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# The Impact of Agricultural Credit on Agricultural Productivity in Dera Ismail Khan (District) Khyber Pakhtonkhawa Pakistan

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**Abstract**
Agriculture is not only the backbone of our food, livelihood and ecological security system, but is also the very soul of our sovereignty. In Pakistan population density is high and has been increasing day by day and agricultural land has been decreasing because of fragmenting or converting it into residential plots. To meet the domestic food requirements use of improved production technologies developed by research is must. In this behalf government of Pakistan has been extending loan to poor farmers for adoption of new farm technology, a capital intensive technology. Therefore objective of the paper was to see impact of credit on agricultural gross domestic product. Data regarding disbursement of credit from different formal sources for different purposes and agricultural gross domestic product of major crops in study area D.I.Khan from 1990 to 2008 was collected from statistical office for crop reporting services DIK. Data was analyzed using linear regression model on The Cobb-Douglass type. Credit disbursed for seed along with fertilizers and pesticides, irrigation and tractors were found strongly correlated to agricultural gross domestic product with values 0.87, 0.58 and 0.42 respectively. Above 80% impact was of credit on agricultural gross domestic product with F = 10.752 significant at 0%.Only credit for seeds, fertilizers etc had greater role in this collective impact. At the end it was concluded that availability of credit increased agricultural production

**Keywords:** Agricultural productivity, Agriculture credit, New farm technology

## Introduction

The economy of Pakistan is mostly agrarian in makeup. Regardless of prompt growth in other sectors, agriculture is still the major sector contributing 25 percent towards the Gross Domestic Production (GDP). About 70 percent of total population of the country lives in rural areas which are directly or indirectly allied with agriculture. According to estimates agriculture sector has occupied about 44 percent of total labor force and its direct and indirect contribution in annual exports of the country is around 70 percent (Government of Pakistan, 2002).

Agricultural output is low in developing countries especially in Pakistan due to small holdings, traditional methods of farming, poor irrigation facilities, low or misuse of modern farm technology etc (Zuberi, 1989).This results in small income and no saving or small saving. Therefore, it needs of time that credit agencies come up to help them in applying and undertaking the improved farm practices. Credit is an important instrument that enables farmers to acquire commands over the use of working capital, fixed capital and consumption goods (Siddiqi et al, 2004). Credit plays an important role in increasing agricultural productivity. Timely availability of credit enables farmers to purchase the required inputs and machinery for carrying out farm operations (Saboor et al, 2009).

After emergence of green revolution, there have been overtime changes in crop production technology, so credit requirements have increased for both inputs for crop production and farm investment.

**Literature review**

Modern agriculture is essential for economic development. Employing modern agriculture is possible when farmers are provided credit for purchasing modern inputs (Schultz, 1964; Zuberi, 1989). Many developed countries had recognized the benefits of using modern farm technology. But application of modern farm technology to increase agricultural output had increased financing needs of farmers (Mellor, 1966).Easy and cheap credit is the quickest way for boosting agricultural production (Abedullah, 2009). Credit is provided for relief of distress and for purchasing seed, fertilizer, cattle and implements (Yusuf, 1984). Use of modern technology increased demand for credit and resulted in increase in agricultural productivity of small farmers (Saboor et al, 2009) Access to credit promoted the adoption of yield-enhancing technologies. Governments used credit programs to promote agricultural output, (Adams and Vogel, 1990).

Dantwala (1989) estimated demand and supply of credit and its role in poverty alleviation in India. He emphasized on supply of credit and to increase technical assistance to farmers to increase agricultural productivity.

Developing countries improved their agricultural output by introducing modern agricultural technology such as chemical fertilizers, recommended seeds, tractors and modern irrigation facilities etc. But modern agricultural technology was capital intensive and hence increased demand for credit (Johnson and Cownie, 1969).

Nosiru (2010) proved in his research article on the topic "Micro credits and Agricultural Productivity in Ogun State, Nigeria" that micro credit enabled farmers to buy the inputs they needed to increase their agricultural productivity. However, the sum of credit obtained by the farmers in the study area did not contribute positively to level of output. This was as a result of non-judicious utilization, or distraction of credits obtained to other uses apart from the intended farm enterprises.

