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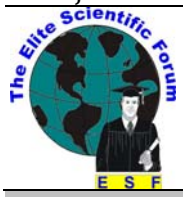

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RESEARCH ARTICLE

Institutional Credit and Agricultural Productivity: An Evidence from Pakistan

Muhammad Zahir Faridi, Muhammad Omer Chaudhry and Nabeel Tahir
School of Economics, Bahauddin Zakariya University, Multan, Pakistan

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***Corresponding Author:**
omer@bzu.edu.pk

ABSTRACT

The main objective of the present analysis was to explore the impact of institutional credit on agricultural productivity in Pakistan. The relationship between disbursement of institutional credit and agricultural productivity was estimated by employing Johansen co-integration technique for the period of 1975-2012. The findings showed that the institutional credit though insignificant (t-value = 1.16) but had positive impact on the agriculture productivity (i.e. about 5%). The modern and expensive agriculture inputs e.g. tube-wells had 0.20%, fertilizers had 0.48%, pesticides had 0.44% and seeds had 1.52% positive effect on agricultural productivity. Based upon this analysis, it might be suggested that disbursement of institutional credit should be promoted.

INTRODUCTION

Agriculture sector has remained principal source sector of the economy since 1947, as it contributed around 60 percent in Gross Domestic Products (GDP) of Pakistan. At that time agricultural output was key source of production for the whole economy. With the passage of time, agricultural sector's share fell noticeably due to technological inventions. In Pakistan's history, agricultural sector's share to GDP was 57 to 60 percent in 1949-1950 that dwindled to 29 to 31 percent in 1978-1979, whereas, it was recorded at 20.88% in year 2014. However, agriculture sector still inhabits a prime position in Pakistan's economy by engaging 44 percent labor force employment. So, the products of agricultural sector are contributing a great deal earning by exports of products and agro raw materials (Pakistan Economic Survey, 2014-15).

The growth of agricultural sector in Pakistan was lowered down as compared to other developed countries but with the help of technological progress, helping agricultural inputs, agricultural research and conservatory land infrastructure, its growth rate has been sustained. In turn, agricultural growth has contributed considerably to overall economic growth of 5.1 percent per year during same period (Ahmed and Gill, 2007). During 2012-2013, overall agriculture sector demonstrated a positive growth rate of 3.3 percent. In short, a positive growth rate of 3.2 percent for crop production, 3.7 percent for livestock, 0.1 percent for forestry and 0.7 percent for fisheries (Pakistan Economic Survey, 2013).

Overall, agriculture sector of Pakistan is confronted by different hurdles, challenges and distortions in different aspects. Top of them are unavailability of credit, water shortage, increasing prices of agricultural inputs, seed and fertilizers insufficiency, natural resource management issues, electricity shortage and fluctuating price of gasoline (Zaidi, 2015). In same edges, small and medium farmers are facing more troubles in adopting new technologies due to shortage of finance. Inadequate access to formal credit is the major bottleneck in development. To overcome these troubles by providing agricultural credit to small and medium farmers, is the reinforce effort towards maximum productivity and economic development.

In less developed countries different institutions prevail for credit disbursement to farmers. Some of these institutions are operating under private custody and some are operating under government financial sponsorship. They are named asinformal and formal sources. The informal sources comprised of family, friends, relatives, private money lenders, commission agents and local bodies. There are no government rules

and regulations for borrowing informal credit. The interest rate between lender and borrower is the only way of communicating for credit and a sole person is the owner of rules and regulations while, formal sources consist of a disciplinary procedural actions under the government regulation's umbrella such as Zarai Taraquiati Bank Limited (ZTBL), Commercial Banks, Punjab Provincial Cooperative Banks (PPCBL), Taccavi Loans, Domestic Private Banks, Micro Financial Institutions and some Non-Government Organizations (NGOs). In June 2004, Government of Pakistan used an impressive technique to boost up the agricultural productivity by introducing Kissan Package for remote and drought affected area's farmers. Government reduced the markup from 14 percent to 9 percent under Kissan package on agricultural credit. Government of Pakistan has laid great emphasis on agricultural credit availability with an enormous view to facilitate the farmers for purchasing inputs such as seed, pesticides, fertilizers, machinery and tube wells. Therefore, amount of credit disbursement has increased many folds in the recent years. Table 1 summarizes the total credit disbursement in Pakistan from formal sources.

