, and the use of fertilizer over time in ruralEthiopia. | • The study was not generalized.<br>• Relied on self-reported data, which may be subject to easurement error and bias.<br>• Didn't estimate the data. |

### 2.2 Challenges

The challenges experienced by the agricultural input credit are given as follows:

- The multiple regression model in [1], helped the policymakers analyze and design a new method for agricultural input credit. However, the method didn't have Accuracy depending on the quality of the data in model estimation techniques. Additionally, emphasize only factors that affect borrowers.
- [3] [5] [6] [13] [8] used various methods to determine the agricultural input credit. Nevertheless, the methods were suitable for only the particular locality, and they cannot be implemented in other regions.

Even though numerous studies have improved the agricultural input credit in many parts of Ethiopia, it is still difficult for the farmers to completely access the agricultural input credit. When farmers lack any one factor of agricultural input credibility, the efficiency of the process is lacking.

## 3. Methodology

The population of the study area consists of smallholder farmers. They are living in 26 rural kebeles of Shebedino District. The entire population cannot be considered due to the large number of people. Time and resource (budget) limitations so sampling allows the whole population for this purpose among 26 kebele in the woreda, 3 kebelasFuraRemeda, and xaremasa were selected by applying probability sampling. The researcher will use the sample random sampling technique because simple random sampling reduces bias by giving an equal chance to the target sample population. The researchers used purposeful sampling because of financial and time constraints. To determine the sample size, researchers used the formula called Yamane Taro sampling formula. The sample size is calculated for the total population.

$$n = \frac{N}{1 + N(e)^2} \tag{1}$$

Where n represents the sample size, N signifies the population under study, and e signifies the margin error. Where e = 0.01 i.e., e = 10%. When the precision level (error term) increases, the sample size decreases, and vice versa.Now the total population under study is 1086, when applying the value in the formula.

$$n = \frac{1086}{1 + 1086(0.01)^2} = 91 \tag{2}$$

Therefore, the sample size for this research will be 91 household respondents.

## 4. Methods of Data Analysis

The study used both descriptive and econometric analysis. Percentage and frequency would be used to analyze the socioeconomic characteristics of maize farmers and other roles of agricultural input credit in

the productivity of maize. A regression analysis of OLS type using data software was used to identify factors influencing maize production in the study area.

# 5. Model specification

The method of data used to measure the functional relationship between a quantity-dependent variable and one or more independent variables was regression analysis. A linear regression equation of the dependent variable is y and the independent variable x1, x2, x3. xi is given by

$$Yi\beta = \beta o + \beta 1IS + \beta 2E + \beta 3FS + \beta 4FE + \beta 5P + \beta 6ac + \beta 7FS1 + \beta 8F + \beta 9S + \beta 10MS + ui \quad (3)$$

Where

Y=maize productivity, which is a dependent variable;

Bo = intercept

The independent variables are: IS-Improved Seed,E- Education,FS- Family Size,FE- Farm experience,P- Pesticide,AC- Access to Credit),FS1-Farm Size,F- Fertilizer,S-Sex,MS- Marital Status, Ui is the value of Y when all independent variables assume zero value (variables that affect maize production that are ignored by the researcher in the study in the case of climate and condition).

# 6. Model Estimation

## 6.1 The ordinary least squares model (OLS)

Theatrically, there are various econometric methods (estimators) with which we may obtain numerical values of estimates of parameters such as OLS, maximum livelihood, method of moments, and so on. Among the methods, we choose OLS to estimate our model. It is the most commonly used estimator in econometric analysis. This is because oils have some optimal properties compared to other potential estimators. When OLS is used to estimate ideas with qualitative variables then the resulting model is linear. It represents the dependent variable has a linear relationship and can apply OLS.

The assumption under OLS is that the coefficients of the linear regression model are estimated under the assumption that the random term assumes a normal distribution with a zero mean and constant variance. The values of random terms are also assumed to be independent. P-value and tests whether each independent t variable is statistically significant.

