

HOUSEHOLD INCOME, CONSUMPTION AND SAVING BEFORE AND AFTER CHASHMA RIGHT BANK CANAL (CRBC), DIKHAN.

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ABSTRACT

This paper examines the impact of irrigation on the income, consumption and saving behavior of the household in the command area before and after CRBC. In all the three stages 180 sample households are taken. To compare income, consumption and saving before and after CRBC, t-statistics and dummy variable approach is used. The analysis of the data states that there is a significant change in all the three variables in all the three stages of the CRBC.

INTRODUCTION

In an agrarian economy of Pakistan, irrigation is a good source of employment. Irrigation raises employment and income and thus adds to capital formation but at the same time changes the consumption and saving pattern of the people. Development of the irrigation project has a considerable impact on the social and economic life of the people living with in the command area. Huge investment in the irrigation projects creates new productive activities which in turn increases income. This increase in income changes the behavior of the consumer. This is reflected in the change in the consumption and saving behavior of the people. (Reddy 1995).

The Chashma Right Bank Irrigation Project (CRBIP) lies on the West bank or right side of the main Indus River. It takes its start from the Chashma Barrage in DIKhan district (Khyber Pakhtun Khaw (KPK province) and ends in the Punjab province in Taunsa. One of the objectives of the project was to accelerate growth by

increasing agricultural productivity in the command area, increasing employment, income, consumption and saving. DIKhan from the agriculture point of view is backward as compared to other districts of the province. Before the advent of CRBC water was not available except rain and flood irrigation (Rod Kohi). CRBC has not only provided water for irrigation but it is also a constant source of drinking water. Due to the project the agricultural productivity has increased many folds. Cropping pattern and cropping intensities has also changed. This has improved the standard of living of the people. (Sheladia Associates Inc; 2001).

OBJECTIVES

Following are the main objectives of the study

1. To compare the income level of the household before and after CRBC.
2. To compare the consumption level of the household before and after CRBC.

3. To compare the saving level of the household before and after CRBC.

HYPOTHESES

The study tests the following hypotheses

1. There is a significant difference between income level of the household before and after CRBC.
2. There is a significant difference between consumption level of the household before and after CRBC
3. There is a significant difference between saving level of the household before and after CRBC

LITERATURE REVIEW

Various studies have been conducted with in Pakistan and out side Pakistan, but few of them are taken for literature review in the study.

(World Bank 1994).Due to irrigation one percent increase in per capita agricultural growth increases 1.5 percent per capita non-agricultural growth. This increase in incomes in agriculture are spent on locally produced goods and services and help to increase rural employment, reduce poverty and serve as a pre condition in enhancing rural development. (World Bank 1994).

Gill and Mustafa (1997) has concluded that irrigation plays an important role in poverty reduction both directly and indirectly. Directly, it helps by increasing agricultural production and productivity. Indirectly, irrigation helps in increasing the employment of unemployed landless laborers and small and marginal farmers through its positive impact on cropping intensity and agricultural productivity; the increased employment, in turn increases

more income and this puts more purchasing power into the pockets of the poor.

Bhattarai et al. (2002). States that availability of irrigation has a positive impact on the agricultural productivity and this not only has a positive sign on income but also has a positive impact on the consumption and saving pattern of the people benefiting from that irrigation project.

Palmer, Richard Jones and Kunal Sen, (2003) extends earlier work by Datt and Ravallion, 1998.They are of the view that there is a strong correlation between irrigation, agricultural productivity and poverty reduction. Poverty can be reduced by increased agricultural productivity and this is possible only through sustained supply of water. Increased agricultural productivity will make certain the improvement in standard of living of the people through increase in income. It is confirmed by the relationship studied by others as Vaidyanathan (1992) and Datt and Ravallion (1998).