Siddiqi et al, (2004) reported that flow of credit to farmers had increased demand for inputs to increase crop production. The elasticity of amount of credit, No of tractors, irrigation, use of chemical fertilizer and pesticides etc with respect to dependent variable agricultural income on per cultivated as well as per cropped acre basis indicated that credit (production credit) and tube wells impacted positively and significantly at 95 percent confidence level. Number of tractors and use of fertilizers also contributed positively but insignificantly. It was because of inappropriate use of fertilizer and tractors.

The total amount of agricultural credit disbursed by various institutional sources in Pakistan during 1986-87, was Rs. 16.3 billion and was 13 percent of the GDP generated in agricultural sector. It reflected thirteen fold increase in 2001-02 over 1980-81. The ratio of institutional credit as a proportional of sectoral GNP of agriculture increased three fold from 4.0 percent in 1976-77 to about 13.0 percent in 1986-87(Government of Pakistan, 1988).

The impact of institutional credit, fertilizers, seeds, and irrigation on agricultural production was found positive and significant (Zuberi, 1983, 1990; Sohail et al, 1991 Iqbal *et al*., 2001, 2003;Waqar et al, 2008)..

Credit had been only a meek cause of agriculture sector growth in Nepal (Shrestha, 992). Credit as an independent variable showed insignificant impact on production but chemical fertilizers, high quality seeds, labor and tractors were found significant (Zuberi,1989;). Mean input expenditures per hectare was significantly higher for the farmers who participated in credit. Higher input expenditures were presumably associated with higher productivity growth (Saeed *et al*., 1996).

Chaudhry (1986) stated that combined effect of irregation,fertilizers,seeds and pesticides etc was positively on crop production. Strong correlation exists between the amounts of institutional credit and the real gross domestic product agriculture sector in a given time period (Carter 1988; Carter and Weibe 1990; Feder et al, 1990; Shrestha, 1992; Binswanger and Khandker 1995; Pitt and Khandker 1996). Positive relationships exist between institutional credit and productivity (Bernstein and Nadiri, 1993; Nickell and Nicholitsas, 1999; Schiantarelli and Sembenelli, 1999; Schiantarelli and Jaramillo, 1999; Schiantarelli and Srivastava,

1999). Inefficiently allocated capital by Malaysia's banking sector declined total factor productivity of the country (Ghani and suri, 1999).

Use of tractors had positive and significant impact on gross domestic product (Waqar et al, 2008). Khan (1985) reported that use of tractors had no positive impact on production.

Ahmad et al, (2006) analyzed the impact of advancing in-kind credit in the form of fertilizer and seed to smallholder farmers in the Ethiopian. They found that in kind input credit of fertilizer and seed increased crop output reasonably.

Zuberi (1989) found that 70 percent of total formal credit was used for the purchase of seed and fertilizer and concluded that most of the increases in agricultural output could be explained by changes in the quantity and quality of seed and fertilizer.

**Metholodgy**

Secondary data penetrating from 1990-2008 was collected from Statistical office for crops production D.I.Khan and was analyzed using Statistical Package for Social Scientists (SPSS).To assess contribution of institutional credit in agricultural output Linear Regression Model on The Cobb-Douglass type was used as applied by (Zuberi, 1983,1989,1990;Shrestha,1992**;** Iqbal et al,2001; Khushk et al,2009;Nosiru, 2010).

Traditionally agricultural production function represents connection between physical quantities of output and the inputs like land, labor, capital and quantities of other inputs (like water, seeds, fertilizer, pesticides etc.). However, as agriculture is a multi-product industry therefore, Agricultural Gross Domestic Product (AGDP) was used as the dependent variable and agricultural production was assumed to be the function of credit disbursed by different financial institutions for irrigation purpose, seeds, fertilizers, pesticides, implementation of tractors and other purposes as used by Sohail et al (1991) who stated that expenditure on seeds, fertilizers etc may explained by the amount of institutional credit obtained. Agricultural credit was also used directly as one of the explanatory variables based on the arguments of Carter (1989). He argued that credit affects the performance of agriculture in three ways: (i) it encourages efficient resource allocation by overcoming constraints to purchase inputs (ii) if the agricultural credit is used to buy modern farm technology it shift the entire input-output surface—in this regard it embodies technological change and a tendency to increase technical efficiency of the farmers; and (iii) credit can also increase the use intensity of fixed inputs like land, family labor, and management, persuaded by the 'nutrition-productivity link of credit'—that raises family consumption and productivity. Carter's reasoning implies that agricultural credit not only increases management efficiency but also affects the resource allocation and profitability.

