"Impact of Credit on Agricultural Output: Evidence from Pakistan"

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Reg. No PIDE2016FMPHILDS21

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A dissertation submitted to the Pakistan Institute of Development Economics (PIDE) Islamabad, in partial fulfillment of the requirement for the degree of Master of Philosophy in Development studies

Department of Development Studies

Pakistan Institute of Development Economics, Islamabad

(2016-2019)

Pakistan Institute of Development Economics
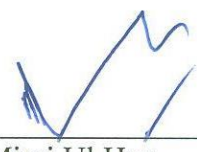### P.O. Box 1091, Islamabad, Pakistan

CERTIFICATE

This is to certify that this thesis entitled: "*Impact of Credit on Agricultural Output: Evidence from Pakistan*" submitted by Rija Khan is accepted in its present form by the Department of Development Studies, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Development Studies.

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Date of Examination: July 17, 2019

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Acknowledgement

First, I would like to thank my supervisor, Dr. Muhammad Jehangir of department of Development Studies at Pakistan Institute of Development Economics, Islamabad. His door was always open for me whenever I needed any guidance or had queries in my mind regarding my thesis. He helped me to be in the right direction throughout my thesis.

I would also like to thank the internal reviewer, Mr. Fida Muhammad Khan of department of Development Studies at Pakistan Institute of Development Economics, Islamabad, to give time and valuable comments on this thesis.

Finally, I would like to express my gratitude to my parents and Siblings who supporting and encouraging me throughout. The thesis would not have been completed without their prayers and support.

Thank you.

Rija Khan

Abstract

Purpose of this research is to investigate the factors that effect on the Agricultural GDP in Pakistan by taking updated data set. In the study, I investigate the Agricultural GDP (AGR_GDP) and all the factors which may have impact on this agricultural output during the time period of 1980-2016. The study made estimation using data taken from Agricultural Statistics, Economy Survey of Pakistan, Metrological department and world development indicator (WDI).The study employed Cobb Douglas production function, Johansen test of co-integration and OLS to analyze the data set in order to check the long-run relationship among the variables .The study also used ADF test to confirm the level of the data stationarity. The study reached on this conclusion that the factors like agricultural credit, agricultural labor, and agricultural capital formation effects the agricultural GDP, i.e. expansion of FIB occurs due to agricultural credit, it has direct relationship. However temperature effects it negatively so due to climate change it is projected that production that occurs from the land of agriculture.

Chapter 1

Introduction

In development process, agriculture was mostly viewed as passive sector in the past. But since, last few years it has been observed as active sector and co-partner of the industrial sector (thorbecke, 1970).Agriculture sector depends more using a credit card than different parts of the economy because of regular varieties in the ranchers returns and furthermore give chance to agriculturists to acquire more cash and enhance their way of life (Vogt, 1978). The credit of agricultures are known as funds which are borrowed by individual's household, farm business for purpose of generating, storing, processing and advertising crops and livestock products (International Encyclopedias of the Social Sciences, 1968)

Sial *et al.,* (2011) documented in his paper that most of the developing countries continuously depend on their agricultural sector for economic growth, poverty reduction and food security. In developing countries like Pakistan small farmers are facing many problems such as energy crises, water shortage, and high amount of rising prices of seeds, pesticides and fertilizers. Chandio *et al.,* (2016) finds that most of the Pakistan economy is highly depending on agriculture sector. Agriculture contributed 20.9 percent of the gross domestic product in Pakistan's economy in 2015 while engaging 43.5 percent of the labor force in the agriculture sector. Thus agriculture sector plays a vital role in national development. During period 2016-17 performance of the agriculture sector accomplished growth of 3.46 percent which was very close to the target of 3.5 percent of agriculture sector. This was made possible due to greater availability of agriculture inputs such as water, agriculture credit and fertilizers.

Feder *et al.,* (1990) document that credit is one of most important components in agricultural farm production. In production cycle it helps producers to fulfill cash needs such as in cultivation, planting and harvesting the crops. Credit increases welfare of the farmers to purchase good quality input material and equipment. Credit will accommodate farmers to make proper utilization of available resources in order to enhance productivity.

Khandker and Faruquee (2011) documented that credit is essential for development. It capitalizes farmers and entrepreneurs to adopt new technologies and make new investments . Agricultural credit helps farmers to implement new equipment tools and technologies which mostly have expensive cost and to pay wages to labors. That was supported by Feder *et al.,* (1990) that Credit helps producers to fulfill the cash needs which are require in production cycle to fulfill agriculture activities such as harvesting, planting and cultivation. During the process, cash revenue is earned when expenditures are done while purchasing inputs and materials. The availability of credits enhances welfare of the farmers due to larger consumption and more purchased input and improve their capacity to influence long-term investment in their farms. Mahmood *et al.,* (2009) agricultural credit plays vital share in procedure of upgrading of agriculture and commercialization of country side economy.

Izhar and Tariq (2009) document that finance in agriculture sector is very necessary requirement besides development of technologies. Farmers will only able to buy technical inputs if they have enough money .Credit is an effective way of economic transformation because it helps farmers to give wage to labor and to invest in capital. Like various other businesses agriculture farming also needs capital for its agriculture farm activities. Therefore, by implementing capital into agriculture, it is possible to enhance the rate of agricultural development. Availability of credit at appropriate time will leads to implementation of improved seeds, pesticides, fertilizers and modern

technologies which will further lead to enhance agricultural farm productivity and growth rate. Hence, for modernization in agriculture, credit is a necessary element (Iqbal *et al* 2003). Since the last few decades due to rising pricing of fertilizers, seeds, pesticides and other raw material the requirement of credit in agriculture sector have increased to large extent. For the economic development of the country, modernization in agricultural sector is necessary requirement. Agricultural technology use is only possible when farmers have enough facilities and credit to buy agricultural inputs (Sjah *et al.,* 2003).

Gupta and Chaudhary (1997) claim in their work that in less developed economies there are two kinds of rural credit offered to farmers such as institutional and non-institutional. They are also known as formal and informal credit. Institutional credit sources are nationalizing banks, local rural banks and organizations, whereas non institutional credit sources are friends, relatives' money lenders, trader's etc. Sial *et al.*(2011) reported in his study that farmers of less developed countries such as Pakistan have no possibility to save money .So therefore small farmers mostly borrow money from institutional and non-institutional creditors.

Iqbal *et al* .(2003) document in their paper that currently the official credit foundations contain financial institutions such as Zarai Taraqiati Bank Limited (ZTBL) which was previously known as Agricultural Development Bank of Pakistan (ADBP) and commercial Banks. A short time ago in the rural areas, some non-government organizations (NGOs) were also growing in agricultural sector .ZTBL is an important institution for supply of credit to agriculture area in Pakistan .ZTBL offers short-term, medium-term and long-term credits for farm and non-farm activities (Chandio *et al.,*2016).Ahmad (2011) reported in his paper that richer farmers in rural areas have better access to credit sources which are also low in cost because they fulfill all the

requirements of banks such as securities and grantees .While poor farmers depend mostly on more non institutional credit which are also expensive because they are not in the position to fulfill bank requirements.

Chandio *et al*., (2015) in their study reported that in 2014-15 the state bank of Pakistan allotted agricultural credit approximately 500 billion rupees to 20 commercial banks, four Islamic bank, two professional banks and seven microcredit banks to give assistance for the contribution of agriculture sector development and growth. Like most of the other developing countries, extension of funded institutional credit has been extensively implemented in Pakistan. The aim is obviously to gain higher agricultural growth in adding contribution to the economic development of Pakistan.

1.1 Background of the Study:

Agricultural credit plays an essential role in agricultural development. According to the latest studies, growth rate of investment in agriculture is less than other sectors of the economy. For the developing countries agricultural financing is one of the most key factors to develop rural regions. Payment of bank credit is a mode of financing. In fact, productive investment can be raising by assistance of access to credit. Generally, for improvement of quality of farm products credit accessibility is very important so it can enhance farmer's income and will avoid farmers from rural migration. Both formal and informal sector played a vital role in credit disbursement, but recently formal sector takes the lead in provision of credit to farmers. Demand for agricultural products is increasing due to rapid increase in country population. It is not possible for country like Pakistan to ignore the agriculture sector and necessity of role of small farmers in country's economy.

1.2 Objective of study:

To investigate the effect of credit on agricultural farm production in Pakistan.

1.3 Hypothesis

To determine the impact of credit on agricultural output the following hypothesis is formulated.

Ho: Credit has no impact on agricultural farm productivity in the area.

H1: Credit has significant positive impact on agricultural farm productivity in the area.

