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Impact of Institutional Credit on Agricultural Production

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Abstract:
Institutional credit to agricultural sector plays a crucial role in supporting agricultural production. Agricultural credit allows the farmers to purchase the necessary farm inputs and to meet their daily agricultural expenses (fertilizers, wages, rental charges etc.) and also helps in adopting new farm technology. For stimulating the tempo of agricultural production, it is necessary that the farmer must be provided with adequate and timely credit. In this paper an attempt has been made to study the impact of institutional credit on agricultural production.

Keywords: *Institutional Agricultural Credit, Agricultural Production, Agricultural Growth, Short Term Credit and Medium Credit*

Introduction

Credit has been recognized as a life blood of all economic activities. Like all other producers, agriculturists also need credit. One of the most important lessons of universal agrarian history is that the agriculturalist must borrow due to the fact that his capital is locked up in his land livestock and machinery etc. For stimulating the tempo of agricultural production, it is necessary that the farmer must be provided with adequate and timely credit.

A United Nations publication has stressed the need for credit for farmers and it observed, "Most of the world's farmers have to borrow at some time, many of them heavily. To raise agricultural production, they will have to borrow still more. And more is almost always needed where there is redistribution of right in land. It is thus in the interest of agriculture and essential to agriculture and general progress, that credit be available to farmers in adequate amount and appropriate costs"[1] Prof. John D. Black has very rightly stated, "If we are all concerned about the increasing total agricultural output in the shorter time, we must provide credit first and foremost. This will enable them to buy more labour- saving equipment, more seeds and fertilizers"[2]

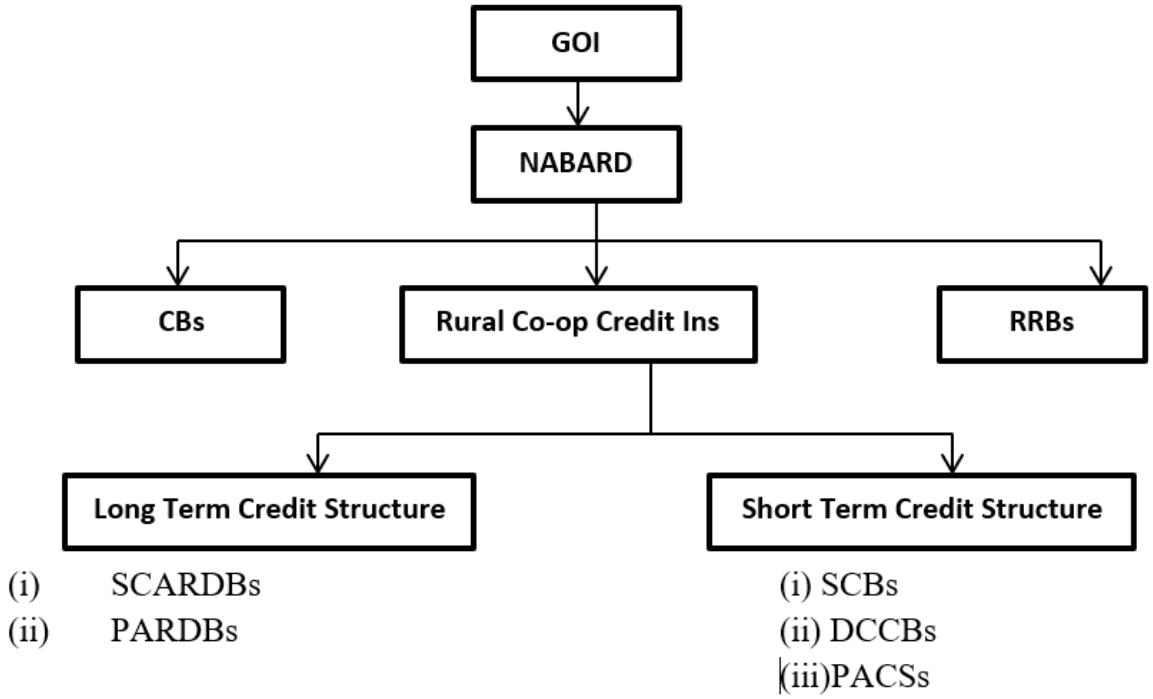
Institutional credit to agricultural sector plays a crucial role in supporting agricultural production. Agricultural credit allows the farmers to purchase the necessary farm inputs and to meet their daily agricultural expenses (fertilizers, wages, rental charges etc.) and also helps in adopting new farm technology. In this paper an attempt has been made to study the impact of institutional credit on agricultural production.

