IMPACT OF AGRICULTURAL CREDIT ON AGRICULTURAL PRODUCTIVITY IN PAKISTAN: AN EMPIRICAL ANALYSIS

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Abstract: *The purpose of this paper is to investigate the impact of Zarai Taraqiati bank limited's credit to farmers on their agricultural productivity by using logit regression analysis. The study is based on primary source of data collected through field survey of Bahawalpur Tehsil. It is concluded that Household size, income of the household, education of the famers, agricultural credit, short term and long term loans have significant positive impact on agricultural yield per acre. The positive association between credit and agricultural productivity represents that credit enables the farmers to purchase superior quality or high yield variety seeds, fertilizers and pesticides and agricultural yield increases because of timely and adequate inputs. The study suggests that the in time provision of appropriate amount of loan to farmers may be helpful for the enhancement of agricultural productivity of Pakistan.*

Key Words: *Agricultural, Productivity, Credit, Logit Model, Pakistan*

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1. INTRODUCTION

Agriculture is the most important sector of the developing countries like Pakistan. It is the single largest sector in Pakistan and its relative share in the total national income has declined. It contributes 21.4 percent to Gross Domestic Products and provides employment to 45 percent of the country's labour force. The majority of population (almost 70%) lives in rural areas and mostly rural population is engaged in agricultural activities. Currently the share of agriculture in gross domestic product is 21.4 percent, as compared to 24.5 percent in 1990s, 32 percent in 1977-1978, 53 percent in 1959-1960 and 64 percent in 1947-48. Our country's total export earnings include ¾ of agricultural and agro based products and this sector supplies raw material to many major industries. The consumption of industrial goods in agriculture sector is almost 33 percent (Economic Survey of Pakistan, 2012).

It will, therefore, be seen that the problem directly inhabiting the agricultural production attains a degree of paramount importance because agriculture in Pakistan not only provides employment to the majority of the population but also supplies much needed raw material for the industrial sector as well. Pakistan's economy, in general, and agriculture sector in particular, have achieved significant development during the last decade especially in recent years. Agriculture sector, however, is still spring from a number of inherent and apparent problems. Water logging/salinity coupled with scarcity of irrigation water rank at the top of physical problem while inadequacy of credit, weak marketing mechanism and ineffective co-operative structure are prominent inherent problems.

Keeping in view the population growth rate of 2 percent per annum, the need is to provide them a balance diet and limitation on expansion of cropped area, the national commission on agriculture has recognized for considerable expansion in the pace of agricultural production. Recent revaluating in agriculture has made it capital intensive but majority of our small farmers are not in position to practice agriculture on modern lines due to lack of capital.

The agriculture growth depends very much on improvement of infrastructural facilities, supply of enhanced irrigation water, land reclamation, transpiration, mechanical power and other critical form inputs like seeds, pesticides and fertilizers etc. Agricultural credit assumes even a central position in the whole strategy of agricultural development of a country like Pakistan for a number of reasons.

Agriculture is characterized by the small farms (12.5 acres or less) constitutes about 3 - 4th of total farms in Pakistan and under operation is about 35 percent of farm area in the country. Small farmers generally having low income negligible saving and low capital formation are unable to undertake latest agriculture technologies. A severe drought or flood may destroy capabilities of small farms to sustain even normal production cycle for years resultantly they cannot exploit the potential of their land to the optimum level and thus fail to achieve higher yield per acre.

Farming requires capital like other business for its farm operations. Timely availability of capital leads to adoption of improved seeds, fertilizers and modern technologies which increase the farm production and ultimately the growth rate. Therefore, agriculture credit is an essential element for modernization in agriculture.

In past few decades, the need of credit in farming sector rapidly increases because of rise in use of fertilizer, pesticides, high yield variety seeds and mechanization and rise in their prices. In Pakistan, there are two sources of credit informal and formal. Informal sources of credit include friends, relatives, traders and private money lenders and the formal credit sources consists of financial institutions like Zarai Taraqiati Bank limited, commercial banks and co-operative societies. Non government organizations (NGOs) are also providing financial support to the rural communities (Iqbal, et al., 2003). The merger of the agricultural development Finance Corporation and agricultural bank of Pakistan resulted in establishment of Agricultural Development Bank of Pakistan (ADBP) in 1961. The bank provides credit to agriculture and its linked disciplines. ADBP, since its inception, extending credit to individual as well as to corporations engaged in agriculture. The bank is the principal and leading foundation of contributing over half of institutional agricultural credit in the country.