After reviewing the available literature, it is visible that there is enough literature present have an effect of credit on agriculture in Pakistan. Whereas limited work has been done to calculate the impact of credit on agricultural farm productivity .few studies in this concern are documented by Zuberi (1989), Iqbal *et al*. (2003) and Chandio *et al.,* (2016). This study will fill this literature gap, while considering the fact that Pakistan is an agricultural country.

1.4 Research Question:

What is the impact of credit on agricultural farm production in Pakistan?

1.5 Significance of the Study :

Motivation for this research comes from the fact that like country such as Pakistan which is an agricultural country, agricultural development plays a vital role in country's development where 68 % of population still lives in rural regions (Chandio el al., 2016) .According to a report published by the state Bank Of Pakistan, banks distributed Rs 704.5 billion agricultural credit in 2016-2017 which was higher than previous years disbursement. Chandio *et al.,(2016)* stated that agriculture is helping hand of Pakistan's economy while contributing 20.9 percent of the GDP,

hiring 43.5 percent of the labor force and providing raw materials for numerous value added sectors. Its very essential to analyze how such rising rates of credit are affecting the farm production and output of agricultural side of Pakistan.

It is intended that the results of this study will be used by the experts to access and then evaluate the current agricultural development through the credit received by the farmers.These results can also be used for the correction of the prevailing rural agricultural development of Pakistan.

1.6 Organization of the Study:

The present study is organized into five chapters. Introduction, objective given in chapter 1. In chapter 2, literature review and Chapter 3, chapter 4 explain specification of the model, research methodology results, and discussion respectively. In the final chapter 5, conclusion and recommendation are given.

Chapter 2

Literature review

This chapter briefly discusses the previous studies. Many Researches have presented an enormous theoretical and empirical work to validate their appropriate model. Literature relating to the factors that affecting Agricultural Output, considerable numbers of studies has examined. Below is an extensive literature review on the impact of Credit on agricultural Output and problems which are faced by small farmers.

Ahmad *et al.* (2015) investigated the impact of credit on wheat productivity in district jhang Pakistan using Cobb Douglas production function and found that there is a positive relationship between agricultural credit and wheat crop productivity. The results revealed that only 30 % of credit users are using loan for buying seeds and fertilizers while rest of 70 % are utilizing credit on other household expenses such as marriages etc. the results also indicated that credit use enhanced output growth by 5 %.

Ahmad (2011) investigated case study of Pakistan by examining the impact of institutional credit on agricultural output. Annual data has been used in the study for period 1972-2008.time series data have been applied in the study. The empirical findings of regarded study revealed positive relation of directly credit with agricultural output but has insignificant effect of credit on agricultural production.

Bashir and Gill (2009) observed effect of credit over the productivity by means of Cobb-Douglas production function. Credits have indirect effect on output rather than direct effect. The results revealed that credit have found positive impact on productivity of wheat and credit coefficient is greatly significant. It is also concluded that commercial banks play effective role in contributing

agricultural sector of Pakistan through various credit disbursement schemes and hence improving the quality and living standard of rural people, eliminating poverty and eventually serving the economy of the state.

Carter (1989) in his paper utilize endogenous switching regression framework to analyze the impact of small farm credit for food production in Nicaragua. The model is implemented at farm level data composed in Nicaraguan. The results strengthen the hypothesis and showed positive impact of credit on farm production. Credit also helps to lessen the probability of structurally unstable growth pattern in agriculture sector of Nicaraguan. Mostly effective and capable producers apply for credit because they are able to utilize it more effectively than others.in a sample of small farmers in Nicaraguan, Descriptive statistics also showed a positive association among credit, input and small farm productivity. Credit recipients also show significantly more technical efficiency as compare to non-credit recipients. Credit recipients also consume significantly greater inputs than non-credit recipients.

Chandio *et al.,* (2016) used secondary data from period 1996 to 2015 to examine the impact of formal credit on agricultural production in Pakistan. Data used in this study is time series data which was taken from economic survey of Pakistan. To evaluate the impact of credit on agricultural output the (OLS) method was applied. The results indicate that 1% increase in credit will lead to 0.86% increase in the agricultural output.so it is clearly stated from the results that there exists a positive and significant impact of formal credit on agricultural output.

Chandio *et al.,* (2015) reported in his study the impact of agricultural credit on productivity of maize crop. Secondary data has been used for period 1991-2014 by applying Cobb Douglas production function. Since the last two decades, commercial banks have been playing important

role in providing agricultural credit. Maize production contributes 0.4 % to GDP and 2.1 % to the value added in agriculture of Pakistan. The results revealed one to one relationship and highly effect the agricultural credit, agricultural labor force and maize cropped region on productivity of maize.

Chisasa and Makina (2013) used Cobb Douglas production function to identify the impact of bank credit on agricultural production in South Africa. Time series data have been taken from period 1970-2009 to evaluate Cobb Douglas function. Results revealed that in South Africa bank credit and capital accumulation has a major and positive effect on agricultural output. While keeping the other factors of production constant, agricultural output will increase by 0.6% due to increase in credit by 1 %.

Fabiyi and Osotimehin (1984) used three multiple regression analysis technique to understand the impact of credit on productivity of rice in Nigeria. The results show that size of farm, aggregate of credit and experience of rice farming were statistically significant. And further he concluded that size of farm and credit experiences were significantly associated to the total amount of credit which is borrowed by farmers. Small farmers play a key role in every economy agricultural progress but they face serious problems such as financial and other constraints. Farmers need more amount of credit for large number of farms because more input and capital are required for larger farms.

Feder *et al.* (1990) shows an econometric analysis of impact of credit on output. The fundamental feature is that at household level, credit transactions are not essentially in equilibrium. Cross sectional household level data has been used in northeast china from latest farm survey. It has been noticed that capital, education, and farm experience have statistically significant positive effects on output for the credit unconstrained households but have statistically insignificant effects

for the credit constrained households. This finding recommends that capital, education, and experience are less expected to give to output if the farmer's options are restrained by liquidity. The findings show that one additional Yuan of credit on average would increase the further gross value of output by 0.04%.

Ibrahim and Bauer (2013) examined the impact of credit on farm profits in dry land of Sudan. For investigating the impact of access to credit a Heckman selection model was used. The results of model revealed positive signs for access to credit but there has been inadequate effect on farm revenues. The reason behind it is insufficient amount of loans provided to famers for agricultural activities which are too small that does not have significant impact on agricultural farm productivity. The study suggests, increasing agricultural investment in order to improve farm profits, mainly the implementation of effective and sustainable technology. This could be achieved by enhancing amount of credit available to agricultural farms.

Iqbal *et al.* (2003) investigated effect organized credit on agricultural production in Pakistan. Data that used by Iqbal were collected different sources i-e, publications of government of Pakistan and from ZTBL. They used simple regression modeling for analysis along with Douglas production function to capture the objectives of the study by taking time series data from (1972-2002) .Agricultural production is used as main focus variable while agricultural credit is used as explanatory variable. The results showed positive and significant relationship among institutional credit and agricultural GDP.

Izhar and Tariq (2009) documented evaluate the impact of institutional credit on aggregate agricultural production in India 1972-2005 by using time series data and used a Cobb Douglas production function for further estimation. Findings conclude that institutional credit has significant impact on agricultural production during pre-reform period 1971-91 but during post

reform period it have been noticed that institutional credit have not significant determinant of agrarian production.

Khandker *et al.* (2001) studied the impact of farm credit in Pakistan by taking latest huge household survey data from the rural areas of Pakistan. A two stage estimation technique is used for the purpose to find impact of farm credit in this paper. The results revealed positive and significant impact of formal credit on most of the household outcomes. Agricultural productivity increases by almost 1 % due to 10% rise in borrowing from a formal source. Agricultural development bank of Pakistan (ADBP) also play vital role in household welfare and its impact is more beneficial for smallholders as compare to large holders.

Mohammad and temu (2008) use switching regression model to regressed credit with certain other factors on implementing of agricultural technology in Zanzibar. The results show that mostly small farm holders faced problems in formal credit market so they have limited access of official credit in the study capacities. Implementation of technology increases as number of times farmers had taken proper credit. The main results of the study suggest that some socio economic factors play important role in manipulating farm households right of entry to ceremonial credit such as the amount of accesses to credit, the opportunity of keeping livestock, having an account in bank, the value of useful assets owned, the power of implementation of agricultural technologies and household income. The results suggest that there is requirement for focusing credit interventions.

Obeta (1992) reported in his study of Nigeria Anambra state that due to some constraints, very limited amount of smallholder farmers have access to formal credit. About 62 % of farmers who utilized credit obtained them from informal sources and 38 % of farmers got it from formal

credit institution. The credit demands of the smallholder farmers in general are low as compare to other farmers. The main reason behind the constraint is the lack of ability of farmers to give collateral security to the commercial bank. Mostly farmers prefer for informal sources of credit due to comfort of attaining credit, minor distance to creditors, nonexistence of severe collateral security and very small number of credit required by the farmers.