Experience of developed countries and view point of eminent economist, agriculture, being a mainstay in developing countries, credit through institutional channel played a vital role in agricultural growth. So the structure of institutions which provide the credit should be sound in this manner. The

[1] Rural Progress through Co-operatives, United Nations, 1954, p. 6 Cited from "Fundamentals of Agricultural Economics" Sadhu, A. N. & Amarjit Singh (2004). pp 475-476.
[2] Contemporary Reading in Agricultural Economics, 1955, p. 322 Cited from "Fundamentals of Agricultural Economics" Sadhu, A. N. & Amarjit Singh (2004). pp 475.

institutional source of credit incorporates Co-operatives, CBs, RRBs, LDBs and GOI etc. The structure of institutional agricultural credit system in India is given below in a flow chart:

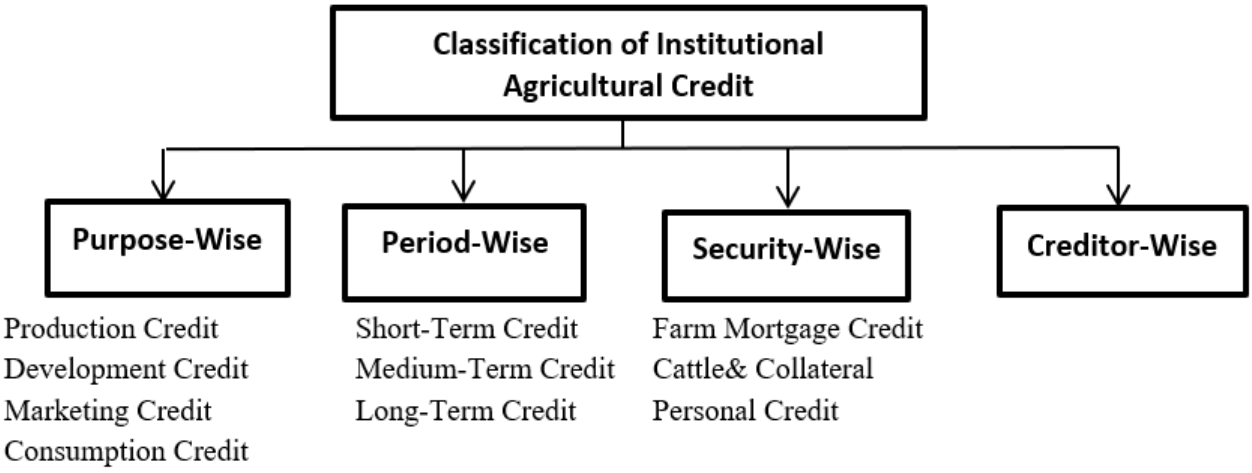
Fig 1.1 Structure of Institutional Agricultural Credit in India



(Source: RBI- www.rbi.org.in)

The role of institutional agencies in financing agriculture is very important and significant. In India agricultural credit disbursed through a multi-agency network as clear from the above figure. Government of India financed to NABARD and it finance or refinanced to these institutions. Further, all these institutions finance directly or indirectly to the farm community for a period of short, medium and long term according to their requirements or nature of lending. Classification of institutional credit to agricultural sector is given below in a flow chart.

Fig 1.2 Classification of Institutional Agricultural Credit in India



Review of Literature

This section deals with the review of literature of related studies. Iqbal, M; M. Ahmad; and K. Abbas (2003) investigated the impact of institutional credit on agricultural production in **Pakistan**. The study

estimated Cobb-Douglas production function relating agricultural output with institutional credit and other independent variables including were land and water. The study found positive and significant relationship between institutional credit and agricultural production (GDP) and also with other important determinants of agricultural production i.e. availability of irrigation water, agricultural labour and cropping intensity. The study suggested that the commercial banks and other financial institutions be encouraged to expand agricultural credit and extend the net of institutional credit to a larger proportion of farming community, especially, small farmers.

Wickramanayake, J. (2004) analyzed the supportive role of Institutional financing to the informal sector (rural) of **Shri Lanka**. The study empirically analyzed rural credit scheme for paddy production by using regression analysis on time series data for the time period 1980-2001. The study found that the level of credit extended to rural sector was positively related to number of rural banks branches and suggested that formal institutions arrangements should be continually reinforced to improve the economic condition in informal sector of Shri Lanka.

Sidhu, R. S.; Kamal Vatta; and Arjinder kaur (2008) tested the demand-supply situation under different scenarios and change therein over a decade period. A simultaneous (four) equation model had been used to estimate the contribution of institutional credit towards use of production inputs, private investments and agricultural growth. It was found that supply of production credit doubled in **Punjab** and it took more than 15 years to double from 1984-85 to 2000-01.