# 7. Definition of variables

The research determined the dependent variable, which may be impacted by the independent variable. The dependent variable will be allotted to maize production while the independent variables are improved. Seed education, family size, farm experience, pesticides, access to credit, farm size, fertilizer, sex, and marital status.

**Improved seed:** It is a very important factor that affects maize production positively. It is assumed that the use of improved seed improves their maize production. It will be measured in kilograms.

**Education:** It is the key to improvement. It also affects maize production positively. It is assumed that the more the farmers are literate, the more they adopt technology in maize production. It will be measured in years.

**Family size:** This also affects maize production because the larger the family has higher the working people which would eventually increase the maize production, It provides that it holds up to the return to scale. It is measured in years.

**Farming experience:** When the people from households work longer in maize production, they can produce higher and they are aware of the production system. It will be measured in years.

**Pesticide:** When more pesticides are used in the production of maize then there will be fewer pests and weeds, which contributes to higher maize production. This also works up to the concept of return to scale. It will be measured in litters.

**Access to credit:** When more people get access to credit, it is easier to afford inputs on time, which contributes to higher maize production. It is going to be a dummy variable.

**Farm size:** When more lands are used for maize production then there will be larger maize production. It will be measured in hectares.

**Fertilizer:** As more kg of fertilizer is applied, the greater the soil fertility, which directly contributes to maize production. It will be measured in kilograms.

**Sex:** When there is more participation in both sexes, the higher the maize production. The variable will be handled as a dummy one.

**Marital status:** It will affect maize production both positively and negatively because there will be both wife and husband participate in maize production. It is going to be a continuous variable.

# 8. Results and Discussion

## 8.1 Descriptive Analysis of Primary Data

This section is primarily concerned with the descriptive analysis results of survey data and the interpretation of the analytical findings. Data is collected from three kebeles with a sample size of 91.

## 8.2 Result of descriptive status

***Table. 2.*** *Sex, Marital status, and Age of respondents*

| | | Respondents | |
|---|---|---|---|
| | **Variables** | **Frequency** | **Percentage (%)** |
| 1. Sex | Male | 61 | 32.96 |
| | Female | 30 | 67.04 |
| **Total** | | **91** | **100** |
| 2. Marital status | Single | 5 | 5.5 |
| | Married | 76 | 83.5 |
| | Divorced | 10 | 11 |
| **Total** | | **91** | **100** |
| | | **Respondents** | |
| Number | **Age** | **Frequency** | **Percentage** |
| 1 | 0-10 | 46 | 50.5 |
| 2 | 11-20 | 33 | 36.2 |
| 3 | 21-60 | 7 | 7.7 |
| 4 | >60 | 5 | 5.5 |
| | **Total** | **91** | **100** |

Source: own survey, 2017As may be noted in the table above, the gender distribution of the total sample respondents was 61 (32.96%) male and 30 (67.04%) female. However, this does not mean that the population in this area is based on this gender distribution. This shows that among the respondents, men have a higher share than women. This means that, although men have a very high rate of participation in development, women's participation in agricultural activities was recorded. As shown in the table above, 76 respondents (83.5%) are married, 10 (11%) are divorced, and 5 (75.5%) are single. which means that most of the farmers in the study area were married and had a major role in production.

The results of the study show that the majority of respondents aged 0–10, comprising 46 (50.5%) This indicates that the majority of respondents are economically found in the working age group and may be dependent on home as a Table 1. Show approximately 33 (36.2%) respondents between the ages of 11 and 20 having a working group that is divided and able to contribute to the economy. The respondents who received between the 21 and 60 age population groups are 7 (7.7%) and are the most economically active group found in this group, and respondents who have reached the age group over 60 also play a significant role. Therefore, this indicates the age of the workers has a significant impact on crop production in the research area. Table 3 represents the information on the education level of the respondents.