Osuntogun et al. (1992) in his study in Nigeria examined the impact of specialized credit programs on small holder farmer beneficiaries. Two major techniques used in this study are variance analysis and least square regression analysis. According to study such programs will help in increasing farm production and famer income. It may also cause an increase in purchase of modern technology inputs which are required in farming activities. The findings also revealed that both labor and capital utilization increases after obtaining credit but use of capital increases more as compare to use of labor over the period. Credit program is also making shift to higher value crop from lower value crop.

Pollard and Heffernan (1983) examined impact of credit utilization on agricultural farm productivity in Jamaica. Data has been taken for farm household using two traditional small farmer's areas.in order to do estimation for each region Cobb Douglas functions has been used. The results revealed that there is limited current formal credit movement and informal credit is more common among farmers as compare to formal credit. The reason behind it is that insufficient formal market that does not meet the prevailing demand of credit.

Sial *et al.* (2011) in their study using a time series data from period 1972-2008 in order to investigate relationship between the role of institutional credit and agricultural farm production. The Cobb-Douglas production function is to be estimated by using Ordinary least square technique and converts all variables per cultivated hectare. The findings of the study that Agricultural credit

and agricultural GDP were positively significant to each other while the elements that boost agricultural GDP were availability of water, agricultural labor force and cropping intensity.

Temi *et al*. (2004) study investigates the impact of agricultural credit on agricultural farm production in Nigeria during period of 1970 -2001 using production-production externality approach. They used data from Annual Reports, Statements of Accounts of the CBN and Annual Abstract of Statistics of FOS and the results revealed that agricultural credit is an important characteristic examining growth of agricultural production and development.

Udoka *et al.* (2016) in Nigeria studied the effect of commercial bank credit on agrarian production. The ordinary least square regression technique was used in order to estimate the identified equation in the study. According to the estimated results it has been revealed that there exists a significant and positive association among agricultural output and agricultural credit assurance endowment scheme in case of Nigeria. The results further showed that in agricultural sector a rise in commercial banks credit will led to enhance growth in agricultural production.

Zuberi (1989) used time series data from period 1956-1986 to observe the production function in agriculture sector in Pakistan. He examined that the impact of finance to seeds and fertilizers is significant associated with agricultural credit. It is determined that agricultural development depends on the maximum utilization of improve and low cost technology.it is also concluded that for increasing productivity the use of recent agricultural technology and extra inputs are required.

Waqar et al. (2008) emphasized on the borrowing behaviors of farmers in rural Punjab and also on the constraints of agricultural credit. He concluded that impact of credit has been limited despite the introduction of several agricultural credit programmes through the institutional sources. Mostly

the farmers could not get credit because of the required collateral. The logit model have been used in the study while the results revealed that coefficients of transitory income, predicted interest rate and education level have important effect on borrowing behavior.

Fengxia et al., (2010) addressed in his study that access to credit always play an essential role for improving farm revenues and living standards of rural people in developing countries. His study observe that how much credit constraints affect the productivity of agriculture and rural household income in china. Survey data have been used in the study. The findings of study suggest that agricultural productivity and rural household income could be enhanced by removing credit constraints.

2.1. Research gap:

As explained earlier ,previous resrearches have inspected the influence of credit on poverty reduction and childlabour .But in pakistan there are less attention towards this research work to capture the efect of credit on the agricultural farm productivity.So, this research project therefore seeks to take opportunity to test the Cobb Dogulas Production Function to credit and to empirically investigate the effect of credit on agricultural productivity for Pakistan.Study is based on time series data from period 1980-2016.Study is different from zuberi 1989,Iqbal 2003 and chandio 2016 due to variables which are included in the study such as rainfall which is not included in any other study.variables like cropping intensity and farm gate availablity have been dropped from my study which were included in iqbal article.

Chapter 3

Methodology

3.1 Introduction

Cobb Douglas Production Function is used to find the impact of credit on the agricultural farm productivity.Cointegration method will be employed by employing johansen cointegration test which is used when we have more than one cointegrating relationship for cointegration. The Cobb-Douglas production function represents the relationship between two or more inputs - typically physical capital and labor - and the number of outputs that can be produced. It's a commonly used function in macroeconomics and forecast production.

3.2 Theoretical framework

Different theories of the agricultural credit that are studied on national level or international level by the theoretical economist. Few of the theories are discussed below that arises due to the uncertainty.

a) Risk and Uncertainty Theory of Agricultural Credit:
There are different problem issues facing by the agriculture sector like floods, earthquakes, famines drought, crops damages due different small insects and diseases, property loss due to fire and flucation of the prices that arises the problem of uncertainly, that creates risks. "Increasing hazards in farm sector is one of the most significant caused for low availability of agricultural credit from institutional sources.

Aside from dangers rising up out of physical just as normal elements, borrowers need to confront unanticipated money related misfortunes. An expansion in interest in horticulture will occur just when the dangers and vulnerabilities in the psyches of the agriculturists have been evacuated. The bank as a merchant of credit endeavors to guard him by method for security. Along these lines, the moneylender ends up more secure than the borrower. There are three sorts of dangers for example

varieties brought about by the business cycles, changes in the modern example and changes in the structure of credit markets.

For the different lenders and borrower, there risk bears abilities that increases due to following reasons.

i)   Making of money and saving occurs due to increase of ability

ii)   Create knowledge about the stability and reliability of income

iii)   Feasibility about to borrow in both condition either poor or good

iv)   Ability to restrain operational and living expenditures,

v)   Retaining own resources.

vi)   Remove the alarm of the liability from the borrower minds.

Nowadays, credit is one of the most element for input that arising output of farm. Risk of lending is to be minimized by making connection between credit and marketing, make personal relations, checked and balance for credit utilization and reserve the funds. Markets agency check and balance should be able to collect surplus of the markets from farmers.

Credit of provision timely is more important in agriculture sector. And to developed credit is essential for farms and farmers. Risk and uncertainly that bears farmers capacity make be more strength by expansion of production, elastics programs for productions, better environment for protection of plants, insurance for crops, contracts between to both sales and purchases of the product and reduce the expenses by dealing fairly. In this manner, borrowers' hazard relies on nature of soil, decision of yield, trim security, utilization of bio-compound and mechanical innovation, water system, family needs, accessibility of information administrations, family foundation, and capital.

These kind of level is grouped into four distinct parts

➢ Farms

➢ Crops

➢ Property

➢ Natural Tragedy

A.G, Nelson describe in a very effective ways as one would be absurd to stack a truck to the point, where a hub would break, if a wheel hit a chuckhole in the street. A ranch family would be similarly incautious to assume on a praise load to the point where they would go belly up if unfavorably hit.

b) Demand and Supply Theory of Agricultural Credit:

The credit of the farmers that depends on few following factors

1) Size of the operational unit
2) Efficiency
3) Productivity of farms
4) Controlling of productivity and prices
5) Feasibility of better economic condition
6) Investment in agriculture for long-term

Inappropriately, poor's and unconscious farmers that have a small capitals cannot show concentration in investments in their farms for long time periods. Nowadays, agriculturists are responsibility mutually existence and commercial activities. Hence demand of credit in the long run can be practice that was steadily rising. The fund supply is insufficient. Individual there are a numerous kinds of policy procedures are being announced to resolve the monetary lack.

Demand of credit for individual is much better captured by non-institutional through contracts. And there are variation occurs in the demand of credit for to the different seasons. Credit demand is higher, if there is a low interest rate and access to credit is easy. Institution earns low interest rate, but there procedure for taking loans is too much difficult and much time consuming.