Izhar, A. and Massod Tariq (2009) attempted to assess the impact of institutional credit on agricultural production by estimating Cobb-Douglas production function for the pre-reform (1972-91) and the post reform (1992-05) period in **India** by using time series data. The study also analyzed the trends and pattern of institutional credit for the same period. It is found that institutional credit has a significant impact on aggregate agricultural production in India during the overall period from 1972 to 2005. Also the credit per cultivated area increased tremendously over the period since the total cultivated area remains more or less same over the period. The study concluded that during the post reform period the sectoral share of agriculture sector declined and also the growth rate of agricultural credit deteriorated. During the post reform period institutional credit is not a significant determinant of agricultural production in India.

Murthy, C. Mahadev; B. H. Suresh; and K. P. Veena (2009) assessed the role of multiagency system to agricultural activities. The growth of institutional finance to agriculture and allied activities were analyzed for the period 1969-70 to 2005-06. The paper concluded that institutional credit played a vital role in supporting agricultural production in **India** and the amount of institutional credit for agriculture and allied activities increased over the years.

Das, Abhiman; Manjusha Senapati; and Joice John (2009) examined the role of direct and indirect agricultural credit in the agriculture production in **India**. Panel data of agricultural production and credit disbursement analyzed by using Arellano- Bond Regression and analysis suggested that the direct agriculture credit amount has a positive and statistically significant impact on agriculture output and its effect is immediate.

Sial, M. H.; Masood Sarwar Awan and; Muhammad Waqas (2011) analyzed the role of institutional credit in agricultural production using the time series data for the period 1972-2008. Cob-Douglas production function is estimated using OLS and the variables are transformed to per cultivated hectare. Results shown that agricultural credit, availability of water, cropping intensity and agricultural labour force are positively significant in relation to agricultural production.

Ammani, A. A. (2012) investigated the relationship between agricultural production and formal credit supply in **Nigeria**. The methodology employed in the study involved the development and estimation of three simple regression models relating agricultural output with formal credit while holding other explanatory variables constant. The study found that formal credit is positively and significantly related to the productivity of crop, livestock and fishing sector of the Nigerian agriculture. The study suggested that government should continue to encourage the expansion of formal credit sources to reach as much farmers as possible.

Chisasa, J. and Daniel Makina (2013) empirically examined the impact of bank credit on agricultural output in **South Africa** using the Cobb-Douglas production function on time series data of agricultural output, bank credit, capital accumulation, labour and rainfall from 1970-2009. They observed that bank credit has a positive and significant impact on agricultural output, when other factors of production kept constant. The results revealed that a 1% increase in credit results 0.6% in agricultural output.

Naidu, V. B.; A. Shiva Shankar and P. Surya (2013) attempted to study the impact of agricultural credit on agricultural production and productivity in **India** during 1985-86 to 2011-12. It is found that agricultural credit is one of the main factor for the production and productivity of agricultural commodities but not only the one factor, there are some other factor like rainfall, irrigation facility, quality of seeds, minimum support price and environmental conditions etc. The study suggested that in spite of all these, timely availability of credit is most essential for the small and the marginal farmers for their agricultural activity.

Sharmeem, K. and Samia Taranum Chowdhury (2013) reviewed the agricultural growth and productivity of Bangladesh in terms of credit provided by Government of Bangladesh. It was found that a positive correlation exists between available agri-credit and greater production yield and the credit enables the farm community to more use of machineries, seeds & fertilizers and cultivation equipment etc. in an optimistic manner.

As, it is clear from the above reviewed studies that institutional credit is a positive and one of the significant factors for agricultural production. So in this regard the main objective of this paper is to study the impact of institutional credit on agricultural production at a district and a block level namely, Muzaffarnagar and Baghra.