***Table. 3.*** *Information about the educational level of respondents*

| No | Item | | Respondents | |
|---|---|---|---|---|
| 1 | Educational level | | **Frequency** | **Percentage** |
| | | Illiterate | 26 | 28.50% |
| | | Read and write | 18 | 19.70% |
| | | Primary school | 25 | 27.40% |
| | | Secondary school | 15 | 16.40% |
| | | Diploma | 6 | 6.59% |
| | | First degree | 1 | 1.09% |
| | | **Total** | **91** | **100%** |

Source: own survey, 2017

The distribution of respondents' level of education indicates that most of the 26 (28.5%) are literate, 18 (19.7%) are literate, and 25 (27.4%) are literate. 15 (16.4%). For which high school? 6 (6.59%) for the term Diploma.1 (1.09%) their first degree. As shown in Table 3, most farmers are illiterate. This means that the city no longer has the knowledge to do agricultural work effectively. It will even take longer to embrace and develop a new production system and technology. Table 4 represents the information on the credit service.

***Table. 4.*** *Information about the credit service of respondents*

| | | Respondents | |
|---|---|---|---|
| Number | **Access to credit** | **Frequency** | **Percentage** |
| 1 | Get access to credit | 19 | 20.9 |
| 2 | Do not get access to credit | 72 | 79.1 |
| | Total | 91 | 100 |

Source: researcher survey, 2017

As shown in Table 4, 19 (20.9%) of the total respondent sample took credit. 72 (79.1%) of the total sample respondents did not take credit. So most respondents are unable to take credit.

## 8.3 Source of input credit

Government institutions, NGOs, and others are the main sources of the input credits. The values from each sector are represented in Table 5.

***Table. 5.*** *Sources of input credit*

| | Number of respondents | | | |
|---|---|---|---|---|
| Input credits | **Male** | **Female** | **Total** | **Percentage** |
| Government institution | 60 | 15 | 75 | 82.4 |
| NGO | 7 | 3 | 10 | 10.9 |
| Others | 6 | - | 6 | 6.59 |
| Total | **73** | **18** | **91** | **100** |

Source: researcher survey, 2017

As Table 5 shows the majority of retail farmers are earning credits from the government institutions. 91 respondents are using the last input loan. 60 men and women equal to 75 (82.4%) respond to the government as a major source of revenue. 7 men and 3 women in total 10 (10.9%) responded by receiving the credit from the NGO and 6 (6.9%) received credit for investing in other sources. Farmers. Table 6 represents the respondents of improved seeds.

***Table. 6.*** *Information about respondent's use of improved seeds*

| | | Number of respondents | |
|---|---|---|---|
| Input | **Status of farmers** | **Frequency** | **Percentage** |
| Seeds | Use improve seed | 49 | 53.94 |
| | Local seed | 42 | 46.16 |
| | **Total** | **91** | **100** |

Source: own survey, 2017

As shown in the table above 6 (53.94%) of the total sample respondents use improved seeds and the remaining 42 (46.16%) of the total sample respondents do not use improved seeds in their farming activities. This means that most respondents use improved seeds to increase their productivity on farms.

## 8.4 Allocation of agricultural land to household

***Table. 7.*** *Information about farmers land size*

| No | Farmland size in hectares (a) | No of household (b) | Household in percentage | Total area in hectare(a×b) |
|---|---|---|---|---|
| 1 | 0.25 | 4 | 4.4 | 1 |
| 2 | 0.5 | 8 | 8.8 | 4 |
| 3 | 0.75 | 10 | 10.98 | 7.5 |
| 4 | 1 | 9 | 9.89 | 9 |
| 5 | 1.25 | 14 | 15.38 | 17.5 |
| 6 | 1.5 | 32 | 35.16 | 48 |

| | | | | |
|---|---|---|---|---|
| 7 | 1.75 | 9 | 9.89 | 15.75 |
| 8 | 2 | 5 | 5.5 | 10 |
| Total | 9 | 91 | 100 | 112.75 |

