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The Role of Institutional Credit in the Agricultural Development of Pakistan*

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INTRODUCTION

There has been a consensus among Pakistani policy-makers since the early 1970s that the shift from a resource-based to a science-based agriculture can be facilitated through the availability of agricultural credit. The official statistics on the disbursement of agricultural credit bear testimony to this behalf. A perusal of Table 1 shows clearly that while other inputs such as fertilizer offtake, the availability of improved seed, water and tractors grew at rates ranging from 3 percent to 15 percent per annum over the period from 1971-72 to 1986-87, the disbursement of institutional credit to the rural sector of Pakistan grew at an impressive 28 percent. It is interesting to note that while agricultural production, measured as an index with base year 1960, grew at only 3 percent, the ratio of institutional credit to agricultural GNP grew from 0.7 percent in 1971-72 to over 12 percent in 1986-87.

Two studies have recently appeared in *The Pakistan Development Review* that highlight important yet diverse aspects of the role of institutional credit in the agriculture development of Pakistan. The first study [Zuberi (1989)] stated that "the strategy for agricultural development in the country has been based on greater utilization of 'high pay-off' low-cost technology. The government advanced loans through financial institutions to make it possible for the farmers to acquire this technology". This study, however, using a Cobb-Douglas type production function and time-series data found that specifications which included institutional credit as an independent variable offered meaningless results. Based on the fact that 70 percent of total institutional credit disbursed was for the purchase of seed and fertilizer, the author chose expenditure on these categories as a proxy not only for credit but also for capital and using this and labour obtained significant estimates. He concluded that 97.5 percent changes in output

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Table 1

Growth Rates of Agricultural Credit and other Agricultural Inputs, 1971-87

Year	Total Institutional Agricultural Credit (Rs Million)	Fertilizer Offtake ('000' N/t.)	Improved Seed ('000't.)	Water Availability MAF	Tractor Numbers	Index Agricultural Production (1960-100)	Agricultural GNP (Rs Billion)	Credit as Percent of Agricultural (Percent)
1971-72	121	379	23	71	31,109	183	17.9	0.7
1972-73	300	436	18	81	35,333	188	21.9	1.4
1973-74	865	403	28	80	37,180	196	28.1	3.1
1974-75	1,003	426	26	77	42,396	187	33.5	3.0
1975-76	1,446	551	43	86	49,586	199	38.3	3.8
1976-77	1,709	632	94	85	60,395	203	44.0	3.9
1977-78	1,824	714	48	89	75,949	209	50.6	3.6
1978-79	2,224	880	49	87	87,851	219	54.1	4.1
1979-80	3,016	1,044	61	91	103,029	239	62.2	4.9
1980-81	4,028	1,080	73	38	122,342	249	71.7	5.6
1981-82	5,102	1,080	79	96	138,479	258	83.4	6.1
1982-83	5,871	1,244	70	101	157,772	270	90.7	6.5
1983-84	8,680	1,202	76	104	180,685	237	92.2	9.4
1984-85	10,375	1,253	86	103	204,846	275	108.7	9.5
1985-86	13,156	1,512	75	105	236,092	298	119.2	11.0
1986-87	15,810	1,582	90	110	260,907	318	127.5	12.4
Growth Rate (Percent)	27.5	10.2	9.6	2.6	15.0	3.2	12.1	

Sources: Scott and Redding (1988) base on Pakistan Economic Survey, 1986-87; Federal Directorate of Fertilizer Imports; Agricultural Statistics of Pakistan, 1987-88.

Note: Agricultural GNP shown at current factor costs. All growth rates calculated using a semi-log regression model.

could be explained by changes in the amount of fertilizer and seed expenditure and the number of labour force employed in farming, assuming all other inputs remain constant.

The second study by Malik *et al.* (1989) using crosstabs from a set of national surveys highlighted the serious and growing problem of access to institutional credit especially by the small and tenant farmers.

The present study brings into focus the growth of institutional credit in Pakistan. Using household level data from the Rural Credit Survey of Pakistan 1985, this study provides more rigorous evidence on the role of institutional credit in agricultural production and on the determinants of access to institutional credit.

In the larger study on which the present one is based, a more formal two-stage structure is estimated in which the probability of access to institutional credit is predicted at the first stage and this predicated value is used in the second stage to predict fertilizer use per acre. The sample selectivity bias is offset in this procedure through the use of the Mill's inverse ratio [Heckman (1979)]. In the current paper Ordinary Least Squares estimates are presented of the determinants of total output highlighting thus the relative importance of institutional credit in agricultural output. Maximum Likelihood Estimates of a Probit Model for determining access to institutional credit are also presented.

THE DATA

This analysis is based on the 1985 Rural Credit Survey which was conducted by the Agricultural Census Organization in September-October of 1985. Details of the sampling methodology are available in Government of Pakistan (1985). A total of 54,987 households were interviewed all over the country.