The Zarai Taraqiati Bank Limited has a team of 1441 mobile credit officers (MCOs), 354 branches and 51 regional offices in all over the country. The ZTBL is performing its role as a pioneer in mechanization of agriculture. Credit for tractor and tube well on easy terms and conditions has helped in rising farm productivity and cropping areas. To improve the availability of agricultural finance on easy terms and at door steps of small farmers, kisan banking windows have established all over the country since 1st July, 1994. This has met to the credit requirements of poor farmers. Awami tractor scheme has also been launched for

landless and small farmers. In short, the ZTBL has played a crucial role in advancing loan and technology to agriculture sector of Pakistan.

But the performance of ZTBL is still unsatisfactory. The rural people and farmers hesitate for applying credit to a formal institution due to high interest rate of institutions, Bank's distance from home, unnecessary delay in disbursement of loan, complicated procedure, and unlawful demand of officials, non co-operation of revenue department and bank and security used for the loan from the institutional sources. These were the major problems affecting the formal credit structure in Pakistan (Akram, et al., 2008).

2.   REVIEW OF LITERATURE

The importance of the review lies in the fact that it highlights the background knowledge about the problem to be solved. It provides further orientation to the problem and eliminates the possibility of un-necessary duplication of efforts. Valuable information or research techniques may be gained with previous research. Some relevant studies conducted in Pakistan and abroad are reviewed here under in the context.

Zuberi (1989) analyzed the production function in the agriculture sector in Pakistan. The study uses the time series data from 1956 to 1986 and developed the strategy for the agricultural development in Pakistan. It is concluded that agricultural development depends upon the maximum utilization of better and low cost technology. It is suggested that government should provide the institutional credit on easy terms and conditions to make possible for farmers to purchase latest implements and use the modern methods of production. Because per Acer yield major crops like wheat, rice and sugarcane in Pakistan is lower than other developing countries. It is also concluded that the use of latest technology and additional inputs are necessary for rising productivity.

Mbata (1991) investigated the impact of the supervised Agricultural Credit scheme (SACS) first set up by the Rivers State Government (Nigeria) in 1975 as a tool for agricultural development. A comparative analysis of the productivities of two groups of farmers who borrowed from formal sources and those who borrowed from informal sources were undertaken. Data covered the 1998/89 cropping season. The findings of the study revealed that farmers who had access to the SACS consumed more inputs, obtained higher yields and thus realized greater farm profit per hectare than their counterparts who obtained credit form informal courses. This was direct impact of the SACS on small scale farmers. It was

therefore recommended that through extension services the scope of the SACS should be widened to embrace more farmers in Rivers State in particular and in Nigeria at large.

Qureshi et al. (1992) critically reviewed the rural credit policy in Pakistan. The study found that improvement in agricultural productivity depends on an appropriate technical as well as functioning marketing system for both agricultural inputs and output and adequate rural infrastructure. They analyzed per hectare series of annual data from 1959-1990 in the log form and equations were estimated by using the ordinary least square OLS) method. The coefficient of credit, labor force and fertilizer were found to be highly significant. The results indicated that the small farmers produced more per acre of operated land than the large farmers. They concluded that policy instruments chosen were the subsidization of production, development of credit and fixation of quota for the credit supply to the agricultural sector for the small farmers.

Khandker.R. et al. (1999) explained that the loan which had given to small land holders is more effective and suitable for agricultural productivity than the loan given to the land lords. The Asian development bank of Pakistan gave more facilities and credits to the land lord then the small land holders, while the credit given to small land holder is proved to be more productive than the large land holders. It also played very important role in the development of the life style of the poor peasants and decreased their poverty too.

Seibel (2000) investigated that agriculture farming is seasonal activity. The agricultural credit institutions should increase the credit supply during the sowing season. He pointed out that agricultural credit institutions should provide credit for purely agricultural purpose, especially for crop production. He opposed to providing finance for other purpose. Such programs have disturbed the capacity of agricultural development.