Proper causes of agricultural credit cannot enforce hard circumstances of credit, so high interest rate can be charged.

$$D_c = f(X_1 \ X_2 \ X_3, X_{3,a}, X_{3,b}, X_4, X_{4,a}, X_{4,b}, X_5, X_{5,a} \ X_{5,b})$$

The directly above equation of the task is for demand of credit that will be determined by occurs due to cost of credit, credit effectiveness, production predicibilty of farms and capability of repayment

Agricultural Supply for credits depends on the following factors

> Capital formations and Saving (S_1)
> Level of risk and uncertainties degree in advancing (S_2)
> Projections of financial organizations (S_3)
> Different chances for investment (S_4)

Main factors of the determinants is saving level. And it can be written for supply of farm credit as below

$$Sc = f(S1, S2, S3, S4)$$

If there is a high income, but lo MPC that increase the saving. Higher interest rate on deposits increase to save more/ Capacity of risk bearing affects the credit supply. Those who supply more credit can bears more risk and worries. For agriculture sectors, there will be an equilibrium point, where demand and supply are equal. Government and banking organizations is incapable to supply credit, what the wants of the farmers. Supply of credit not to be inexpensive, well-timed and satisfactory. Agricultural credit need be completely institutionalized. Nicholson preached, Credit is a weapon that may pulverize the unskillful wielder, it is useful or dangerous to the extent that it is utilized or mishandled.

c) Business vs. Social and Moral Theory of Agricultural Credit:

The aspect of business quite of agriculture sponsorship emphases on earnings and cost financial records social and ethical features is ignored. The moral as well as social characteristics that keeps money-lenders in the business sector in the long term that help lender to lead in rural credit even occur in nowadays. Credit institution gives more focus on social and moral aspects. The interest rate and proficiency for credit foundation contrast the social and good angles. The credit of agriculture has to be qualified for the well-being of the general public. Business feature would not be terminated give emphasis to and should be retained within sound parameters. When business

feature becomes critical, the moral and social aspects are naturally overlooked that was badly affect prosperity of the social order. The community segment banks reviewer their presentation on the principles like

- ➢ Different types of growth of the credit's that prepared
- ➢ Credit Management ,
- ➢ Public financial transactions
- ➢ Fallback desires,
- ➢ Excellence, side by side and possibility of client facility
- ➢ Banks Productivity

Due to the development of social and good duty of saving money, the parameters, for example, social managing an account and client benefit are viewed as additional. Be that as it may, the managing an account staff ought not just underline on business viewpoint on the grounds that because of the blend of these three perspectives, the urban co-agent Banks and Urban Credit Societies have turned out to be extremely well known. Staff ought to be roused through appropriate preparing and impetuses for incorporating these three parts of farming credit.'

Credit of agriculture ignoring good and social perspectives won't be socially satisfactory. For customary reimbursement, a feeling of belongingness of monetary framework ought to be made among the agriculturists. Just offering credit to poor ranchers won't fill this need. Co-agent society is an association of people. Social and good excellences of co-task are dismissed and business proficiency is increasingly underscored. Business banks before bank nationalization did not develop these demeanors.

There are few factors that are mainly effect 'i) There is neither loss nor profit for the operation of a firm, ii) do-it-yourself, iii) brotherhood, iv) shared support approach, v) wellbeing of the builds'. 'While business features include a) withdrawal from limitless obligation, ii) multi-purpose events of the organizations, iii) Assistance of Government ,iv) horizontal and vertical combination of agricultural credit organizations etc.'

d) Cost Theory of Agricultural Credit:

Agricultural credit which the agriculturists need to take for undertaking ranch tasks. Costs for getting horticultural credit incorporate expenses paid for a duplicate of land proprietorship record, travel costs towards saving money units, use on refreshment amid the visits to banks, misuse of his work hours while visiting credit units, photos and different charges and so forth. Such costs don't finish with the receipt of credit, however proceed up to the last reimbursement portion. Such expenses do not end with the receipt of credit, but continue up to the final repayment installment". The charges of farming credit is written off as -

a) Expenses of persistent by agriculturalists beforehand in receiving of advance quantity,

b) Expenditures that a farmers must to be bear after they paid credit.

This sort of expense isn't anything but difficult to gauge which makes horticultural credit an intense assignment.

In creating nations like India fanners are poor yet the expense of farming credit is high. In addition, banks and different offices need powerful credit getting ready for auspicious supply of horticultural credit an agriculturist needs to encase the accompanying records with his application frame

- ➢ Agreements for property of land that ownership must kept not dangerous
- ➢ Proper insurance documentation for previous years yields
- ➢ Not at all duties authorized manuscript
- ➢ Duplicates of current snap shot etc.
- ➢ Complete formulae of dualistic guarantors

The defaulter farmers have to pay charges for the attachments of these official papers.

Those farmers who visit 3 or 4 times get his obtained loan amount and it take almost 15 to 30 days to receive these loan. Few companies have need of more than 3 months for pay out. Due to high interest rate, the farmers fancy to get from other casual sources like cash moneylenders, dealers, relatives and companions. In today periods, business banks have embraced speedier procedures of credit payment. What's more, there are quicker in routes than organizations. J. Norton suggested certain insurances for better utilization of agriculture credit..

These proposals region.

- ✓ Borrow for the Business that have some knowledge
- ✓ Retain dues at bottommost opinion.
- ✓ Known about the level of prices as well as their trends for existing time period of the loan.
- ✓ Usage of credit individual for income bring into being determinations.
- ✓ Preserve amount overdue from receiving must great.
- ✓ A credit assistance that will obligate in proper documentation to proceed when incomes are little.
- ✓ Kind an acceptable endowment for protection.

3.3 Empirical Model

Cobb Douglas production function is assumed as a function of labour (L) and capital (K).

The Cobb Douglas production function is still known as most universal tool in the theoretical and empirical analysis of growth and productivity.it is usually used to represent the relationship of an output to inputs. It was suggested by Knut Wicksell (1851-1926) and tested by Charles and Paul Douglas against statistical evidence in 1928.In same year Charles Cobb and Paul Douglas issued a study in which they showed the growth of the American economy during period 1899-1922. Fundamentally ,it considers a basic view of the economy in which production output (P) is determined by total amount of labour (L) which is involved and total amount of capital (K) which have invested, the following equation will be resulted.

$Y = Ak^{\alpha}L^{\beta}$

$LnY = lnA + \alpha\ lnK + \beta\ lnL$

Where:

Y = total production (the monetary value of all the goods which are produced in a year)

L = labor input (the aggregate number of person-hours worked in a year)

K = capital input (the monetary value of all the machinery, equipment, and buildings)

A = total factor productivity

Whereas α is known as output elasticity of capital and β are known as output elasticity of labour. These values are the constants determined by the existing technology. Tan argues that cobb and Douglas were inclined by statistical evidence that are appeared to show that labour and capital shares of the total output were constant overtime in the developed countries, however there is uncertainty over whether consistency exists overtime or not. This argument is based on the fact that machinery and other capital goods (K) differs with the passage of time and agreeing to what is being formed. Same is in the case of Labour (L).

All the variables are transformed to logarithmic form to estimate the Cobb Douglas production function. Unit test root is used in the model.

The estimated equation of Cobb Douglas production is given below.

$$LnAGDP_t = \beta_0 + \beta_1 LnACredit_t + \beta_2 LnALabour_t + \beta_3 LnACapitalForm_t + \beta_4 LnRainfall_t$$
$$+ \beta_5 LnALand_t + \beta_6 LnTemp_t + \varepsilon_t$$

lnAGDP = log of Agricultural gross domestic product measured in rupees million;
lnCredit = log of Bank credit disbursed from all institutions in rupees million;
lnLabour = log of Labour force in rupees million;
lnCapital accumulation = log of annual changes in farm fixed improvements, machinery and inventory of livestock in rupees million;
lnRainfall = log of Annual rainfall in millilitres;
LnTemp=Log of Temperature
ε_t = Error term.

3.4 Definition and construction of variable

The independent and dependent variables for regression have been chosen on the basis of data availability and previous tests of Cobb Douglas Production Function.

Dependent variable :

Agricultural GDP is the Gross Domestic Product (GDP) coming from the agricultural sector. Total GDP is defined as the sum of the value added from Total agriculture, industry and the services sectors. If the value added of these sectors is calculated at purchaser values, total value added is derived by subtracting net product taxes from GDP. Agricultural GDP is the gross domestic Product which is coming from the agricultural sector. Iqbal (2003) used agricultural gross domestic product as dependent variable in his study. It is a continuous variable and data regarding agricultural GDP have been taken from Agricultural Statistics of Pakistan at a constant rate.

Independent Variable :

The key independent variables selected for regression equations includes agricultural credit,agricultural labour force ,capital formation and rainfall.

Agricultural Credit:

Agricultural Credit is the amount of investment funds made available for agricultural production from resources outside the farm sector. Agricultural credit is the amount of credit which is used for agricultural activities involved in the production process. Chandio (2015) used agricultural credit as one of the independent variables in his study. It is also a continuous variable and data regarding Agricultural credit have been taken from Pakistan Economic survey.

Agricultural Labor:

It is the amount of labor force participation rate involved in agricultural sector. Chandio (2015) used agricultural labor force in his study as independent variable.it is a continuous variable and its data has been taken from Pakistan Economic Survey from 1980-2018.

Agricultural Capital Accumulation:

It is the annual changes in farm fixed improvements, machinery and inventory of livestock in million rupees. Capital formation is used as a proxy variable in this study. It is a continuous variable and its data have been also taken from Pakistan Economic Survey.

Agricultural Land under cultivation:

It is the total amount land which have been cultivated in each time period. Sial et al(2011) used land per cultivated hector in his study. Data regarding land under cultivation have been taken from Pakistan Economic Survey.