Data and Methodology

Designing an appropriate methodology with proper analytical tools is important for a meaningful analysis in any research undertaking. This section details the methodological aspects of this paper which includes source of data and area of the study, period of the study, and statistical framework for analysis of the data. The study depends on secondary data. Secondary sources of data relating to agricultural production, pattern of land use, irrigation, use of fertilizers has been collected from various published sources such as Directorate of Economics and Statistics, Lead Bank Office, Statistical Diary of Uttar Pradesh and Muzaffarnagar, Block Development Office, books and journals etc. The study used the data for the period from 1991-92 to 2013-13. Only CBs, DCBs and PACSs have been considered for the institutional credit flow to agriculture at district level and at the block level only PACSs has been considered due to the unavailability of data of other banking institutions. District Muzaffarnagar and Baghra block has been purposively selected for the study. It is in the Western part of Uttar Pradesh. The district forms a portion of Saharanpur division and situated in the fertile Doab region of Yamuna and the Ganges rivers. Its net sown and irrigated area is 326897 and 323654 hectare according to the census 2011. Agriculture is the main occupation of the economy of Muzaffarnagar. Near about 80% of the population depends upon agriculture and farming as its main occupation. As well as it is an industrially developed area also. The district has large number of industries (both small and large scale) based on agriculture. On the other hand, the banking structure (CBs-183, RRBs-34,

Cooperative Banks-44, Land Development Banks-7, PACS-98) of the district is also good. The co-operative movement in Muzaffarnagar is one of the best movements in Uttar Pradesh. All above mentioned is the rationale for the selection of this district. The data has been analyzed with the help of SPSS-20.

For this multiple regression analysis is used. Regression equation is estimated by using Ordinary Least Square (OLS) method. The dependent variable is agricultural production and independent variables are institutional credit (Rs.), net irrigated area (ha.), distribution of fertilizers (quintal) and total cultivated area (ha.). These variables have been selected on the bases of economic theory and prior studies. All variables have been transformed into per cultivated hectare to overcome the problem of multicollinearity following the earlier studies of Quershi and Shah (1992), Iqubal et al. (2003), Ahamad Izhar and Tariq (2009) and Sail, Maqbool et al. (2011) who transformed all variables to per cultivated hectare to control the problem of multicollinearity in their studies. Impact of institutional credit has been studied first at district level then at the block level. The models used in the study are:

$$\mathbf{APPCH = \beta_0 + \beta_1\ ICPCH + \beta_2\ NIRRIPCH + \beta_3\ DFERTIPCH} \quad (1)$$

$$\mathbf{LAPPCH = \beta_0 + \beta_1\ LICPCH + \beta_2\ LNIRRIPCH + \beta_3\ LDFERTIPCH} \quad (2)$$

Where,
AP=Agricultural production
IC=Institutional credit
NIRRI=Net irrigated area
DFERTI=Distribution of fertilizers
PCH= Per Cultivated Hectare
L=Log

Results and Discussion

Institutional credit is taken as only medium and short term direct credit advanced per hectare during the study period by three main institutional sources which are primary agriculture co-operative societies (PACSs), district co-operative banks (BCBs) and commercial banks (CBs) at district level but at the block level only PACSs is taken due to the unavailability of data. Distribution of fertilizers is measured as the yearly total amount of nitrogen, phosphorous and potassium used per hectare in a year. Irrigation is measured as net irrigated area per hectare. So the agricultural production is measured in the form of intensive use of credit, irrigation and fertilizers in Muzaffarnagar district and Baghra block. The multiple regression method has been applied here to get the results by using Statistical Package for Social Sciences (SPSS20). The estimates of multiple linear regression models have been presented below in the table 1.1.

Table 1.1 Estimates of regression model at District Level

Dependent Variable- AGP (Agricultural Production)						
Models	**I Data/Ha Cultivated**			**II Data/Ha with Log**		
Time period	**1991-92 to 2012-13**			**1991-92 to 2012-13**		
Explanatory Variables	**Coefficients (B)**	**t-values**	**P-values**	**Coefficients (B)**	**t-values**	**p-values**
Constant	178.521	0.684	0.503	2.653	52.506	0.000
IC	0.716	3.392	**0.003**	0.547	3.814	**0.001**
NIRRI	207.261	0.729	0.475	0.15	0.026	0.980
DFERTI	215.683	1.708	0.105	0.104	1.335	0.198

N	**22**	**22**
R-squared	**0.640**	**0.658**
Adjusted R-squared	**0.580**	**0.601**
F- value	**10.666, sig= 0.000**	**11.552, sig= 0.000**
Durbin-Watson	**1.689**	**1.700**

Note: sig= 0.05 level

Table 1.1 shows the summary and overall fit statistics of multiple linear regression models (I& II). The variables included in the first model are able to explain 64 percent (R^2 =0.640, adjusted R^2 =0.580) variation in agricultural production over the period from 1991-92 to 2012-13 but only one variable, institutional credit turned out to be significant (p=0.003) out of all included variables. The coefficient of the variable IC is 0.716 which infers that for a percent change in institutional credit, agricultural production increases by 0.716 percent to per hectare. In this model the F-test, including all three predictors is found highly significant [F (3, 5) =10.666, p< 0.05 (0.000)] which means the model is a good fit. The Durbin-Watson (d) =1.689, which lies between the two critical values of 1.5 <d < 2.5 so the first order linear auto correlation does not exists in this multiple liner regression model.