Hammond (2003) identified that there should be some changes at the banks including simple procedure for small loans, elimination of the need to provide detailed plans and financial statements of an applicant. This work should be done by the bank officers with the help of borrower. However, there are many obstacles in the way of obtaining agricultural credit.

Iqbal et al. (2003) suggested that the formal financial institution should be encouraged to expand the agriculture loans for farming sector especially small land holder. The study also indicated that the institution should expend the loan for consumption purpose to poor

farmers in case of emergencies (flood and drought etc). In addition to a crop insurance, other schemes should also be launched to provide protection to the farmer against the pest attack, drought, heavy rains and flood) on payment of minimum premium.

Nuryatono. N., et al. (2005) analyzed that the contribution of agriculture in development process but they have observed that poverty is a major problem of this area. They found that almost 46% of total households are considered as a poor. The purpose of this study was to improve the understanding of the Interlinkages between access to credit and agriculture production. The main focus of the study was to observe the influence of household credit and credit rationing on agriculture profitability especially in rice production.

Fayaz (2006) conclude that ZTBL's credit schemes had significant impact on agriculture production and income of the farmers and it is most effective tool for the agricultural development. He also suggested that the credit distribution should be done in a simple and easy procedure.

Nasir (2007) found that credit plays a pivotal role in development. It helps farmers to undertake new investments and adopt new technologies to increase agricultural yield. Lack of access of the rural poor to institutional loan has negative impact for rural growth and well being. Institutional loans are normally used for production and investment purposes while informal loans are squandered away on consumption. Being short- term, informal loans do not contribute to rural development, as these cannot be channeled to long-run productive activities.

Charchar (2007) analyzed that credit is the need of both subsistence and economic land holders for production and development. Almost 95 percent farmers have less than 25 acres land. Mostly in rural areas, where the institutional finance are neglected except ZTBL. The small growers are hesitating to avail credit facilities from formal institutions due to complicated and time consuming lengthy procedure. They prefer to purchase the input on double prices payable after the marketing of their produce.

Waqar, A. et al. (2008) discussed the agriculture credit constraint and borrowing behavior of the rural farmer in Punjab. The Govt. of Pakistan introduced many programmes of credit through financial institutions. The effect of these programs is very low due to unfavourable credit policies. The farmers were facing many problems and obstacles in the way of borrowing. The security or collateral is the major problem. The majority of the small farmers

could not borrow due to unavailability of collateral. The tenants and share croppers face the security problem and could not avail the credit. The borrowing behaviour of farmers was estimated through logit regression model. There were many problems faced by the farmers like complicated procedure, unnecessary delay in disbursement, unlawful demand of official, but the major problem is collateral due to which the tenants and share cropper were dropped from loaning schemes.

Waheed (2009) analyzed that to improve the well being of rural poor, micro finance is proposed to be primarily essential for investment in rural productive activities. The study concluded that per capita credit to non poor was better than per capita credit to poor farmer. Micro credit was largely taken by non poor and the poor have little access to micro credits.

3.   DATA AND METHODOLOGY

The Main purpose of the study is to investigate the impact of Agricultural credit on agricultural productivity in Pakistan. The study is based on field survey and Logistic regression model is employed to analyze the data. The survey is based on simple random sampling and stratified random sampling techniques. We have selected 300 farmers randomly from 10 villages of Bahawalpur Tehsil. We have selected 30 farmers randomly from each village. The format of the survey questionnaire has covered some socio-economic characteristics of the farmer. Information was collected through interview of selected informants and direct questioning from target population. The survey was conducted in the months of September and October, 2009.

The present study considered some significant quantitative explanatory variables based on theory and literature. The list of the selected variables for Logit model analysis is as follows.