Out of 293849.88 million rupees disbursed in 2011-12, 66067.92 million rupees were disbursed through ZTBL, 8520.00 million rupees through cooperative banks, 146271.12 million rupees through commercial banks and 60875.89 million rupees were disbursed through domestic banks. The basic purpose of credit disbursement to farmers was to capture the effects of advancement in technologies and to supplement their resources for purchase of inputs like pesticides, seeds and fertilizers as well as for purchasing of agricultural machinery etc

Moreover, the vitality of agriculture credit was observed in many past studies. Formal credit is the main source of raising agricultural output and productivity by using better farm practices, modern technology, better fertilizers, hybrid seeds, pesticides etc. (Sjah et al., 2003; Iqbal et al., 2003). Ahmad and Gill (2007) found that institutional credit disbursed by commercial banks had positive impact on agricultural economy of Pakistan. Different studies like Das et al. (2009) and Sial et al. (2012) investigated the impacts of direct and indirect credit disbursement on agriculture productivity and found that direct credit was more effective for increased agricultural output as compared to indirect credit. Riaz et al. (2012) stated that capital was essential for prosperous agriculture by adoption of new farm technologies improved seeds and fertilizers. Obilor (2013) also found the positive impacts of formal credit of commercial banks on agricultural development.

Though the impacts of credit disbursement on agriculture productivity is well researched area but still there are not many recent studies on said subject in Pakistan. As stated in table 1, the amount disbursed as credit in agriculture sector has increased many folds in recent past; therefore, this study is timely and important. Based on the above background and review of existing literature, the main objective of the present analysis is to explore the contribution of institutional credit to agricultural productivity in Pakistan.

MATERIALS AND METHODS

In order to examine the impact of formal credit on agricultural productivity, annual secondary data from 1975-2012 has been used. The data has been taken from Pakistan Economic Survey, Agricultural Statistic of Pakistan, Labour Force Survey, Federal Bureau of Statistics, National Fertilizer Development Center and Statistical Supplementary book of Pakistan. The variables used in this study are: Agricultural Output in million Rs (AGOP), Total Credit Disbursed by Formal Sources in million Rs. (CDBA), Agricultural Labour force in millions (AGLF), Pesticides Consumption in metric tons (PES), Fertilizers Take Off in metric tons (FTO), Improved Seed Distribution in metric tons (ISD), Production of Tractors in numbers (POT), Total Cropped Area in million hectors (TCA), Inflation Index as measured by GDP deflator (INFI), Water Availability (WAL) and Number of Tube-wells (NT).

Specification of model

In order to investigate the impact of direct credit on agricultural productivity, the following specified model was used:

$$LNAGOP = \alpha_0 + \alpha_1 LNCDBA + \alpha_2 LNAGLF + \alpha_3 LNTCA + \alpha_4 LNWAL + \alpha_5 INFI + \mu_t \quad (1)$$

Further, we also specified the model for explaining the impact of indirect credit disbursement on agricultural productivity as given by equation (2)

$$LNAGOP = \alpha_0 + \alpha_1 LNISD + \alpha_2 LNPES + \alpha_3 LNFTO + \alpha_4 LNNT + \alpha_5 LNPOT + \mu_t \quad (2)$$

The study was based on time series data, therefore, we applied time series econometric techniques. First of all we examined the stationarity of the variables used in the model by Augmented Dicky Fuller (ADF) test. On the basis of results from ADF test, Johansen Julies Co-integration technique was used for estimation. The results are interpreted in Table 2. The co-integration results based on the eigen values and likelihood ratio test first and second equations of the model are reported in table 3 and 4, respectively.

The above Augmented Dickey Fuller Test indicates that the series is found non stationary at level even 10% point of significance, but the same time series became stationary at 1st level of difference. So the null hypothesis of non stationary is rejected at 5% level of significance.

Table 1: Total Credit disbursement in Pakistan from formal sources

Years	1962-63	1972-73	1982-83	1992-93	2002-03	2011-12
Total credit (Millions Rs)	133.33	306.75	6075.14	15440.00	58915.27	293849.88

Source: Federal Bureau of Statistics.

