FUNCTIONAL ANALYSIS

Much emphasis has been laid in the previous chapters on the association of production credit with the level of farm technology which invariably increases the level of output on the farm. The earlier attempts, however, are based merely on the crude estimate of costs and returns on the farm. The present chapter based on functional analysis gives us more explicit idea about the problem and helps in generalizing the facts.

The central themes of the functional analysis made in this chapter are to determine the productivity of different important input factors on the farm business as a whole, on one hand, and to assess the contribution at the margin to the output by the production credit vis-a-vis owned production fund (O.P.F.) 'other than production credit' (O.P.C.), on the other. The types of function used and the specification of dependent and independent variables have already been dealt with in Chapter III (Research Methodology). The results of different functions have subsequently been discussed.

In choosing the independent variables for inclusion in the functional equation in all those cases where two independent variables were highly correlated (i.e. when the value of 'r' was 0.8 or above), only one of these and preferably objective variable was retained with a view to eliminating the effect of multi-collinearity. The equations were fitted using least square method of regression for which the data were processed with the help of Electronic Computer I.B.M. 1620.
available at the Institute of Agricultural Research Statistics (I.C.A.E.) New Delhi. Standard errors of the regression coefficients were examined and only those independent variables, whose coefficients were greater than their respective standard errors, were selected for second or third run. Two types of algebraic functional equations were fitted, namely, Linear and Cobb-Douglas. However, because of the higher R^2 values, generally, obtained in the Cobb-Douglas functions, this form was frequently used in most of the cases. In all, one linear and six Cobb-Douglas functions were finally retained for the purpose of inclusion in the findings of this study. The frequent use of Cobb-Douglas function by most Agricultural Production Economists, is partly because of the better fit it provides and also partly because of (a) computational ease with this algebraic form and (b) the information regarding returns to scale which it provides.

**Regression of production credit on the level of farm technology:**

To examine the regression of production credit on the level of farm technology, the linear equation was developed with production credit as dependent variable and the level of the actual outlay on different capital inputs on the farms was taken as independent variable. The size of holding was also included as an independent variable. The general form of the equation was as under:

\[ P.C. = A + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 \]

Where, P.C. = Total amount (in rupees) of production credit borrowed by sampled farmers from institutional agencies;

A = Constant in equation,
$X_1 = \text{Hired human labour on the farm as a whole (in hours)},$

$X_2 = \text{Hired bullock labour on the farm as a whole (in rupees)},$

$X_3 = \text{Tractor and machinery charges on the farm as a whole (in rupees)},$

$X_4 = \text{Value of seed on the farm as a whole (in rupees)},$

$X_5 = \text{Value of manures and fertilizers on the farm as a whole (in rupees)},$

$X_6 = \text{Value of pesticides on the farm as a whole (in rupees)},$

$X_7 = \text{Cost of irrigation on the farm as a whole (in rupees)},$

$X_8 = \text{Size of holding in hectare},$

b_1 \ldots b_3 = \text{are regression coefficients of the respective independent variables.}$

The above equation was also tried for each size group of borrowers as well as for all farms combined. The results of the equations within the different size group of the farms, however, did not show any consistency and their regression coefficients were often non-significant (except small size group, i.e. 0.0-2.5 hectare, where manures and fertilizers was significant at 1.0 per cent level of probability (see Appendix IV), and, therefore, it was dropped in the subsequent analysis. Two to three runs of regression analyses with varying number of variables were done for each relationship so as to eliminate the non-significant variables from the equation. The results of the final run were as under:

$$\text{P.C.} = 41.47 - 0.1803 X_1 + 0.4524 X_5 + 0.4369 X_7$$

$$R^2 = 0.86 \quad n=100 \quad R^2 = 0.7202 \quad F = 37.33$$

Figures in parentheses are standard error (S.E.) and starred figures just above them are the regression coefficients.

* Significant at 5.0 per cent level of probability

** Significant at 1.0 per cent level of probability.

Note: Value of $R^2$ was taken from first run equation where all the eight variables were examined.
As already spelt out, the linear regression equation was fitted to explain the relationship of different capital inputs with production credit. The higher value of $R^2$ (0.7202) explains that there exists a very strong correlation of production credit with various capital inputs. The result of regression equation reflects that out of eight independent variables included in the equation, only two of them, namely, manures and fertilizers and irrigation have significant and positive association with production credit indicating thereby, that the production credit enhances the level of use of these inputs on the farm. The absence of any significant relationship between production credit and rest of the capital inputs enumerated above (i.e. seed, pesticides and tractor and machinery charges) meant that any increase or decrease in the cost of these inputs did not reflect any increase or decrease in the amount of production credit borrowed by the farmers.