The variables included in the second model are able to explain about 65 percent variation in agricultural production (R^2 = 0.658, adjusted R^2= 0.601) but only one variable, institutional credit turned out to be significant (p=0.001) out of all included variables. The coefficient of the variable IC is 0.547 which implies that for a percent change in institutional credit, agricultural production increases by 0.54 percent to per hectare. In this model the F-test, including all three predictors is found highly significant [F (3, 5) =11.552, p< 0.05 (0.000)] which means the model is a good fit. The Durbin-Watson (d) =1.700, which lies between the two critical values of 1.5 <d < 2.5 so the first order linear auto correlation does not exists in the multiple liner regression model.

The estimates of multiple linear regression models at the block level have been presented below in the table 1.2.

Table 1.2 Estimates of regression model at Block Level

Dependent Variable- AGP (Agricultural Production)						
Models	**I Data/Ha Cultivated**			**II Data/Ha with Log**		
Time period	**1991-92 to 2012-13**			**1991-92 to 2012-13**		
Explanatory Variables	**Coefficients (B)**	**t-values**	**P-values**	**Coefficients (B)**	**t-values**	**p-values**
Constant	459.849	2.989	0.008	2.736	88.808	0.000
IC	12.481	5.560	**0.000**	0.92	5.296	**0.000**
NIRRI	-48.748	-0.303	0.765	-0.052	-0.179	0.860
DFERTI	257.580	3.044	**0.007**	0.087	1.540	0.141
N	**22**			**22**		

R-squared	**0.752**	**0.726**
Adjusted R-squared	**0.711**	**0.680**
F- value	**18.186, sig= 0.000**	**15.907, sig= 0.000**
Durbin-Watson	**1.495**	**1.589**

Note: sig= 0.05 level

Table 1.2 shows the summary and overall fit statistics of multiple linear regression models (I & II). The variables included in the model are able to explain about 75 percent variation in agricultural production (R^2 =0.752, adjusted R^2 =0.711) but two variables, institutional credit (0.000**)** and distribution of fertilizers (0.007) turned out to be significant out of all included variables. The IC's coefficient is 12.481 which imply that for a percent change in institutional credit, agricultural production increases by 12.481 percent to per hectare. The coefficient of the variables DEFERTI is 257.580 which imply that for a percent change in distribution of fertilizers, agricultural production increases by 257.580 percent to per hectare. In this model the F-test, including all three predictors is found highly significant [F (3, 5) =18.186, p< 0.05 (0.000)] which means the model is a good fit. The Durbin-Watson (d) vale is around 1.5, which lies between the two critical values of 1.5 <d < 2.5 so the first order linear auto correlation does not exists in the multiple liner regression model.

The variables included in the second model are able to explain about 72 percent variation in agricultural production (R^2 =0.726, adjusted R^2 =0.680) but only one variable, institutional credit turned out to be significant (0.000**)** out of all included variables. The coefficient of the IC is 0.92 which implies that for a percent change in institutional credit, agricultural production increases by 0.92 percent to per hectare. In this model the F-test, including all three predictors is found highly significant [F (3, 5) =15.907, p< 0.05 (0.000)] which means the model is a good fit. The Durbin-Watson (d) =1.589, which lies between the two critical values of 1.5 <d < 2.5 so the first order linear auto correlation does not exists in the multiple liner regression model.

So the district and block level results are in conformity as institutional credit is found to be significant at the both levels. The regression models are found to be highly significant which means models are a good fit. There is a positive impact of institutional credit on agricultural production at the both levels (district and block) but remaining regressors are insignificant. The variables included in the regression model are able to explain about 65 percent variation in agricultural production at the district (Muzaffarnagar) level and about 75 percent at the block level (Baghra). The district and block level results are in conformity as institutional credit is found to be significant at the both levels.

Conclusion

Institutional credit to agricultural sector plays a crucial role in supporting agricultural production. Agricultural credit allows the farmers to purchase the necessary farm inputs and to meet their daily agricultural expenses (fertilizers, wages, rental charges etc.) and also helps in adopting new farm technology. In this paper an attempt has been made to study the impact of institutional credit on agricultural production. The results revealed that there is a positive impact of institutional credit on agricultural production at the both levels namely Muzaffarnagar and Baghra (district and block). As institutional credit flow increased to agricultural sector, agricultural production increased faster.

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