**Source: respondents survey, 2017**

As shown in Table 7, farmers occupying 1.5 hectares of land account for 32 (35.16%) of the sample population. The table also shows that the average farmland area in the area is 1.25 hectares per household.

$$Estimateoflandownership = \frac{TotalLand}{FamilyTotal} = \frac{112.75}{91} = 1.25usually$$

***Table. 8.*** *Fertilizer users respondent's*

| | Number of respondents | |
|---|---|---|
| Input amount in Qt | **Frequency** | **Percentage** |
| 2 | 5 | 5.5 |
| 1.5 | 7 | 7.7 |
| 1.25 | 24 | 26.35 |
| 1 | 28 | 30.77 |
| 0.75 | 17 | 18.68 |
| 0.5 | 10 | 11 |

Source; own survey, 2017

In Table 8, we can see the average number of fertilizers used by the respondents is 1 quintal. The respondent's maximum amount of fertilizer used is a sample of quintal 2, while the minimum amount is 0.5 quintals. As we have seen in Table 8, 28 (30.77%) of the sample respondents used 1 quintal of fertilizer, 24 (26.35%) of the respondents used 1.25 quintal of fertilizer, 17 (18.68%) of the used quintals 0.75 fertilizers, 10 (11%) respondents also used 0.5 quintals of fertilizer. The remaining 12 respondents also used fertilizer at a different rate. This shows that although there is a difference in the amount of fertilizer used by farmers, all respondents accept the use of fertilizer in their farming activities.

## 8.5 Major inputs used by farmers

### 8.5.1 Fertilizer

Most of the land that could produce grain was traditionally cultivated as a result of this it lost its fertility. The main types of fertilizer used are DAP and REREA. The farmers receive an average of 90.15 fertilizers to be used per hectare in the area.

### 8.5.2 Improved seed varieties

One of the most important things that farmers need is improved seeds. It is also expensive but not as good as the young ones who wish to increase maize production. The improved varieties such as BH -140, BH -340, and weed BH -660 were commonly used. -Owen of 2017)

The chemicals are one of the available pest control methods in the area. It controls migratory insects such as locusts and weeds. 116 kg (116L) of chemicals are used in the year 2016/17.

About one liter of pesticide is used over an area of 1 hectare. Table 9 summarizes the major materials used in the area and their value accordingly.

***Table. 9.*** *Major inputs used for maize production in the area and the respective amount*

| **Type of input seed** | **Unit of measurement** | **Amount of input used** |
|---|---|---|
| Fertilizer | Kg | 106 |
| DAP | " | 52 |
| Urea | " | 54 |
| Improved maize seed variety | Qt | 917 |
| Maize BH – 660 | " | 292 |
| BH -540 | " | 265 |
| BH -140 | " | 360 |
| Pesticide and herbicide | Kg | 116 |

Secondary source shebedino woreda agricultural and rural development of office

## 8.6 Loan provision and Repayment

The loan provision was increased year along with the changing rates. Table 10 mentions the loan provision in the shebedino District. As of Table 10, the provision of rural loans to emerging farmers in Shebedino Rare is rare. Transformation and other factors determine whether farmers want to borrow money and produce maize from farmers. Figure 1 represents the graphical representation of the credit provision change and Figure 2 mentions the changing rates.

***Table. 10.*** *Loan Provision in shebedino District*

| Year | Credit Provision in each per year | Credit Provision change | Changing rate |
|---|---|---|---|
| 2006 | 198700 | 12500 | 6.29 |
| 2007 | 211200 | 18100 | 8.57 |
| 2008 | 229300 | 2800 | 1.22 |
| 2009 | 232100 | 2800 | 1,2 |
| 2010 | 238900 | 6800 | 2.84 |
| 2011 | 245800 | 6900 | 2.8 |
| 2012 | 260000 | 15000 | 5.76 |
| 2013 | 501000 | 241500 | 48.1 |
| 2014 | 523600 | 22100 | 4.22 |
| 2015 | 630400 | 106800 | 16.9 |