Table 2: Results of ADF stationarity test for Unit Root

Variables	ADF Statistic test at Level		ADF Statistic test (1st Difference)		Order of Integration
	Without trend	With Trend & intercept	Without Trend	With Trend & intercept	
Agricultural Output	0.396	-2.324	-4.566	-4.570	I(1)
Total Credit Disbursed	-0.575	-1.855	-3.939	-3.903	I(1)
Agricultural Labor Force	-0.615	-2.368	-5.884	-6.033	I(1)
Pesticide Consumption	-1.391	-3.471	-4.307	-4.260	I(1)
Fertilizer Take-Off	-3.226	-2.867	-4.408	-5.643	I(1)
Number of Tube-wells	-0.582	-2.248	-3.259	-3.241	I(1)
Improved Seed Distribution	-0.831	-2.844	-8.950	-9.164	I(1)
Production of Tractors	-1.816	-2.622	-5.852	-5.770	I(1)
Water Availability	-2.231	-0.505	-5.297	-7.022	I(1)
Total Cropped Area	-2.364	-2.250	-4.553	-4.902	I(1)
Inflation	4.143	1.590	-4.270	-5.612	I(1)

Source: Authors' calculation.

Empirical results describe the co-integrating relationship between agricultural productivity and credit disbursement in long run as well as short run. For this purpose Johansen co-integration approach (1989) is considered as an appropriate approach because all variables are co-integrating of order one. In the same way vector auto regressive test which is based on Akaike information criterion (AIC) and Schwarz Bayesian criterion (SBC) with optimal 1 and 2 lag lengths is used for short run analysis. Similarly, Eigen values of Johansen stochastic matrix investigate the co-integration among variables. Empirical results of direct and indirect models are described as follows.

Table 3 communicates the results of co-integrating vectors. According to likelihood test, 2 co-integrating vectors are found at 5 percent level of significance. So the null hypothesis of no co-integration is rejected. The analysis brings to a decision that two co-integration vectors are found.

Likelihood test result shows that there found 1 co-integrating equation between credit disbursement and agricultural productivity at 5 percent level of significance.

RESULTS AND DISCUSSION

The results or findings of the study are discussed both in the long run as well as in short run. First of all, we discuss the impact of direct credit disbursement that is given in table 5 and 6 whereas the estimation of effects of indirect credit disbursement on agricultural productivity is presented in table 7 and 8.

Long run estimates of direct credit disbursement on agricultural productivity

The results of the long run analysis regarding coefficients of α matrices in the form of normalized co-integrating coefficients for equation (1) are described in Table 4.

It is observed that agricultural labor, cropped area and inflation are significant apart from credit disbursement and water availability. It is also examined that credit disbursement and water availability are less elastic as compared with the labor force participation and total cropped area. Furthermore, it is stated that an increase of 1 percent in credit disbursement lead to 0.050 percent increase in agricultural productivity. It would be expected that increase in credit disbursement would enhance the productivity and will place positive impact on economy. The results are according to Javed et al. (2012), Hussain (2012) and Obilor (2013). They found positive but insignificant relationship between agricultural credit and agricultural productivity. Similarly for, 1 percent increase in improved seed distribution, agricultural productivity increases about 1.53 percent and 1 percent increase in pesticides raises agricultural productivity by 0.43 percent.

Short Run Estimates of Direct Credit Disbursement on Agricultural Productivity

In short run analysis of first model, ECT-1 shows the negative sign that explain the convergence of short run time period into long run time period. Coefficient value of speed of adjustment describe that the adjustment of 0.019 percent will take place each next year towards long run equilibrium. Simply it can be said that in short run and long run, credit disbursement through formal sources have positive impact on agricultural productivity.

Table 6 describes that in the preceding year employed agricultural labour force, total cropped area and inflation have negative impact on agricultural productivity with reversible relationship. Table 5 on one side shows that employed labor force has strongly

Table 3: Co-integration Results of Direct Credit Disbursement

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.865018	165.8610	94.15	103.18	None**
0.751419	93.76689	68.52	76.07	At most 1**
0.472327	43.65541	47.21	54.46	At most 2
0.301105	20.64142	29.68	35.65	At most 3
0.187201	7.744240	15.41	20.04	At most 4
0.007816	0.282487	3.76	6.65	At most 5

Source: authors' calculation; *(**) denotes rejection of the hypothesis at 5% (1%) significance level; L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Table 4: Co-integration Results of Indirect Credit Disbursement