Table 1: List of Variables for Logit Model Analysis

Variable	Description of Variables
Explained Variable	
PROD	Agricultural productivity after borrowing from the bank = 1If there is rise in productivity = 0 If there is no rise in productivity
Explanatory Variables	
HSIZ	Household Size
HINC	Income of the household

EDUC	Education of the farmer = 1If the farmer is literate = 0 If the farmer is illiterate
AGE	Age of the farmer in years
CRDIT	Amount of Credit borrowed by the farmer from the bank in a year
SHRTL	Short term loan = 1If the farmer has borrowed for short term = 0 If the farmer has not borrowed for short term
LOTL	Long term loan = 1If the farmer has borrowed for a long term = 0 If the farmer has not borrowed for a long term
NLOAN	How many times the farmer has borrowed from ZTBL
LIVSTK	Livestock = 1 If the farmer has livestock = 0 If the farmer has no livestock

As far as methodological issues are concerned, the dependent variable is the rise in agricultural productivity (PROD). Agricultural yield or productivity is calculated as the ratio of agricultural inputs to agricultural output. While individual products are usually measured by weight, their varying densities make measuring overall agricultural output difficult. Therefore, output is usually measured as the market value of final output.

The regressions are mostly applied by using a Probit or Logit Model. In Probit or Logit model a dummy or a categorical variable is used which represents whether there is rise in agricultural productivity by spending the amount of credit on agricultural inputs or not. This dichotomous variable is regressed on a set of selected explanatory variables. The empirical analysis of the impact of various explanatory variables including agricultural credit on agricultural productivity is analysed by employing Logit Model. As far as justification of Logit model is concerned, logit model is usually used in empirical work due to its simplicity and relatively flatter tails as compared to Probit or Tobit model. In a Logit Regression Model, the endogenous variable is a dummy variable with 1 if there is rise in productivity or 0 otherwise. The probability of rise in productivity depends on a set of variables x so that,

Prob $(Y = 1) = F(ß'X)$

Prob $(Y = 0) = 1 - F(ß'X)$

Using the logistic distribution we have

Prob (Y = 1) = e $^{\beta' X}$ / 1 + e $^{\beta' X}$

= Λ (ß'X)

Where 'Λ' represents the logistic cumulative distribution function. Then the probability model is the regression:

E [Y/X] = 0 [1-F (ß'X)] + 1 [F (ß'X)]

= F (ß'X)

We have included some significant variables based on literature review. According to theory and literature our hypothesis are as follows. Amount of the credit (CRDIT), income of the household (HINC), long term loan (LOTL), Short term loan (SHRTL) household size (HSIZ). Education of the farmer (EDUC), age of the farmer (AGE), Livestock (LIVSTK) and the number of times the farmer has borrowed from ZTBL (NLOAN) have significant positive impact on agricultural productivity.

4. Results and Discussion

The study empirically estimated the impact of credit on agricultural productivity by employing logit regression model by taking the agricultural productivity (PROD) as a dummy variable with 1 if there is rise in productivity due to credit availability or 0 otherwise. The estimates of Logit regression model are as follows.

Table 2: Estimates of the Logit Model Analysis
Dependent Variable: PROD
Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.23	0.52	-2.38	0.01
CRDIT	1.81***	1.07	1.69	0.09
SHRTL	0.53***	0.33	1.63	0.10
HSIZ	0.11***	0.05	1.82	0.06
EDUC	0.54***	0.32	1.68	0.09
LIVSTK	0.19	0.51	0.39	0.69
Mean dependent var	0.49	S.D. dependent var		0.50
S.E. of regression	0.48	Akaike info criterion		1.35
Sum squared resid	45.55	Schwarz criterion		1.45
Log likelihood	-129.43	Hannan-Quinn criter.		1.39
Restr. log likelihood	-138.54	Avg. log likelihood		-0.65
LR statistic (5 df)	18.23	McFadden R-squared		0.16
Probability(LR stat)	0.00			

Source: Author's calculations by using e-views

Note:* Represents 1 percent level of significance.

** Represents 5 percent level of significance.

*** Represents 10 percent level of significance.

Table 2 Shows that the coefficients of amount of credit (CRDIT), short term loan (SHRTL), Size of the household (HSIZ) and Education of the farmers (EDUC) have significant positive impact on productivity. The significance level of all the variables is 10 percent. Livestock (LIVSTK) has expected sign but the variable is insignificant. When farmers borrow credit from bank they are able to purchase the superior quality or high yield variety seeds, fertilizers and pesticides and agricultural productivity increases because of such timely and adequate inputs. Agricultural productivity increases due to the increase in household size. The greater the household size, the greater the labour force participation of household's members in agricultural activities and as a result agricultural produce rises. The farmers are also benefitted from short term loans being able to spend on crops growing activities. The educated famers can better utilize the economic resources for their farming activities. They are more familiar and can manage with the problems of the agriculture in better ways as compared to illiterate farmers.