The examination of relationship between the production credit and the use of traditional cash input, viz. hired human labour reveals that as long as there is an increase in the magnitude of credit, the employment of hired human labour on the farm diminishes. The negative significant association of production credit with hired human labour needs a thorough analysis. However, in the wake of analysis of this study as has has already been pointed out, it was observed that on small borrowers farms (viz. 0.0 - 2.5 hectare), the availability of family labour is greater than on their non-borrower counterparts. This tendency was attributed to the fact
that credit prevents migration of family labour by providing more employment opportunity on the farms. Moreover, the large farms (viz. 5.0 and above hectare) allocate a little chunk of credit on employment of heavy machinery like tractor and thresher which invariably replaces the human and bullock labour use on the farm. The non-significant regression coefficient of credit with that of hired bullock labour did not provide any clue to the generalization of any fact in favour of it. Similarly, regression coefficient for the size of holding which was non-significant, though positive, could not establish any consistent result.

Regression of owned production fund other than production credit on the level of farm technology.

The term production finance ought to cover borrowing of production credit from institutional agencies as well as the portion of owned funds of the farm which is diverted for production purposes. A small portion of borrowing from private agencies is also put to production expenditure on the farm. But due to its being rather, inadequate and specific in the production, its impact on the farm productivity is doubtful. Therefore, the whole production finance on the farm was broadly divided into two heads, viz. production credit (P.C.) and owned production fund (O.P.F.) other than production credit which also includes borrowings from private agencies. The impact of production credit on the level of farm technology has already been discussed. In the subsequent analysis, the regression of owned production fund (O.P.F.) other than production credit (O.P.C.) on
level of farm technology has been examined.

However, when the production credit is provided for a farm, within short period, some sort of re-adjustment of resources on the farm comes to evidence. In such a situation, some input factor receives still greater attention than what it could have received due to non-availability of production credit. Thus, to identify the kind of input which receives greater attention due to borrowing on the borrowers farm, a group of 50 non-borrowers was also included in this analysis and a separate equation was tried for them. The equations for borrowers and non-borrowers developed and tried on them were of the following order:

**Borrowers:**

\[ O.P.F. = A \cdot X_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \cdot X_4^{b_4} \cdot X_5^{b_5} \cdot X_6^{b_6} \cdot X_7^{b_7} \cdot X_8^{b_8} \]

**Non-borrowers:**

\[ O.P.F. = A \cdot X_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \cdot X_4^{b_4} \cdot X_5^{b_5} \cdot X_6^{b_6} \cdot X_7^{b_7} \cdot X_8^{b_8} \]

Where, O.P.F. = Owned production fund including borrowings from private agencies (in rupees),

\[ A = \text{Constant in the equation}, \]

\[ X_1..X_8 = \text{Specified as earlier}, \]

\[ b_1..b_8 = \text{Regression coefficients of respective independent variables}. \]

After eliminating the non-significant independent variables from the equation, the results of the final run obtained were as under:
Borrowers:

\[
0.0178 \times X_1 + 0.0170 \times X_2 + 0.0165 \times X_3 + 0.9391 \times X_4 = 0.91
\]

\( R^2 = 0.91 \) \( n = 100 \) \( R^2 = 0.3150 \) \( F = 63.31 \)

Non-borrowers:

\[
0.0209 \times X_3 + 0.8418 \times X_4 + 0.0425 \times X_7 = 0.92
\]

\( R^2 = 0.92 \) \( n = 50 \) \( R^2 = 0.8358 \) \( F = 70.53 \)

Figures in parentheses are standard errors (S.E.) and starred figures just above them are the regression coefficients or elasticity coefficients.

** Significant at 1.0 per cent level of probability.

Note: Values of \( R^2 \) were taken from the first run equation when all the seven factors were examined.

The Cobb-Douglas function was fitted to explain the relationship of different capital inputs with owned production fund (O.P.F.) other than production credit (O.P.C.). The higher \( R^2 \) values on borrowers and non-borrowers farms which were obtained at 0.3150 and 0.8358 respectively for the above two categories explain that there exists a high degree of correlation between the use of capital input and the amount of owned production fund.

In case of borrowers, the highest elasticity coefficient was obtained for expenditure on seed, being 0.9391, followed by hired human labour (0.0178), hired bullock labour (0.0170) and employment of tractor and machinery (0.0165) on their farm. The above four variables are responsible for about 81.50 per cent variation in the
amount of owned production fund.

In the case of non-borrowers, the highest elasticity coefficient was observed at the order of expenditure on seed being 0.3418, followed by expenditure on irrigation (0.0425) and tractor and machinery (0.0209). All the above eight variables together explain about 83.53 per cent variation in the magnitude of owned production fund.