Eigen value	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0.619569	98.39922	94.15	103.18	None*
0.524563	63.60696	68.52	76.07	At most 1
0.416715	36.84022	47.21	54.46	At most 2
0.219277	17.43334	29.68	35.65	At most 3
0.160373	8.522075	15.41	20.04	At most 4
0.060048	2.229366	3.76	6.65	At most 5

Source: Authors' calculation; *(**) denotes rejection of the hypothesis at 5% (1%) significance level; L.R. test indicates 1 co-integrating equation(s) at 5% significance level

Table 5: Normalized Co-integrating Coefficients: 1 Co-integrating Equation(s)

Variables	Coefficients	Standard Errors	t-statistic
Total Credit Disbursed by Formal Sources	0.050	0.043	1.16
Agriculture Labor Force	1.095*	0.563	1.94
Total Cropped Area	6.611**	1.530	4.32
Water availability	0.251	0.906	0.26
Inflation	0.020**	0.002	10.0
C	15.399		

Source: Authors' calculations; *Significant at 5% level of significance, ** significant at 1% level of significance.

significant impact as compare to cropped area and inflation. On the other hand, credit disbursement and water availability show positive impact on agricultural productivity but in opposite direction that credit disbursement insignificantly and water availability significantly effect at 5 percent level of significant.

Long run estimates of in-direct credit disbursement on agricultural productivity

The results of the long run analysis regarding coefficients of α matrices in the form of normalized co-integrating coefficients for equation (2) are described in table 7.

It is observed that seeds, pesticides and tractors are significant except fertilizers and number of tube wells. It is examined that pesticides consumption, fertilizers take-off, number of tube wells and production of tractors are less elastic as compared to improved seed distribution. It is also instigating that except production of tractors all agricultural inputs that are purchased by indirect credit disbursement through formal sources have positive impact with accurate sign and has direct influence on agricultural productivity. The negative influence of tractors may be due to the reason that tractors are often used for off-farms activities e.g. road constructions, transportations, loading of mud, sand, iron and bricks etc due to relatively higher cash returns associated with these activities.

Short run estimates of in-direct credit disbursement on agricultural productivity

Short run analysis result for model 2 is depicted in table 8. In this indirect credit disbursement model, ECT-1 shows the negative sign that illustrate the convergence of short run into long run. The values of short run analysis are shown in the table 8.

Coefficient value of the speed of adjustment describes that 0.049 percentage conversion will take place each next year towards long run equilibrium. ECT-1 is negative as well as significant with 5 percent significant level. Short run analysis result describes that fertilizers and tube wells show negative relationship while, improved seed distribution, pesticides and production of tractors have positive relationship.

Conclusions and recommendations

Conclusively, in long run, agricultural employed labour force, total cropped area, water availability and inflation affects the agricultural productivity positively and significantly, whereas, credit disbursement and water availability are insignificant. Similarly, in long run analysis of indirect model, improved seed distribution, pesticides availability, fertilizers take-off and number of tube well effects positively while, production of tractors affects negatively.

From the present analysis, it has been found that credit disbursement through different formal sources has

Table 6: Error Correction estimates of direct credit disbursement model

Dependent Variable = DLNAGOP			
Variables	Coefficient	Standard Errors	t-statistics
Constant	0.095	0.031	2.98
D(LNAGOP(-1))	0.201	0.163	1.230
D(LNCDBA(-1))	0.020	0.06	0.328
D(LNAGLF(-1))	-0.316	0.112	-2.813
D(LNTCA(-1))	-0.2769	0.374	-0.739
D(LNWAL(-1))	0.530	0.304	1.744
D(INFI(-1))	-0.0005	0.002	-0.251
ECT(-1)	-0.019	0.042	-0.464
R-squared		0.329	
Adj.R-squared		0.161	
F-Statistic		1.962	
Akaike Information Criteria		-7.30	
Schwarz Criteria		-4.932	

Source: Authors' calculations

Table 7: Normalized co-integrating coefficients: 1 co-integrating equation

Variables	Coefficients	Standard Errors	t-statistic
Improved Seed Distribution	1.535**	0.404	3.79
Pesticide Consumption	0.436*	0.22	1.98
Fertilizer Take Off	0.481	0.328	1.46
Number of Tube-wells	0.206	0.461	0.44
Production of Tractors	-0.555**	0.206	-2.69

Source: Authors' calculations; *Significant at 5% level of significance, ** Significant at 1% level of significance.