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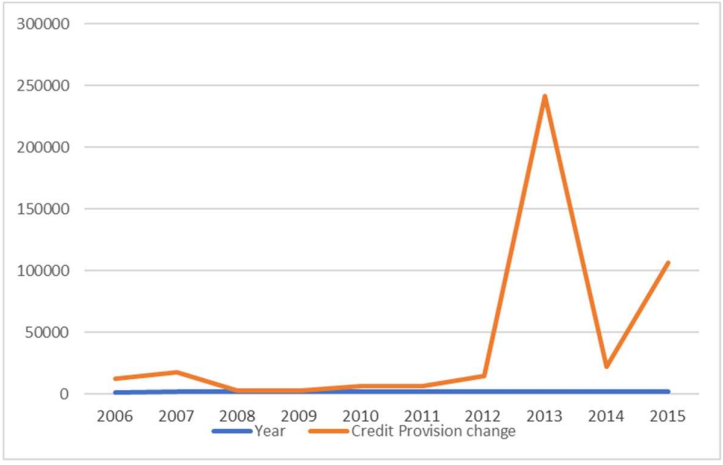


***Fig. 1.*** *Credit provision changes based on years.*

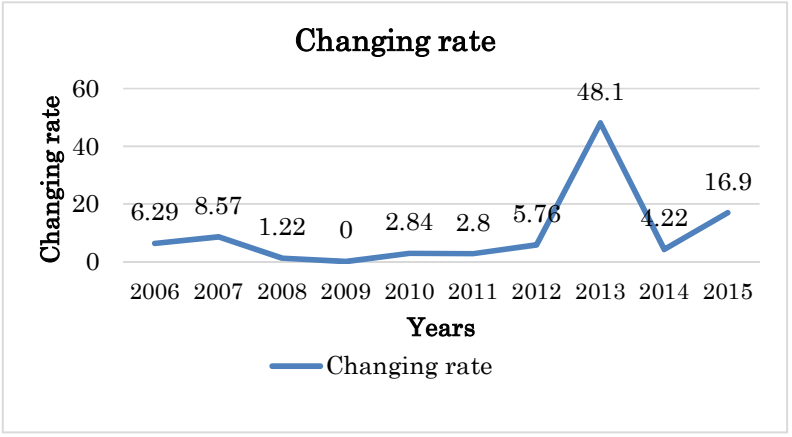


***Fig. 2.*** *Changing rates*

### 8.7 Regression analysis valves using the OLS method

***Table. 11.*** *Regression analysis values using the OLS method*

| Productivity(Yi)/hectare(In quintal) | Coeff | T | p>/t/ |
|---|---|---|---|
| Familysizeinnumber | 0.3057118 | 0.77 | 0.446 |
| Farmsizeinhectare | 10.79406 | 3.68 | 0.000* |
| FertilizerinKg | 2.785888 | 5.45 | 0.000* |
| Pesticideinliter | 9.319467 | 2.72 | 0.008* |
| Farmexperience | 0.1192197 | 0.53 | 0.595 |
| Education | 0.2694829 | 0.3 | 0.764 |
| Maritalstatus | -0.91507 | -1.35 | 0.182 |
| Sex | -0.944775 | -0.69 | 0.492 |
| Improvedseed | 0.3872323 | 2.14 | 0.095** |
| Accesstocredit | -5.794315 | -2.34 | 0.022** |
| Constant | 3.18 | 0.74 | 0.462 |

$$Yi = \beta_0 + \beta_1 Farmsize + \beta_2 Fertilizer + \beta_3 Pesticide + \beta_4 MartialStatus + \beta_5 improvedSeeds + \beta_6 AccessToCredits + Ui$$

$$Yi = 3.18 + (10.7) FarmSize + (2.78) Fertilizer + (9.31) Pesticide + (0.38) improvedSeeds + (5.79) AccessToCredits$$

From the retrospective model above, the study found that dependent variables other than the size of the family farm experience of an academic farm contribute to dependent(output) variables, but all different variables were signed and unaffected by the variables.