Hence Linear Regression Model on The Cobb-Douglass type was expressed as follow

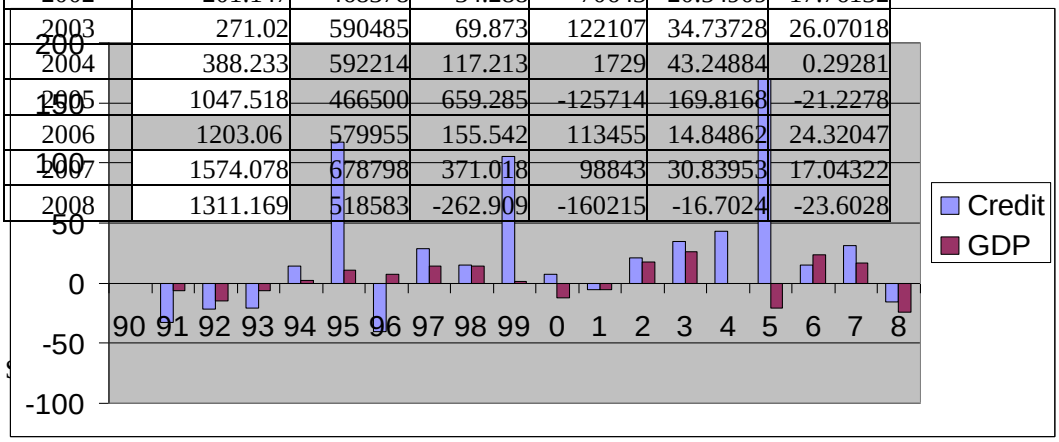
LnY (agricultural gross domestic product) = Lna (constant) + $bLnX_1$ (credit for seeds etc) +$bLnX_2$ (credit for tub wells) + $bLnX_3$ (credit for implementation of tractors) + $bLnX_4$ (credit for other agricultural purposes) + $bLnX_5$ (total credit disbursed) + Lnei (Error term)

**Analysis and interpretation**

Table1 Analysis of impact of formal Agricultural Loans disbursed on Agricultural gross domestic product

| year | Total credit Disbursed in Rs (million) | GDP (In tons) | Absolute increase/decrease wrt to Previous year | | | |
|---|---|---|---|---|---|---|
| | | | Credit | GDP | % | % |
| 1990 | 89.232 | 396037 | 0 | | 0 | 0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1991 | 59.687 | 372085 | -29.545 | -23952 | -33.1103 | -6.04792 |
| 1992 | 46.339 | 317417 | -13.348 | -54668 | -22.3633 | -14.6923 |
| 1993 | 36.506 | 297329 | -9.833 | -20088 | -21.2197 | -6.32858 |
| 1994 | 41.668 | 302873 | 5.162 | 5544 | 14.14014 | 1.864601 |
| 1995 | 90.464 | 335893 | 48.796 | 33020 | 117.1067 | 10.90226 |
| 1996 | 54.229 | 360654 | -36.235 | 24761 | -40.0546 | 7.371693 |
| 1997 | 70.096 | 412000 | 15.867 | 51346 | 29.25925 | 14.23691 |
| 1998 | 80.701 | 471672 | 10.605 | 59672 | 15.12925 | 14.4835 |
| 1999 | 165.363 | 475364 | 84.662 | 3692 | 104.9082 | 0.782747 |
| 2000 | 176.158 | 417826 | 10.795 | -57538 | 6.528063 | -12.104 |
| 2001 | 166.859 | 397735 | -9.299 | -20091 | -5.27878 | -4.80846 |
| 2002 | 201.147 | 468378 | 34.288 | 70643 | 20.54909 | 17.76132 |
| 2003 | 271.02 | 590485 | 69.873 | 122107 | 34.73728 | 26.07018 |
| 2004 | 388.233 | 592214 | 117.213 | 1729 | 43.24884 | 0.29281 |
| 2005 | 1047.518 | 466500 | 659.285 | -125714 | 169.8168 | -21.2278 |
| 2006 | 1203.06 | 579955 | 155.542 | 113455 | 14.84862 | 24.32047 |
| 2007 | 1574.078 | 678798 | 371.018 | 98843 | 30.83953 | 17.04322 |
| 2008 | 1311.169 | 518583 | -262.909 | -160215 | -16.7024 | -23.6028 |