Rainfall:

The amount of water falling in rain, snow, etc., within a given time and area, usually expressed as a hypothetical depth of coverage. It is total amount of annual rainfall which happen in the respective area. It is the amount of rain that falls in a place during a particular period. It will be measured in milliliters. Data regarding rainfall have been taken from Pakistan Metrological Department.

Temperature:

The degree or intensity of heat present in a substance or object, especially as expressed according to a comparative scale and shown by a thermometer or perceived by touch. The data of temperature have been taken from Pakistan Metrological department from year 1980-2016.

3.5 Data and data Source :

Data regarding variables were sourced fundamentally from the secondary sources such as State Bank of Pakistan ,Pakistan Economic Survey and Pakistan metrological department.The data were composed on annual basis from 1980-2016.

Improved seeds, tractors, fertilizers and contributions show dynamic role in agricultural production and these factors are also directly inclined by the availability of agricultural credit.so it is good to use variable of agricultural credit instead of all other factors. Agricultural credit affects the agricultural output indirectly rather than directly.

It has been criticized to use agricultural credit as independent variable on technical ground but Carter (1989) has given three of the reasons to use credit as independent variable. First, availability of credit helps to removes financial constraints to purchase of cash inputs. Second, technical efficiency of farmers will enhance if credit is use to buy new technology and assists a shift to the production frontier. Third, the availability of credit will also increase resource allocation and revenue when amount use of fixed inputs increases such as family labor, land and management.

Qureshi and shah (1992) exclude important variables like water and land to remove problem of multicollinearity in their analysis. Iqbal (2003) involved both variables in their analysis and transformed all the variables to per cultivated hectare to overcome the problem of multicollinearity.

3.6 Estimation Techniques

In this section, discussion about the stationarity of series, optimal lag structure and co-integrated analysis.

3.6.1 Stationarity of time series

To check the time series data that is whether the data is stationary or non-stationary apply Augmented Ducky Fuller test (ADF). By stationarity we mean the series with constant mean and constant variance. From literature it is found that different tests of stationarity are applied to ensure the stationarity of time series data like Dickey Fuller test (DF), Augmented Ducky Fuller Test (ADF), Phillips-Perron Test (PP). In this study we are using Augmented Ducky Fuller Test (ADF) for checking unit root problem.

$$\Delta Y_t = \alpha_t + \beta_t + \rho Y_{t-1} + \sum \gamma_i \Delta Y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots(3.1)$$

$H_0 : \rho = 0 \, and \beta = 0$
$H_1 : \rho \leq 0 \, and \beta \neq 0$

Ghosal (2012) applied the Augmented Ducky Fuller (ADF) test to investigate the stationarity of different variables like financial openness, trade openness, Gross domestic product, and net foreign assets.. Ray (2012) check the stationarity between different variables like economic growth and foreign direct investment by applying the same ADF or PP test. Mustafa et al (2010) applied the ADF test for checking the stationarity of different variables like GNP, human capital (HK), capital stock (K), and total labor force (LF).

3.6.2 Co-integration test:

It show the long run relationship between economics variables, if there are two equation is cointegrated that mean there is long run relationship between variables. If there exist two or more than two cointegrated equations then we can used any model techniques like ARDL, OLS, VAR, ECM e.tc for the estimation of the long run relationship.

There are two different approaches used to analyze the co-integration between time series data via Engle Granger approach and Johansen approach. Johansen (1988) developed a method for finding that how many variables are co integrated with each other, it is one of the best test of co-integration. Johansen approach is better than Engle Granger approach as Granger approach require large sample, dependent, independent variables must be specified and also it is difficult in case when there are more than two time co-integrating relationship. Engle granger (1987) for the first time developed the test of co integration. Engle granger test show only that variables which are exactly co integrated with each other.

. The co-integration and error correction equation are given as follows:

$$\Delta x_t = -\Pi x_{t-1} + \sum_{i=1}^{n-1} \Phi \Delta x_{t-1} + u_t \dots\dots\dots\dots\dots\dots\dots\dots\dots(3.2)$$

Where Π = coefficient of LR relationship between variables

             Φ = coefficient of the SR dynamics

3.6.3 Optimal lag selection

After the step of stationarity and order of integration of time series data, now we will estimate optimal lag length. To ensure the optimal lag length, different criterion like Akaike information

criterion (AIC), Schwartz Bayesian Information Criterion (SBIC), Hannan-Quinn Criterion (HQC) are applied. In this study, we are using (AIC) which written as below:

$$AIC = -2L + \frac{2n}{t} \qquad \dots\dots\dots\dots\dots\dots\dots\dots$$

Chapter 4

EMPIRICAL RESULTS

This chapter reveals the information about movements of different independent variables and analysis with testing the properties of time series. The steps mentioned in the previous chapter Data and Methodology have been followed in this chapter.

4.1 Graphical Visualization

In this section, we have check data visualizations of all the series included in this study. Historical context is every single essential background to understand the empirical investigation. There is many changes occurred in history that effect the empirical models.

4.1.1 Trends in Agricultural Capital Formation in Pakistan

Capital Formation is the independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and agricultural capital formation. In the below figure 4.1, shows capital formation over the times. On horizontal axis we have years and on y-axis we have a data of agricultural capital formation in millions unit. We can see from the graphs that there is smooth increase from 1980 till 1988, after that one small location shift occurs till 1990. Then there is a constant flow of capital formation and in years 2001 there is again a location shifts which change the means over the time. Hence we cannot fitted a regression line without captured of these location shifts. Otherwise there is almost an increases trend over the time in capital formations
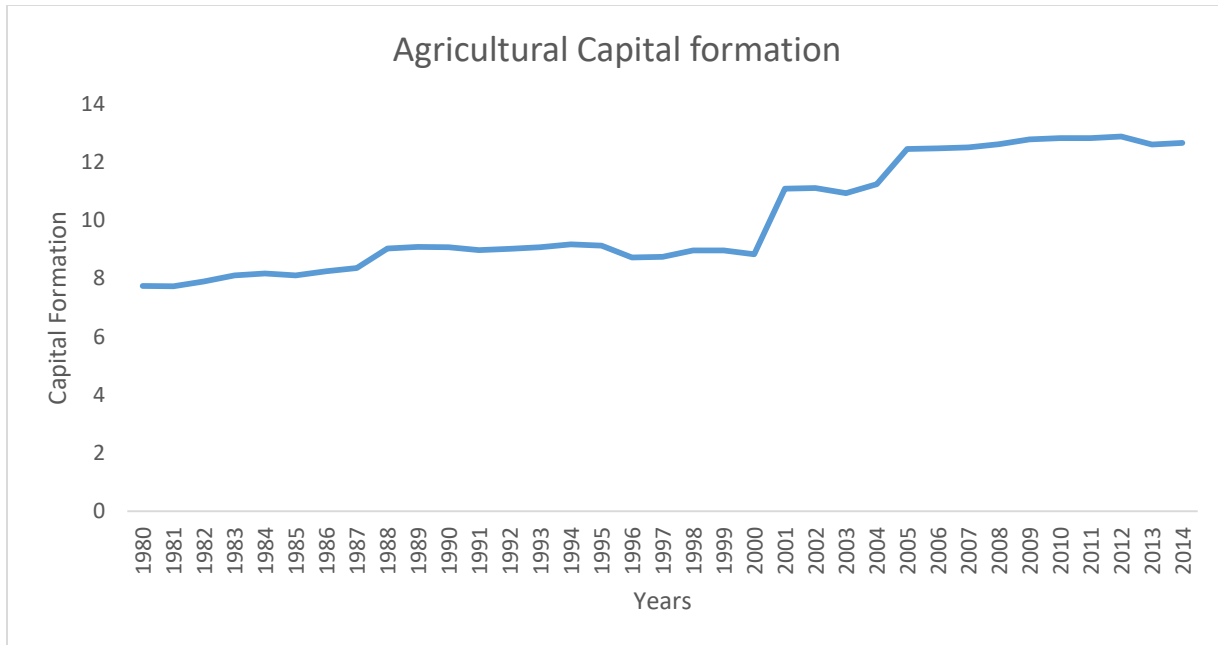
Figure 4.1 Agricultural Capital Formation of Pakistan (Calculated by author through excel 1980-2016)