The Census Organization listed six major limitations of its 1985 credit data set:

(1) Respondents' reservations to government officials' queries about the quantum of loan, its utilization and repayment;
(2) Ecletic sampling forced by limited option in organizational cooperation and staff availability for listing of households;
(3) Relatively limited number of households selected for enumeration. Though nearly 55,000 households were interviewed they belonged to only 1500 *mauzas* [basic administrative unit at the village level];
(4) Quality of data on annual household expenditure and investment is likely to be poor;
(5) Household approach used in this survey may differ from individual approach used by banks and other loan giving agencies; and
(6) The survey was conducted in the wake of the general elections. The effects of increased expectations following the elections cannot be ruled out.

These limitations should be borne in mind when interpreting any results based on this data set.

For the purposes of the present study, the country was divided into eight agro-climatic zones and one tehsil representing each zone was chosen randomly from the data set. The names of the chosen tehsils and the agro-climatic zones

they represent are given below:

Zone	Tehsil Name
Other N.W.F.P. except D.I Khan	Dir
Barani Punjab	Attock
Rice/Wheat Punjab	Gujranwala
Mixed Punjab	Faisalabad
Low-intensity Punjab	Mianwali
Cotton/Wheat Punjab	Rahim Yar Khan
Rice/Other Sindh	Badin
Cotton/Wheat	Nawabshah

A total of 2026 farming households from these tehsils formed the basis of the current analysis. Households that did not draw some or all of their income from farming were excluded from the present analysis. Details of the sampling frame and the original questionnaire are available with the author.

THE RESULTS

To assess the relative importance of the determinants of agricultural output results from two sets of estimations are presented in Table 2.

Here the logarithm of total value of output is explained through a set of agro-climatic zone dummies, dependency ratio, dummies for education, size, tenurial status, electrification, mechanization and either the logarithm of expenditure on fertilizer/seed etc. inputs or the logarithm of amount of institutional credit obtained. The explanation of the variables is as below:

Barani	=	1 if zone is *Barani* Punjab, otherwise zero;
Rice-Wheat	=	1 if zone is Rice-Wheat Punjab, otherwise zero;
Mix	=	1 if zone is Mixed Punjab, otherwise zero;
Low-intensity	=	1 if zone is Low-intensity Punjab, otherwise zero;
Cotton-Wheat	=	1 if zone is Cotton-Wheat Punjab, otherwise zero;
Rice-Sindh	=	1 if zone is Rice-other Sindh, otherwise zero;
Cotton-Sindh	=	1 if Cotton-Wheat Sindh, otherwise zero;
Dependency	=	Hhold size divided by number of adult males in the Hhold;

Table 2

Determinants of Agricultural Output

Independent Variables	Dependent Variable Log of Value of Output	
	Estimates	Estimates
Barani	0.12	1.31
	(0.215)	(0.823)
Rice-wheat	0.75***	2.44***
	(0.115)	(0.758)
Mix	1.06***	2.77***
	(0.134)	(0.754)
Low-intensity	0.16	1.22
	(0.130)	(0.791)
Cotton-Wheat	0.81***	2.52***
	(0.125)	(0.761)
Rice-Sindh	2.65***	3.74***
	(0.143)	(0.748)
Cotton-Sindh	1.25***	2.50***
	(0.370)	(0.823)
Dependency	0.37*	0.69*
	(0.210)	(0.425)
Education	0.09	0.13
	(0.076)	(0.113)
Size	0.78***	1.29***
	(0.083)	(0.128)
Tena	−0.03	−0.27
	(0.096)	((0.242)
Elect	0.09	0.035
	(0.076)	(0.127)
Mech	0.50***	0.27*
	(0.094)	(0.144)
Constant	5.49***	5.27***
	(0.230)	(0.952)
Log Fertilizer/Seed (etc.) Expenditure	0.35***	–
	(0.033)	
Log Institutional Credit Obtained	–	0.15***
		(0.051)
Number of Observations (Total)	2026	2026
R^2 Adjusted	0.73	0.67
F-statistics	127.31***	31.54***

Note: *** Implies significant at 99 percent level.
** Implies significant at 95 percent level.
* Implies significant at 90 percent level.
Figures in parenthesis are estimated standard errors.

Education	=	1 if Education level of any male member > matric, otherwise zero;
Size	=	1 if operational holding greater than 12.5 acres, otherwise zero;
Tena	=	1 if tenant, otherwise zero;
Irrig	=	1 if irrigated, otherwise zero;
Elect	=	1 if electrified, otherwise zero; and
Mech	=	1 if own Tractor, otherwise zero.