It can be seen from the table1 that there was no regular trend in the change in gross domestic product through change in outflow of credit with respect to previous year. During 1994, 1995, 1997, 1998, 1999, 2002, 2003, 2006 and 2007 there was increase in out flow of credit and also gross domestic product with respect to previous years. During 1991, 1992, 1993, 2001and 2008 out flow of credit and gross domestic products decreased with respect to previous years. During 1997 amount of credit disbursed by financial institutions decreased but against this gross domestic product increased with respect to previous year 1996. During 2005 amount of credit disbursed by financial institutions increased while gross domestic product decreased with respect to previous year 2004.Ratio of increase in credit and GDP with respect to previous year was greater during 2002 against all other years during which credit and GDP increased with respect to previous years. During 2002 credit increased 20.55% and GDP increased 17.76% with respect to 2001. Ratio of decrease in credit and GDP with respect to previous year was greater during 1992 and 2008.During 1992 disbursement of credit decreased by 22.36% and GDP decreased by 14.69% with respect to 1991.During 2008 disbursement of credit decreased by 16.7% and GDP decreased by 23.6% with respect to 2007.During 2005 disbursement of credit increased by 169.82% and GDP decreased by 21.23% with respect to 2004. During 1996 disbursement of credit decreased by 40% and GDP increased by 7.37% with respect to1995.

Table2 Correlation between dependent variable domestic product and other independent variables

| Variables | Seeds/Fertilizers /Pesticides | Tube wells | Tractors | Others | Total Credit |
|---|---|---|---|---|---|
| Agricultural gross domestic product | .871* | .584* | .428 | .427 | .842* |

| | | | | | |
|---|---|---|---|---|---|
| Sig. (2-tailed) | .000 | .009 | .068 | .068 | .000 |

*. Correlation is significant at the 0.01 level (2-tailed).

Table3 Regression analysis of credit disbursed for the different independent variables on dependent variable agricultural gross domestic product

| Model | | R | R Square | Adjusted R Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Independent variables | .897 | .805 | .730 | 10.752 | .000 |
| | | Unstandardized Coefficients | | Standardized Coefficients | | |
| | | B | Std. Error | Beta | t | Sig. |
| | (Constant) | 11.037 | .672 | | 16.420 | .000 |
| | Seeds etc | .209 | .090 | 1.504 | 2.338 | .036 |
| | Tub wells | -.030 | .035 | -.199 | -.840 | .416 |
| | Tractors | .064 | .048 | .323 | 1.337 | .204 |
| | Total credit | -.146 | .130 | -.751 | -1.125 | .281 |
| | Others | .015 | .009 | .246 | 1.582 | .138 |

Estimation of the production function using original variables showed moderate to strong multicollinearity among the independent variables (table3). The large value of F-statistics shows that the explanatory variables included in the model collectively had significant impact on agricultural production. The high $R^2$ and Adjusted-$R^2$ values suggest that over 80 percent variations in the agricultural production were explained by the explanatory variables included in the model. The coefficient for credit flowed for seeds, Fertilizers and Pesticides was positive and significant at 5 percent level and suggests that credit flowed for seeds, Fertilizers and Pesticides affected agricultural production positively. One percent increase in the disbursement of institutional credit for seeds, fertilizers and pesticides increased agricultural GDP about 1.5 percent. Remaining explanatory variables i.e credit disbursed for tube wells, tractors and for other agricultural purposes had no significant impact on GDP. Major cause behind this was miss use and under use of these explanatory variables. The analysis revealed findings that rejected null hypothesis and confirmed that credit is very important for agricultural productivity.

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