4.1.2 Trends in Agricultural Credit in Pakistan

Agricultural Credit is the independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and agricultural credit. In the below figure 4.2 of the agricultural credit over the times. On horizontal axis we have years and on y-axis we have a data of agricultural capital formation in million units. We can see from the graphs that there is smooth increase from 1980 till 2016. And there is some shock or intercept changes in the some years.
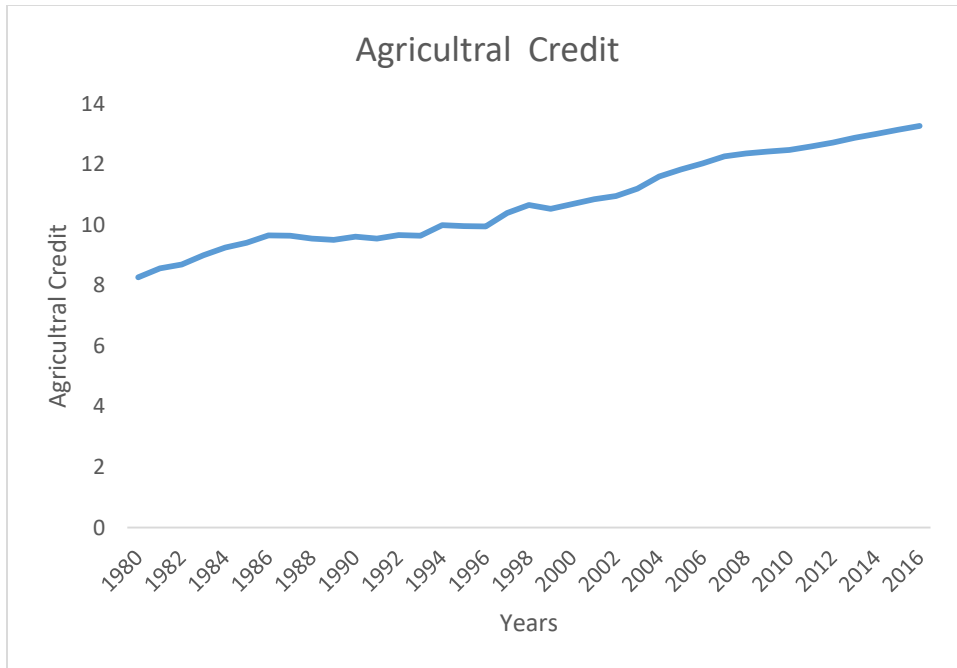
Figure 4.2 Agricultural Credit of Pakistan (1980-2016)

4.1.3 Trends in Agricultural GDP in Pakistan

Agricultural GDP is the dependent variable. This is our main focus variables, which we have target variable and found the relationship among with other variables or indices. In the below figure 4.3 of the agricultural GDP over the times. On horizontal axis we have years and on y-axis we have a data of agricultural GDP in million units. We can see from the graphs that there is smooth increase from 1980 till 2000, after that one heavy location shift occurs in 2001. Hence we cannot fitted a regression line without captured of these location shifts. Otherwise there is almost an increases trend over the time in agricultural gdp.

Figure 4.3 Agricultural GDP of Pakistan

4.1.4 Trends in Agricultural Labor in Pakistan

Agricultural labor is our independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and agricultural labor. In the below figure 4.4 of the agricultural labor over the times. On horizontal axis we have years and on y-axis we have a data of agricultural labor in million units. We can see from the graphs that there is smooth increase from 1980 till 1989, after that one small location shift occurs in 1990. After that there is one another location shift, which is small but we should capture it. Hence we cannot fitted a regression line without captured of these location shifts. Otherwise there is almost an increases trend over the time in agricultural labor
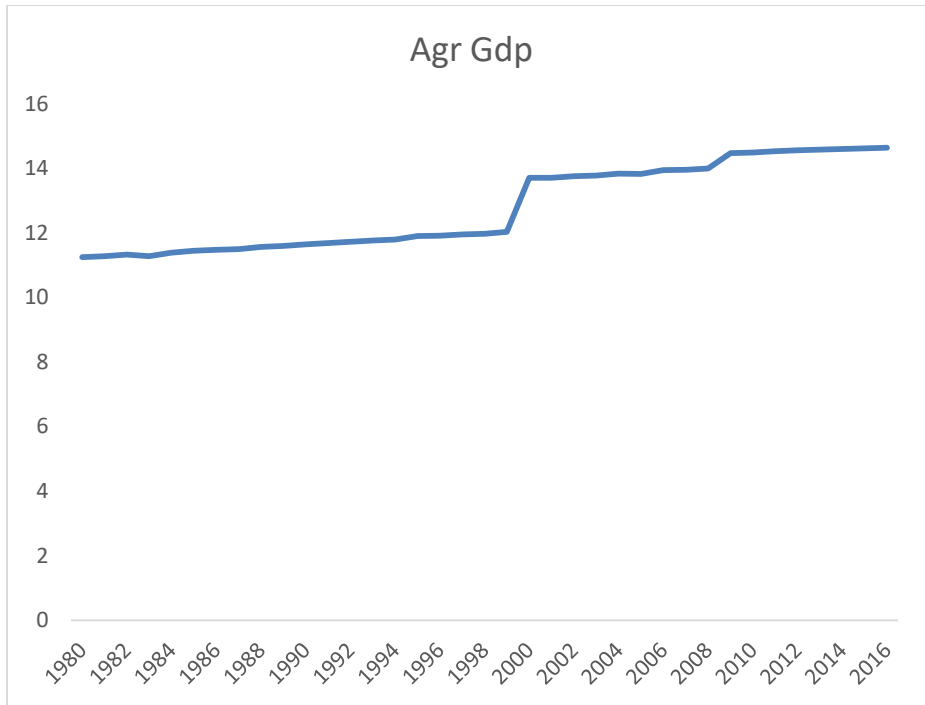
32
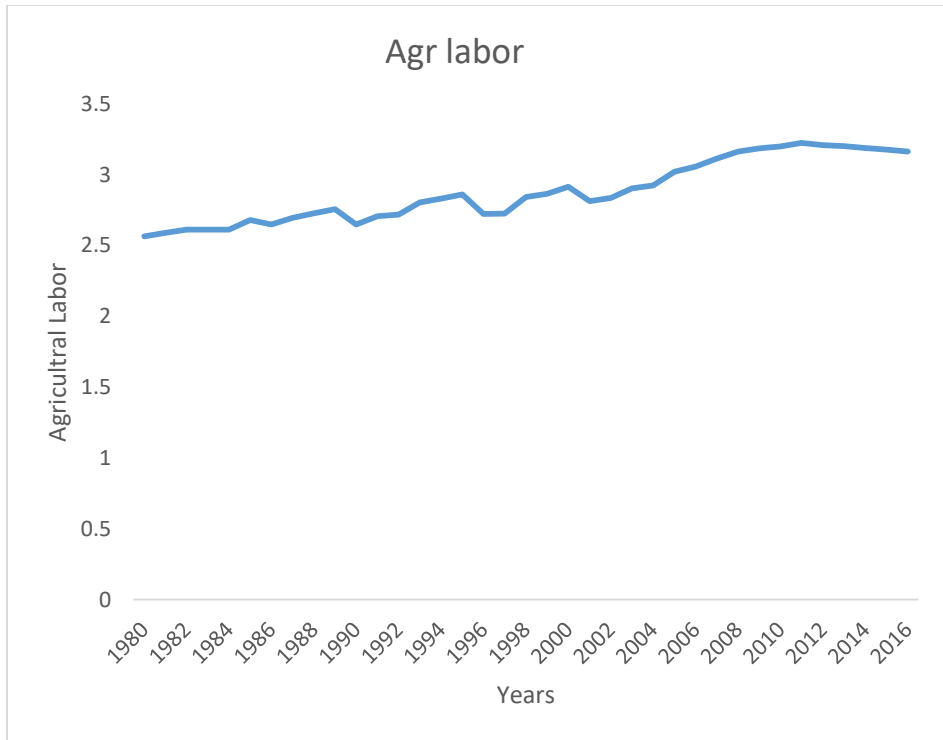
Figure 4.4 Agricultural labor of Pakistan

4.1.5 Rainfall in Pakistan

Rainfall is our independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and Rainfall. In the below figure 4.5 of the Rainfall is increasing and decreasing over the times. On horizontal axis we have years and on y-axis we have a data of rainfall in millimeters units. We can see from the graphs that there is an increase and decrease occurs over the times.