A perusal of Table 2 shows that the specification with the log of institutional credit as an explanatory variable explains 67 percent of the variation in the logarithm of the total value of agricultural output. Institutional credit is positive and highly significant. So are a number of regional dummies, size, mechanization status and dependency ratio. What is interesting and surprising is that electrification status is not significantly different from zero and neither is tenurial status. When we use the logarithm of fertilizer/seed etc. expenditure instead of institutional credit, the adjusted R^2 increases to 0.73. Fertilizer seed expenditure is a highly significant determinant of total output. All the same variables as in the previous case are significant in this estimation also.

We did not use a number of other variables that might impact on total output because our interest was in highlighting the role of institutional credit in total output controlling for regional variation and other obvious social, economic and infrastracture effects. The highly significant constant term possibly masks the effect of these omitted variables.

For the purest we present in Appendix Table 1 results from the regression where log of fertilizer/seed etc. expenditure is explained amongst other things by the amount of institutional credit obtained. This regression shows quite clearly that institutional credit obtained is an important determinant of fertilizer/seed etc. expenditure and hence the use of both in a single equation would create econometric problems of the type that affected Zuberi's (1989) results.

It is clear, whichever way you take it, based on the results in Table 2 and Appendix Table 1 that institutional credit use is a positive and significant determinant of production.

Having determined the importance of institutional credit in agricultural production, we now look at the determinants of access to institutional credit. The results of the Probit analysis are presented in Table 3. Here the dependent

Table 3

Determinants of Access to Institutional Credit Coefficient Estimate Results of Probit Analysis

Independent Variables	M.L.S. Estimates
Barani	0.21 (0.447)
Rice-wheat	−0.50 (0.552)
Mix	0.45* (0.219)
Low-intensity	0.15 (0.434)
Cotton-Wheat	−0.33 (0.612)
Rice-Sindh	−58.84 (144.673)
Cotton-Sindh	0.46 (0.665)
Dependency	−1.45** (0.371)
Education	0.94** (0.296)
Size	0.13** (0.073)
Tena	−6.74* (3.157)
Elect	0.26** (0.103)
Mech	0.74* (0.371)
Dislike	−13.36** (4.514)
Village Credit	0.01** (0.003)
Constant	−2.27** (0.460)
Likelihood Ratio Test	−53.4**
Chi-squared (15)	1310.5**
Number of Observations (Total)	2026
Number of Observations (Y = 1)	226

Note: ** Denotes significant at 99 percent level.
* Denotes significant at 95 percent level.

variable access is a dummy with value equal to 1 if the household obtained credit and zero otherwise. All the other explanatory variables with the exception of 2 are the same as those in Table 2. These variables are: dislike and village credit. Dislike is an attitude variable with value equal to 1 if the respondent was averse to *sood* (interest) or *qurz* (borrowing). The other variable, village credit, was specially constructed to offset the identification problem associated with the access equation. This variable is the mean level of institutional credit obtained in the village net of the respondent's institutional borrowing and in this way provides a proxy for a host of infrastructural and informational characteristics that are impossible to model otherwise.

The Chi-Square and likelihood ratio tests show that the estimated equation is highly significant. The probability of access to credit increases significantly with education, size, electrification, mechanization and the mean level of village credit. It declines with dependency, tenurial status and dislike. It is interesting to note that once these factors are controlled for, the regional differences become insignificant. This is an interesting finding because of its implications for overall rural development policy.

CONCLUSIONS

This study provides statistically significant evidence of the important role of institutional credit in the determination of agricultural output. The study also quantifies the important determinants of the probability of access to institutional credit. The study finds that education, size, electrification, mechanization and the mean level of village credit have a significant and positive impact on the probability of access to institutional credit. The study also finds that dependency, tenurial status and dislike (attitude) significantly reduce the probability of access. The policy implications of these results are obvious and are spelt out in detail in the larger study.

Appendix

Appendix Table 1

Determinants of Modern Input Use

Independent Variables	Dependent Variable Log of Fertilizer/ Seed (etc.) Expenditure O.L.S. Estimates
Barani	-0.18 (0.594)
Rice-wheat	0.87* (0.511)
Mix	1.08** (0.507)
Low-intensity	0.29 (0.602)
Cotton-Wheat	1.44*** (0.518)
Rice-Sindh	0.44 (0.527)
Cotton Sindh	(0.18) (0.668)
Dependency	0.27 (0.536)
Education	0.11 (0.144)
Size	0.95*** (0.156)
Tena	0.02 (0.302)
Elect	0.54*** (0.160)
Mech	0.09 (0.180)
Constant	5.47*** (0.779)
Log of Institutional Credit Obtained	0.16*** (0.061)
Number of Observations (Total)	2026
R^2 Adjusted	0.36
F-statistics	9.84***

Note: *** Implies significant at 99 percent level.
** Implies significant at 95 percent level.
* Implies significant at 90 percent level.
Figures in parenthesis are estimated standard errors.

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