Table 3: The Logit Model Estimates

Dependent Variable: PROD

Method: ML - Binary Logit

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-1.02	0.61	-1.65	0.09
AGE	-0.02	0.1	-1.02	0.31
HSIZ	0.16**	0.06	2.07	0.04
HINC	1.79**	8.73	2.06	0.04
NLOAN	0.03	0.08	0.37	0.70
LOTL	0.82**	0.36	2.26	0.02
Mean dependent var	0.49	S.D. dependent var		0.50
S.E. of regression	0.48	Akaike info criterion		1.35
Sum squared resid	45.56	Schwarz criterion		1.45
Log likelihood	-128.87	Hannan-Quinn criter.		1.39
Restr. log likelihood	-138.54	Avg. log likelihood		-0.64
LR statistic (5 df)	19.34	McFadden R-squared		0.17
Probability(LR stat)	0.00			

Source: Author's calculations by using e-views

Note: * Represents 1 percent level of significance

** Represents 5 percent level of significance

*** Represents 10 percent level of significance.

The results of the Table 3 show that the coefficients of household size (HSIZ), income of the household (HINC) and long term loans have significant positive association with the agricultural productivity. All the variables are significant at 5 percent level. The age of the famer (AGE) and number of times farmer has borrowed from the bank (NLOAN) have expected signs but insignificant impact on agricultural productivity. The greater the household size, the greater the labour force participation of household's members in agricultural activities and as a result agricultural produce rises. As income of the household rises, the efficiency of the farmer increases by being able to purchase inputs of better quality seeds, fertilizers and pesticides and hence productivity in enhanced. Long term loans (LOTL) have positive impact on productivity because farmers become able to purchase machinery, install tube well and have their own tractors and by adopting farm mechanization and better techniques of production agricultural productivity could be enhanced.

5.   CONCLUSION AND POLICY RECOMMENDATION

Household size, income of the household, education of the farmer, amount of credit, short term loans and long term loans have significant positive impact on agricultural productivity. The age of the famer, number of times farmer has borrowed from the bank and Livestock have expected signs but insignificant impact on agricultural productivity. The borrowing from bank is very much helpful for both the small and large farmers enabling them to buy inputs such as the high yield variety seeds, fertilizers and pesticides and agricultural productivity rises because of such timely and adequate inputs. Agricultural productivity increases due to the increase in household size. The greater the household size, the greater the labour force participation of household's members in agricultural activities and hence increasing effect on productivity. The farmers are benefitted from ZTBL's both short term and long term loans and have adequate funds to utilize on crops growing activities such as purchase machinery, install tube well and have their own tractors and by adopting farm mechanization and better techniques of production. The educated famers are familiar with agricultural issues and utilize the economic resources in better way as compared to uneducated farmers. The rise in agricultural productivity causes rise in income of the households which in turn results in rise in agricultural activities as well.

The Policy recommendations are as follows.

1. The credit facility should be provided on time, otherwise the delay in the completion procedure for taking loans will be occurred and the farmers will not get maximum profit regarding their plans.

2. For getting maximum output and improving the welfare of farmers, polices of ZTBL should be flexible and rate of interest should be less for small farmers then large farmers because small farmers hardly acknowledge their basic need.

3. ZTBL should give the credit to farmers according to their need and the importance of crops.

4. Acquisition and recovery process for credit should be simple to give benefits to maximum number of farmers.

5. Micro credit should come in package including input supply (seed, fertilizer, pesticides etc), technical know- how and marketing. This would increase the income of the borrowers and hence repayment condition will be improved.

6. Banking policies for agricultural credit are still business oriented rather than directed towards development. So, it is imperative on the part of such institutions to chalk out policies and programmes aimed at larger national interest rather than individual and personal gains.

7. Efforts should be made to simplify the borrowing procedure in the terms of time-lag, acceptance of security, documentation and disbursement of loan.

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