Figure 4.5 Rainfall of Pakistan

4.1.6 Temperature in Pakistan

Temperature is our independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and Temperature. In the below figure 4.6 of the temperature over the times. On horizontal axis we have years and on y-axis we have a data of rainfall in millimeters units. We can see from the graphs that there is an increase and decrease occurs over the times.
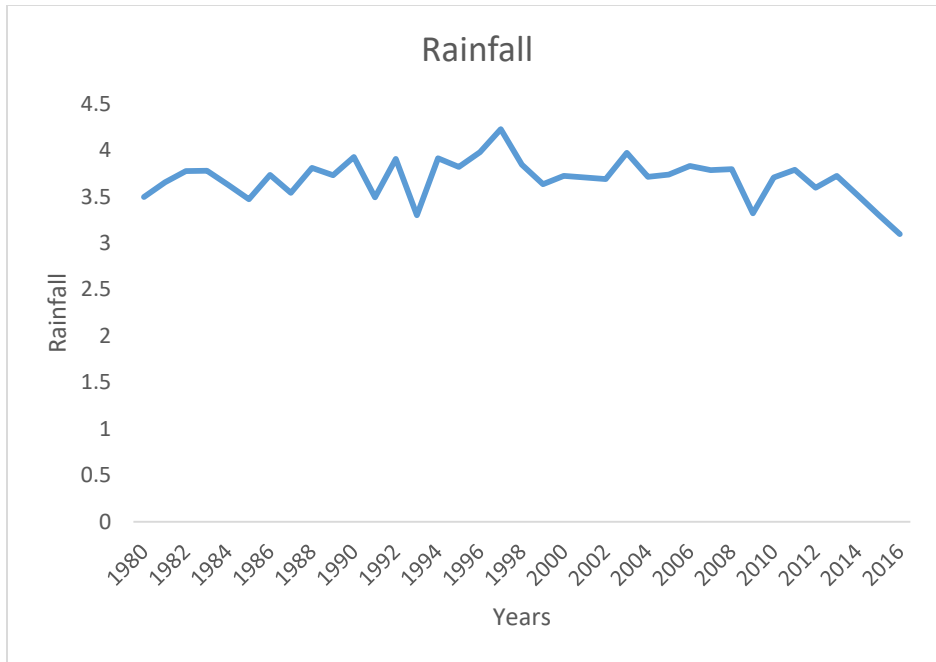
Figure 4.6 Temperature of Pakistan

4.1.7 Agricultural land in Pakistan

Agricultural land is our independent variable. It is one of seven indicators identified for "immediate testing". This is the indicator used for checking the relationship between the dependent variables i-e agricultural GDP and Agricultural land. In the below figure 4.7 of the agricultural land increase over the times, but there is a heavy location shift in 1989 year. On horizontal axis we have years and on y-axis we have a data of rainfall in hectares units. We can see from the graphs that there is an increase and decrease occurs over the times.
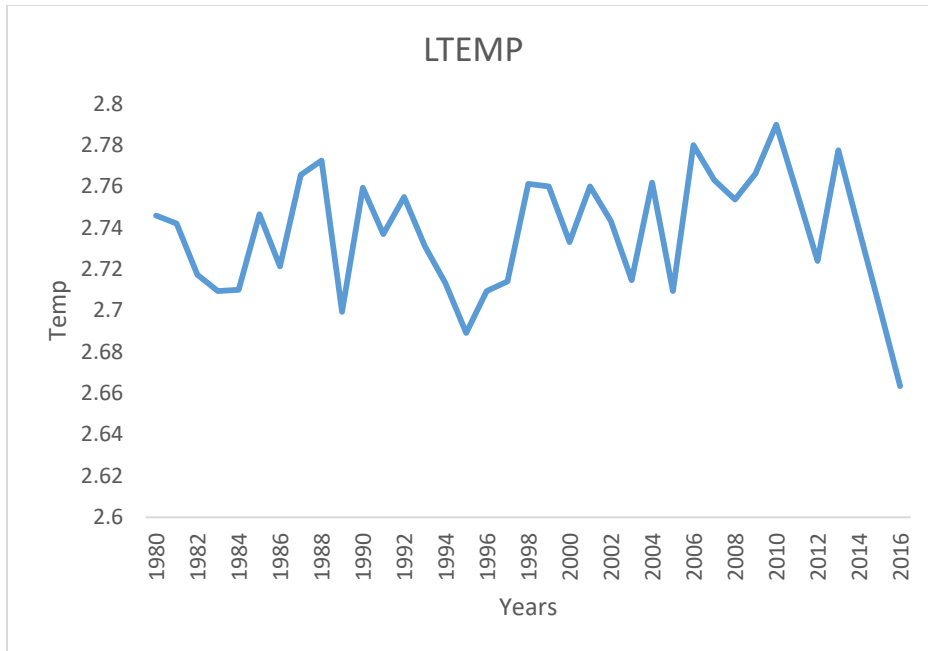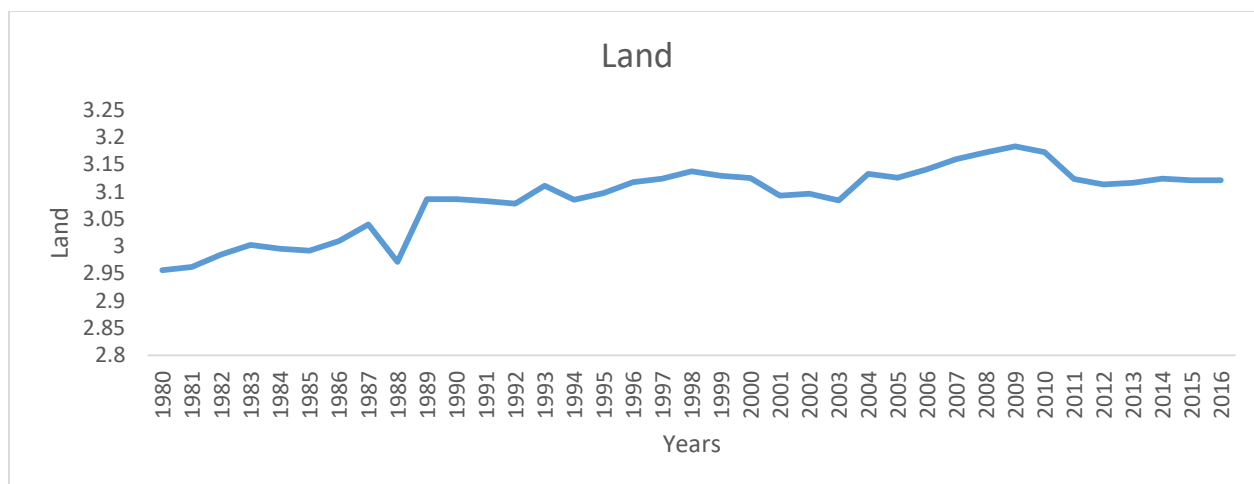
Figure 4.7 Agricultural Land of Pakistan

4.2 Testing Stationary

Before testing co-integration and error correction mechanism we tested unit root in order to find that whether the data is stationary or non-stationary. Augmented ducky fuller test (ADF) and Philips Perron is applied, and results are shown in the table 4.1

Table 4.1 The above estimated results

Variables	ADF	Prob	Integrated	PP	Prob	Integrated
AGR_GDP	-0.4036	0.8980	I(1)	-0.3592	0.9057	I(1)
ΔAGR_GDP	-6.1034	0.0000	I(0)	-6.1213	0.0000	I(0)
Rainfall	-4.1488	0.0002	I(0)	-4.092	0.0003	I(0)
Temp	-4.0125	0.0036	I(0)	-4.051	0.0003	I(0)
AGR_Land	-2.2474	0.1935	1(1)	-2.236	0.1975	1(1)
ΔAGR_land	-8.2952	0.0000	I(0)	-8.295	0.0000	I(0)
Cap Formation	-0.6253	0.8525	I(1)	-0.6054	0.8571	I(1)
Δ(Cap Formation)	-6.1344	0.0000	I(0)	-6.1360	0.0000	I(0)
AGR_Lab	-0.8428	0.7945	I(1)	-0.6965	0.8350	I(1)
Δ(AGR_Lab)	-6.2474	0.0000	I(0)	-8.068	0.0000	I(0)
AGR_CRE	-0.1820	0.9318	I(1)	-0.2309	0.9253	I(1)
Δ(AGR_CRE)	-5.1821	0.0001	I(0)	-5.184	0.0001	I(0)

Source: Calculated by authors

Table 4.1 shows the estimated output of unit root test. The null hypothesis H_0 for all variables like Agricultural GDP, Agricultural Credit, Agricultural labor, and Agricultural land do not accept in their original series, so we can say that the series are non-stationary. However, by taking the first difference of all variables, it is found that H_0 is rejected indicating that all variables are integrated of order one, I (1). The null hypothesis H_0 for all variables like Rainfall and temperature accept in their original series and found to be stationary at level.

4.2.1 Co-integration Analysis

In order to capture the long run relationship among Agricultural GDP and all others independent variables, I applied the Johansen test of co-integration (1988) is applied. Before checking the cointegration, we check the optimal lag structure and then apply cointegration test. Our analysis is based on the following steps.