Huang.Q et al (2005) studied the case of China. The study showed that irrigation has a positive impact on agricultural productivity and per acre yield. Per acre yield has increased for all the crops in the study area. Due to increase in per acre yield, the income, consumption and saving of the farmers has also increased. This shows that irrigation has a strong positive correlation with crop revenue and income. This in turn has reduced poverty in China. Many studies with in the country and outside the world have concluded the fact that there is a positive correlation between

irrigation and income. This in turn increases consumption as well as saving in the area. It is not possible to include all studies on the given topic, few studies are important to be mentioned. These studies second the basic theme of the study that irrigation increases income, consumption and saving. Few of the researcher are mentioned as Ahluwalia (1978), Lockheed et al (1980), Krongkaew (1985) Jehangie et al (1998), Tilak (1993), Sivasubramaniyan (2000), Dollar and Kraay (2000) etc.

RESEARCH METHODOLOGY

CRBC is divided and completed in three stages as Stage I, II and III. First two stages are in Khyber Pakhtun Khaw (KPK) province while Stage III partially lies in KPK and partially in Punjab province. To study the impact of CRBC on the household income, consumption and saving a questionnaire was formulated. Data was collected in 2011. Total sample population selected is 200. Seventy household in each of the First and 2nd stage were selected while sixty household were selected in stage III as a sample respondent. Households were divided in four categories according to farm size of small (less than 6 acres), medium (6-20), large (20-50) and very large holdings (> than 50) acres. The data was collected in June 2010. In order to compare income, consumption, and savings before and after CRBC a paired sample t-test is used which

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - d_0}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

is

Where \bar{X}_1 = mean value after the CRBC, \bar{X}_2 = mean value before the CRBC, d_0 = mean of the difference between paired observations, S_i^2 = sub-sample variance and n_i = sub-sample size (Walpole, 1982). An easy way to analyze the impact of CRBC on income, saving and consumption is to use the dummy variable approach.

$$Y_i = \beta_0 + \beta_1 D_i + \varepsilon_i$$

Where Y_i is the average value of the variable, β_0 is the vertical intercept and D_i is the dummy variable assuming value equal to unity for post-CRBC scenario and zero otherwise, and ε_i is the stochastic error term. If β_1 is significant then it implies that CRBC has significant impact on the average value of the variable under consideration.

DATA ANALYSES

Comparison of Income before and after CRBC

The analysis of the data shows that there is a significant change in the income in all the three stages. But the change is more significant in the Stage II and III. The reason is that Stage I before CRBC was partially irrigated by Paharpur canal and partially by tube wells. This is shown in the following table No. I

Table. I. Average Household Income before and after CRBC (per annum in RS.)

Farm Size	Stage I			Stage II			Stage III		
	Before	After	t-stat	Before	After	t-stat	Before	After	t-stat
< 6	12534	45639	4.3**	8432	44768	4.8*	8765	46090	4.5*
6-20	23470	65280	3.4**	15767	60769	4.9*	14526	62798	5.2*
20-50	31245	82587	3.6**	24654	88985	4.2*	26735	92672	4.1*
> 50	42365	147695	4.2**	34710	136782	5.1*	35728	138765	4.3*

Source. Survey 2011.

Note. * and ** shows statistical significance at 1 % and 5 % respectively.

A dummy variable approach is also used to household income data and it confirmed the results in Table I. In this case instead of taking all the four farm sizes we have taken the average of all in all the three different stages. The estimated equation is given as under and already explained

$$Y_y = \beta_0 + \beta_1 D_i + \varepsilon_i$$

Dummy Variable Approach for Income

$$\text{Stage I } Y_y = 41678 + 33267.23 D_1 \quad R^2 = 0.57$$

(15.3) (12.4)

$$\text{Stage II } Y_y = 57782 + 45678.37 D_1 \quad R^2 = 0.54$$

(14.6) (11.7)

$$\text{Stage III } Y_y = 56738 + 44367.29 D_1 \quad R^2 = 0.59$$

(12.8) (13.5)

Where Y_y is households' income and D_1 is dummy variable for post-CRBC scenario. Figures in parentheses are t-ratios and indicate that household's income has significantly increased after CRBC in all the three stages. R^2 shows coefficient of determination.