Table 8: Error Correction estimates of indirect credit disbursement

Dependent Variable = DLNAGOP			
Variables	Coefficient	Standard errors	t-statistics
Constant	0.147	0.038	3.828
D(LNAGOP(-1))	0.222	0.173	1.283
D(LNAGOP(-2))	-0.195	0.165	-1.180
D(LNISD(-1))	0.029	0.047	0.611
D(LNISD(-2))	-0.079	0.048	-1.637
D(LNPES(-1))	0.044	0.032	1.242
D(LNPES(-2))	0.002	0.032	0.087
D(LNFTO(-1))	-0.054	0.118	-0.455
D(LNFTO(-2))	0.309	0.139	2.216
D(LNNT(-1))	-0.291	0.213	-1.364
D(LNNT(-2))	-0.514	0.202	-2.542
D(LNPOT(-1))	0.039	0.038	1.014
D(LNPOT(-2))	0.030	0.039	0.787
ECT(-1)	-0.049*	0.023	-2.066
R-squared		0.61	
Adj.R-squared		0.37	
F-Statistic		2.59	
Akaike Information Criteria		-8.1462	
Schwarz Criteria		-4.1467	

Source: Authors' calculations; *Significant at 5 percent level of significant.

positive but insignificant impact on agricultural productivity. It is found that impact of institutional credit show a discrepancy throughout all over the world. Every country has its own sphere of agriculture productivity. As is the case concerned with Pakistan, it has been found that formal credit disbursement through different sectors is the necessary element for meaningful agricultural productivity.

Based on the findings of this study, it can be recommended that a comprehensive and integrated system for credit disbursement should be adopted in order to increase the productivity in agriculture sector. In current scenario, conventional as well as Islamic banking systems can play a vital role in this regard. New and better varieties of seed are very crucial for good production and that has been observed in the results also. Therefore, the credit disbursement only for seeds should be encouraged. Microfinance and credit for machinery and other on-farm activities can also be encouraged.

Authors' contributions

The model was developed by MZF and MOC. The data collection and management was done by NT. The estimation and analysis was performed by MZF while the discussion and the write-up was done by MOC.

REFERENCES

Ahmed T and ZA Gill, 2007. Role of Agricultural Credits and Efficiency of Commercial Banks in Pakistan. International Journal of Agrriculture and Biology, 9: 921-924.

Das A, M Senapati and J John, 2009. Impact of agricultural credit on agriculture production: an empirical analysis in India. Reserve Bank of India Occasional Papers, 30: 75-107.

Pakistan Economic Survey, 2013. Ministry of Finance. Government of Pakistan, Islamabad, Pakistan.

Pakistan Economic Survey, 2014-15. Ministry of Finance. Government of Pakistan, Islamabad, Pakistan.

Hussain AH, 2012. Impact of credit disbursement, area under cultivation, fertilizer consumption and water availability on rice production in Pakistan (1988-2010). Sarhad Journal of Agriculture, 28: 95-101.

Iqbal M, M Ahmad, K Abbas, and K Mustafa, 2003. The Impact of Institutional Credit on Agricultural Production in Pakistan. The Pakistan Development Review, 42: 469-485.

Javed MI, W Khurshid, I Hassan, A Ali and N Nadeem, 2012. Impact of institutional credit and extension services on productive efficiency of farmers: Evidence from irrigated Punjab, Pakistan. Journal of Agricultural Research, 50: 145-153.

Obilor SI, 2013. The impact of commercial banks' credit to agriculture on agricultural development in Nigeria: An econometric analysis. International Journal of Business, Humanities and Technology, 3: 85-94.

Riaz A, GA Khan and M Ahmad, 2012.Utilization of agriculture credit by the farming community of ZaraiTariqiati Bank Limited (ZTBL) for agriculture development. Pakistan Journal of Agricultural Sciences, 49: 557-560.

Sial MH, MS Awan and M Waqas, 2011. Institutional credit and agricultural production nexus. International Journal of Business and Social Science, 2: 279-284.

Sjah T, D Cameron and I Russell, 2003. Factors contributing to the performance of agricultural credit in Lombok Indonesia, In: Proceedings of 14th International Farm Management Congress: Farming at the edge held on 10-15th August, 2003 at Perth, Australia.

Zaidi SA, 2015, Issues in Pakistan's Economy: A Political Economy Perspective 3rd Edition. Oxford University Press, Pakistan.