Among the descriptive factors affecting product quality, education, marital status, and creditworthiness are bad relationships. The remaining factors are closely related when maize production is now being researched by a researcher trying to explain all the key variables in maize (output) and trying to evaluate research and translate it at all levels of importance.

The first variable is the size of the earth. The decline in impacts indicates that the size of the land has a positive effect on agricultural production. Extension or output reaction relative to earth size (d output / d earth size) is 10.7. This shows that some things do not change; the change of one unit per hectare of land leads to an average increase of 10.7 units per quintal for farmers. This means that, as the size of the land increases or decreases, leading to an increase in agricultural production, some things have not changed.

The second flexible fertilizer is the coefficient of fertilizer to output is positive from the result. Product volatility for fertilizer is 2.78. It tells us that an increase or decrease in unit 1 (quintal) in fertilizer application leads to an increase of 2.78 units (quintal) or a decrease in production. Some things remain unchanged. This shows that farmers use fertilizer to grow their crops. Fertilizer application improves soil fertility by replacing nutrients taken from the soil during the last crop year. This increases farm productivity. The distribution and use of fertilizers by farmers play a major role in increasing soil production on farms.

The third variation is an improved seed. As some of the independent variables add to the model, the use of improved seeds has a positive effect on agricultural production from a repetitive effect. Extension or reaction response to improved seeds (d output/d improvedseeds) 0.38 indicates that some substances remain unchanged. 1 unit of change in improved seed use earns approximately 0.38 (quintal) units of change in farmers' outflows on the same side. This shows the use of improved seeds by farmers also has a single impact on agricultural production, which facilitates growth and crop production. Improved seed is the most important technology needed to achieve high yields and productive farm work.

Four Credit Correspondent Access is important, and the coefficient is negative, or the availability of credit corn is bad because farmers' producers use credit for other purposes or work without encouraging production.

The fifth most common pesticide is the pesticide coefficient in production, which is correct and provides for the application of instructions for the release of pesticides or an increase in their succession.

## 9. Advantages and Disadvantages

### 9.1 Advantage

- This method strengthens farming systems research and development across biophysical and socioeconomic factors and further helps to make necessary changes in the agricultural input

credit.
- Upswings in the farmer's life due to agrarian input can be easily analyzed.

### 9.2 Disadvantages

- Improved seed and farm size are not clearly mentioned.

## 10. Conclusion and Recommendation

Agriculture is a very important and global activity. It is an insult to economic activity, especially. Since the beginning of the study, many issues have been raised about the role of maize yields in maintaining food security. The general aim of this study is to identify the major role of agricultural credit in crop production. To achieve the desired agricultural outcome, the availability of inputs is compulsory. Researchers have used an OLS model to ensure a correlation between inputs and outputs.As a result of the decline of education Out of wedlock, gender and access to credit are all independent variations (family size of farm, improved pesticides on the farm) that are closely related to crop production, where education, marital status, sex, and access to credit have a negative relationship to crop production. Used to increase crop production to improve food security, avoid poverty, and promote economic growth and development in Ethiopia. Often, the researcher has made the availability of inputs such as improved fertilizer, and the size of a pesticide farm, essential for crop production.

Based on the results of the retrieval and data analysis, the following policy implications and recommendations are drawn up by the researcher:

- Agricultural production is highly dependent on factors such as fertilizer, improved seeds, credit access, land size, etc. It is therefore better for the government to expand the farmer training center and provide farmers with information about the role of agriculture and how to make the best use of it.
- Governments and NGOs strive to focus more on promoting the use of modern ideas and should responsibly provide these ideas.
- The reversal result shows that participation in the credit market is closely related to the product and is statistically significant. What is expected of the government is to make and invest in research and development to increase productivity. Apart from this, rural financial institutions are better off providing an increase in access to rural agricultural credit.
- Farmers should improve their use of inputs and increase their efficiency to increase crop production.
- Additional technical numbers, such as improved seed, fertilizer, credit service, etc., are better to develop and distribute to farmers at a cost and to improve the agricultural sector.