Table 4.2: optimal lag length

Lag	Log L	LR	AIC	SIC	HQ
0	-101.81	NA	-5.4177	-5.1066	-5.3110
1	**231.8908**	**262.4102***	**-12.33**	**-9.8480***	**-11.4775***
2	322.84	58.2362	-12.4484*	-7.7823	-10.8377

(Authors calculated)

After analyzing the results of unit root test next step is to choose optimal lag length. We determine the optimal lag length, because Johansen test of co-integration require lag length. As we have used annually data in our analysis, which results into small sample size, thus preference had given to Schwartz information criterion (SIC).The following table shows the selected lag length of SIC.

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The above table 4.2 provides results of different criterions for lag order selection. However, only SBC are chosen, and optimal lag length is one, lag (1). Lower the SIC value better will be the lower value of SIC is -9.84* with the optimal lag length suggested is one as an optimal lag.

4.2.3 Co-integration test

After applying augmented ducky fuller test (ADF) and PP test suggests that all variables like Agricultural GDP, Agricultural Credit, Agricultural labor and Agricultural land are non-stationary at level. So Johansen Co-integration test is applied to capture long run relationship. To investigate the co-integration relationship between variables, we have used trace test value and Maximum values.

Table 4.3 Trace Test Statistics

Unrestricted Cointegration Rank Test (Trace)			
Hypothesized		Trace	
No. of CE(s)	Eigenvalue	Statistic	Prob.**
None *	0.721259	129.5936	125.6154
At most 1	0.603925	84.88209	95.75366
At most 2	0.474523	52.46677	69.81889
At most 3	0.332963	29.94605	47.85613
At most 4	0.253986	15.77421	29.79707
At most 5	0.133157	5.518808	15.49471
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level			
* denotes rejection of the hypothesis at the 0.05 level			

(Authors calculated)

Table 4.4 Maximum Eigenvalue Statistics

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.721259	44.71151	46.23142	0.0722
At most 1	0.603925	32.41532	40.07757	0.2808
At most 2	0.474523	22.52072	33.87687	0.5673

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Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
At most 3	0.332963	14.17183	27.58434	0.8106
At most 4	0.253986	10.25540	21.13162	0.7203
At most 5	0.133157	5.001400	14.26460	0.7417
Max-eigenvalue test indicates 0 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				

(Authors calculated)

The above table 4.4 provides estimated results of co-integration test. Both the trace test statistics and max-Eigen value are used to check co-integration relationship between dependent and independent variable. Upper panel of this table provides the trace test statistics and max-Eigen value are given in the lower panel in the table. Trace test statistics tell us that there is one cointegration exist between the variables

Estimation Output:

In the data series there are various location shifts and remarked departure between the prices and demand for money after the 1980, so the SIS was applied to identify these shifts

Table 4.5 Regression results for factors of Agricultural Output

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Capital For	0.041	0.01891	2.19	0.0404
AGR_CRE	0.091	0.03824	2.39	0.0265
AGRLAB	-0.56	0.1908	-2.96	0.0074
RAINFALL	0.007	0.05254	0.151	0.8818
TEM	-1.20	0.4136	-2.92	0.0081
AGRLAND	1.49	0.3024	4.94	0.0001
C	3.04	1.44	2.12	0.0463
S1:1994	-0.18	0.04225	-4.43	0.0002
S1:1997	0.15	0.05153	3.04	0.006
S1:1999	-1.74	0.05009	-34.9	0.0000
S1:2003	0.13	0.04802	2.8	0.0103
S1:2005	0.13	0.04738	2.92	0.008
S1:2008	-0.38	0.04709	-8.26	0.0000
S1:2010	-0.20	0.04706	-4.38	0.0002
AR 1-2 test: $F(2,19)$ = 1.6251 [0.2231]				
sigma 0.0433901				
R^2 0.90				

Source: calculate by authors

The above estimated results presented in the table 4.5, shows that, Agricultural capital formulation has significantly positive relationship with agricultural GDP. According to the literature, there is a positive correlated exist between capital formation and Agricultural GDP. The estimated parameter or elasticity (0.04) for agricultural capital formation. This implies that one percent increase in capital formation on average there is 0.04 percent increase in the Agriculture GDP (Joseph Chisasa, 2013). The agricultural GDP can be boost up by the easy and cheap availability of credit. According to act of credit that of Agricultants loan Acts 1858, credit is the mainly provided to support the farmers to purchase agricultural inputs including seeds, fertilizers, cattle's and implicit to comfort the immersible and increase the cropped area. As show in above table, agricultural credit has significantly positive relationship with agricultural GDP, on average increasing one unit in agricultural credit bring 0.091-unit agricultural GDP likely to increase

(Joseph Chisasa, 2013). So in the case of Pakistan it is a good that there is positive relationship between the se two indices. Further in the result above table, there is a positive relationship between crops (hectares) and agricultural GDP**,** while Rainfall is significantly insignificant (Joseph Chisasa, 2013). Variable temperature has also negative impact on Agrictural GDP as increasing in one-degree temperature there will be -1.20(Horowitz etal, 2006), it means that whenever there was low temperature that will automatically increasing the agriculture GDP because of less emissions. If there is high level of emissions occurs, they will increase the temperature which have an effect to change in the reduction of the Agrictural GDP (Economic Brief 2018). By increasing one unit in agricultural labor force bring -0.56 unit decrease in agricultural GDP, that mean there is inverse relationship with agricultural GDP (Joseph Chisasa, 2013). These shifts are significant as the indicator dummy are significant, but some have a positive impact, and few have a negative impact.
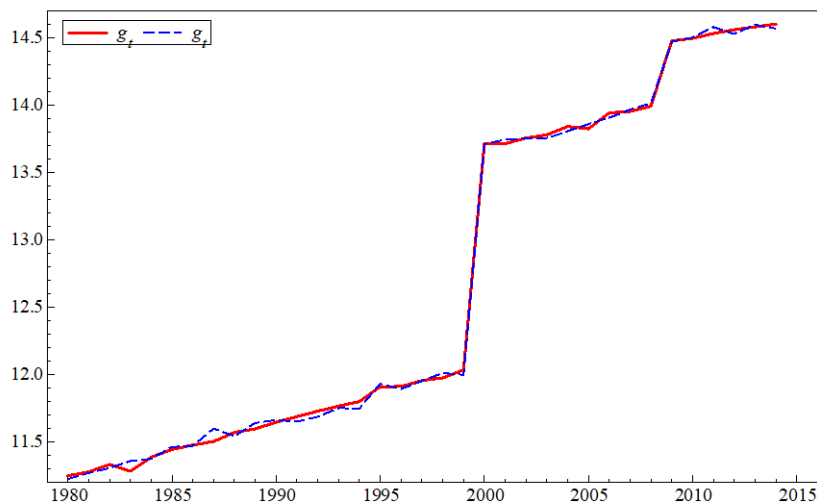

Figure 4.8 Actual and Fitted agricultural GDP

Chapter 5

CONCLUSION AND POLICY RECOMMENDATION

5.1 Conclusion

The present study has been designed to investigate the factors that impact on the Agricultural GDP in Pakistan by taking updated data set. The study investigate the Agricultural GDP (AGR_GDP) and the factors which may have impact on this index during the time period of 1980-2016. The study made estimation using data taken from Agricultural Statistics, Economy Survey of Pakistan, Metrological department and world development indicator (WDI).The study employed Johansen test of co-integration and OLS to analyze the data set. The econometric analysis confirm that Agricultural GDP, Agricultural Credit, Agricultural labor, and Agricultural land variables are non-stationary at level while taking first difference it become stationary, while temperature and Rainfall become stationary at level. The Johansen test of co-integration analysis reveals that there is one co-integrating vector. Before estimating OLS model the study estimated JJ test for co-integration and confirm that there is exist long run relationship among all variables. Further the study estimated the OLS model and regression will be not more spurious, because co-integration is the solution for spurious relationship. The study reached on this conclusion that the factors like agricultural credit, agricultural labor, and agricultural capital formation effects the agricultural GDP, i.e. expansion of FIB occurs due to agricultural credit, it has direct relationship. However temperature effects it negatively so due to climate change it is projected that production that occurs from the land of agriculture. These all results are confirmed by the study of Joseph Chisasa, 2013 done to measure bank credit and agricultural output in South Africa.

5.2 Policy Recommendation

1) To enlarge the agricultural credit disbursement especially to small farmers and these credit gives to farmers on the basis of their productivity that will help to target the needy peoples and decrease their loans. When the productivity of such farmer increases, they will increase in agricultural output, and easily repay the loan that taken by these farmers by selling these agricultural outputs.

5.3 Future suggestions

- The primary study needs to be conducted through which we can find other new and unique factors which effect on agricultural output.

- The relationship of bank agricultural output and factors by using the dynamics analytical techniques that address short-coming of this cob-Douglas models.

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