Comparison of Consumption before and after CRBC

The analysis of the data shows that there is a significant change in the consumption in all the three stages. This is shown in the following table No. 2.

Table. 2. Average Household Consumption before and after CRBC (per annum in RS.)

Farm Size	Stage I			Stage II			Stage III		
	Before	After	t-stat	Before	After	t-stat	Before	After	t-stat
< 6	12234	40639	3.3*	8322	41348	4.5*	7705	40690	4.2*
6-20	20470	55280	3.4*	14737	50769	4.2*	10551	55708	5.4*
20-50	25645	63587	3.2*	19554	68685	4.5*	20775	72692	3.9*
> 50	32362	107645	3.2*	26710	100722	5.3*	28718	100610	4.6*

Source. Survey 2011.

Note. * shows statistical significance at 1 %.

A dummy variable approach is also used to household consumption data and it confirmed the results in Table 2. In this case instead of taking all the four farm sizes we have taken the average of all in all the three different stages. The estimated equation is given as under and already explained

$$Y_c = \beta_0 + \beta_1 D_i + \varepsilon_i$$

Dummy Variable Approach for Consumption

Stage I $Y_c = 9768 + 32217.23 D_1 \quad R^2 = 0.56$
 (13.3) (11.4)

Stage II $Y_c = 14672 + 39769.37 D_1 \quad R^2 = 0.61$
 (12.2) (11.3)

Stage III $Y_c = 28612 + 72279.67 D_1 \quad R^2 = 0.63$
 (13.2) (12.5)

Where Y_c is households' consumption and D_1 is dummy variable for post-CRBC scenario. Figures in parentheses are t-ratios and indicate that household's consumption has significantly increased after CRBC in all the three stages. R^2 shows coefficient of determination.

Comparison of Saving before and after CRBC

The analysis of the data shows that there is a significant change in the consumption in all the three stages. This is shown in the following table No. 3. Before CRBC saving is very low in all the stages.

Table 3. Average Household Saving before and after CRBC (per annum in RS.)

Farm Size	Stage I			Stage II			Stage III		
	Before	After	t-stat	Before	After	t-stat	Before	After	t-stat
< 6	300	5000	16.3*	125	3420	4.5*	1060	5400	5.2*
6-20	470	1000	3.4*	1030	10000	9.2*	3975	12090	4.4*
20-50	6600	19000	3.2*	5100	20300	4.5*	5960	19980	4.1*
> 50	10003	40050	14.2*	8000	36060	4.3*	7010	38155	5.6*

Source. Survey 2011.

Note. * shows statistical significance at 1 %.

A dummy variable approach is also used to household saving data and it confirmed the results in Table 3. In this case instead of taking all the four farm sizes we have taken the average of all in all the three different stages. The estimated equation is given as under and already explained

$$Y_s = \beta_0 + \beta_1 D_i + \varepsilon_i$$

Dummy Variable Approach for Saving

Stage I $Y_s = 560 + 4746.23 D_1 \quad R^2 = 0.61$
 (12.5) (11.2)

Stage II $Y_s = 2023 + 9357.76 D_1 \quad R^2 = 0.68$
 (11.3) (13.2)

Stage III $Y_s = 6238 + 32678.32 D_1 \quad R^2 = 0.64$
 (12.7) (12.4)

Where Y_s is households' saving and D_1 is dummy variable for post-CRBC scenario. Figures in parentheses are t-ratios and indicate that household's saving has significantly increased after CRBC in all the three stages. R^2 shows coefficient of determination.

CONCLUSIONS

As water is the crucial factor in the agricultural productivity and we can not think about agriculture without water. Before the advent of CRBIP this area was a barren land and there was no availability of water for irrigation. This area was irrigated by rains and through flood from the torrential torrents from hills in the west. But after the CRBIP it has revolutionized the life of the people. Due to irrigation on farm and off farm employment has increased not only in the command area but also in the neighboring areas. This has increased the income of the people. Consumption and saving has also increased. This brought a change in the living standard of the people. We can conclude that the project has significantly changed the income, consumption and saving of the people under CRBC.

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