## Compliance with Ethical Standards

**Conflicts of interest:** Authors declared that they have no conflict of interest.

**Human participants:** The conducted research follows the ethical standards and the authors ensured that they have not conducted any studies with human participants or animals.

## References

[1] Gemeda, A., "Farmers' maize seed systems in Western Oromia, Ethiopia", CIMMYT, 2001.
[2] Kassie, M., Jaleta, M., Shiferaw, B., Mmbando, F., Muricho, G., "Plot and household-level determinants of sustainable agricultural practices in rural Tanzania", 2012.
[3] Baum, J. R., Locke, E. A., Smith, K. G., "A multidimensional model of venture growth", Academy of Management Journal, Vol. 44, page no 292-303, 2001.
[4] Lemessa, A., Gemechu, A., "Analysis of factors affecting smallholder farmers' access to formal credit in Jibat District, West Shoa Zone, Ethiopia", International Journal of African and Asian Studies, Vol. 25, page no 43-53, 2016.
[5] Degefe, B., Nega, B., "Annual report on the Ethiopian economy: Volume I, 1999/2000", The Ethiopian Economic Association, Addis Ababa, Ethiopia, 2000.
[6] Gebremedhin, B., Jaleta, M., Hoekstra, D., "Smallholders, institutional services, and commercial transformation in Ethiopia", Agricultural economics, Vol. 40, page no 773-787, 2009.
[7] Tilauan, B., "Rural Credit in Ethiopia Ethiopian Agriculture Problem of Transportation Proceeding of the Four Annual Conferences of Ethiopian Economy ADIS ABEBA University", 2005.
[8] Berhanu Gibremedin Moti J., Dirk H., Services of the owner of a small center and commercial transformation at

the Ethiopia International Livestock Research Center in Addis Ababa, Ethiopia., 2009.
[9] Crenmer, G., "Theory of agricultural development and operation in Addis Ababa, Ethiopia CSA" (2007, 08, 2008, 09) Sample sample survey, 2004.
[10] Crawford, S. D., Couper, M. P., Lamias, M. J., "Web surveys: Perceptions of burden", Social science computer review, Vol. 19(2), page no 146-162, 2001.
[11] Malone, M., Belshaw, D., "The Human Rights-based Approach to Development: Overview, context and critical issues", Transformation, Vol. 20(2), page no 77-91, 2003.
[12] Samuel, G., Sharp, K., "Commercialisation of smallholder agriculture in selected Tef-Growing Areas of Ethiopia", Ethiopian Journal of Economics, Vol. 16, no. 1, page no 57-88, 2007.
[13] Kassie, M., Zikhali, P., Pender, J., Köhlin, G., "Sustainable agricultural practices and agricultural productivity in Ethiopia: does agroecology matter?", rapport nr.: Working Papers in Economics 406, 2009.
[14] Mozumdar, L., "Agricultural productivity and food security in the developing world", Bangladesh Journal of Agricultural Economics, Vol. 35(454-2016-36350), page no 53-69, 2012.
[15] Asresie, A., Zemedu, L. and Adigrat, E., "The contribution of livestock sector in Ethiopian economy. A Review Advances in Life Science And Technology", Vol. 29, 2015.
[16] Zander, R., "Risks and opportunities of non-bank based financing for agriculture: the case of agricultural value chain financing (No. 7/2016)", Discussion Paper, 2016.
[17] HABTE, A. A., "Land use/land cover change and soil erosion risk mapping in Shebedino woreda, Sidama zone, southern Ethiopia (Doctoral dissertation)", 2017.
[18] GBAYEGE, A. O., "Impact Of Credit On Asset Accumulation Among Poultry Farmers In Southwestern Nigeria (Doctoral dissertation)", 2021.