The inferences which can be drawn from the above two equations are that the borrowers divert a significant portion of their owned production fund (O.P.F.) other than production credit (O.P.C.) on employment of hired human and bullock labour and that of tractor and machinery. Unlike this the non-borrowers allocate their meagre resources in meeting the requirements of the fundamental crucial inputs like seeds and irrigation and that of tractor and machineries.

The foregoing analysis points out that the uses of irrigation, manures and fertilizers are mostly associated with the amount of production credit borrowed. Similarly, in the case of owned production fund (O.P.F.) the most important capital input, the use of which decreases or increases with its (O.P.F.) magnitude, is the cost of seeds. Thus, the hypothesis that there are certain inputs which are more elastic to the availability of production finance is proved and holds good.

Impact of the level of farm technology on productivity:

To illustrate the impact of the level of farm technology on the productivity of the farm, all those capital inputs, the regression
coefficients of which on production credit and also with that of owned production fund (O.P.F.) other than production credit (O.P.C.) were examined, were taken as the independent variables. The general form of the equation was as under:

**Borrowers and non-borrowers**:

\[ Y = b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 \]

Where, \( Y \) = Gross value of the crop output (in rupees) estimated at harvest price,
\( A \) = Constant in the equation,
\( X_1 \ldots X_8 \) = Specified earlier,
\( b_1 \ldots b_8 \) = are regression coefficients of the respective variables.

After elimination of the effect of multi-collinearity (see Appendix V) the final independent variables chosen both in the case of borrowers and non-borrowers have subsequently been discussed. However, because of higher correlation between irrigation and manures and fertilizers (the regression of both with production credit were positive and highly significant), the outlays on both the items were added together in case of borrowers. Similarly, in the case of non-borrowers also they were added together with a view to providing a comparison with that of borrowers. The result has been discussed as under:

**Coefficient of multiple determination**:

The examination of \( R^2 \) value of production equation indicated that cost of irrigation, manures and fertilizers and hired human labour in case of borrowers are responsible for 93.65 per cent variation in
the level of output. In case of non-borrowers, irrigation, manures and fertilizers, tractor and machinery and cost of pesticides explain about 79.77 per cent variation in the level of farm income.

**Elasticity of production**:

The elasticity of production along with its test of significance and standard errors for borrowers and non-borrowers farms are presented in table VIII-1.

**Table VIII-1**: Elasticity of production, coefficient of multiple determination and returns to scale as indicated by 't' on farms in Agra during 1970-71.

<table>
<thead>
<tr>
<th></th>
<th>Borrowers</th>
<th>Non-borrowers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.0229</td>
<td>1.8861</td>
</tr>
<tr>
<td>Hired in human</td>
<td>0.0124</td>
<td></td>
</tr>
<tr>
<td>log labour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tractor &amp; Irrigation</td>
<td>0.8226</td>
<td></td>
</tr>
<tr>
<td>Machinery</td>
<td>0.0035</td>
<td>0.0259</td>
</tr>
<tr>
<td>Manure &amp; Pesticide</td>
<td>0.0327</td>
<td>0.6936</td>
</tr>
<tr>
<td>Fertil.</td>
<td>0.0029</td>
<td>0.0114</td>
</tr>
<tr>
<td>R²</td>
<td>0.9365</td>
<td>0.7977</td>
</tr>
<tr>
<td>Returns to scale</td>
<td>Decreasing</td>
<td>Decreasing</td>
</tr>
</tbody>
</table>

* Significant at 5.0 per cent level of probability.
** Significant at 1.0 per cent level of probability.

The elasticity of production for all the capital inputs is positive. The regression coefficients for hired bullock labour and tractor and machinery charges in case of borrowers and hired human labour and bullock labour in case of non-borrowers were lesser than their respective standard errors and, hence were finally dropped. In the case of borrowers, the highest significant coefficients are found for irrigation, manures and fertilizers followed by hired human labour.
while in the case of non-borrowers, the highest significant coefficient are found for irrigation, manures and fertilizers followed by tractor and machinery and pesticides. The elasticity coefficients also reveal that the farms of both the categories, i.e. borrowers and non-borrowers are running under decreasing return to scale.

Marginal value product:

The marginal value product of different independent variables included in the equation are given in table VIII-2

Table VIII-2: Marginal value product of farm resources in Aligarh during 1970-71 (in rupees)

<table>
<thead>
<tr>
<th>Hired human labour</th>
<th>Tractor and machinery</th>
<th>Irrigation, manure and fertilizers</th>
<th>Pesticides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borrowers:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.17</td>
<td>-</td>
<td>8.32</td>
<td>1.39</td>
</tr>
<tr>
<td>Non-borrowers:</td>
<td></td>
<td>1.61</td>
<td>9.36</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6.26</td>
</tr>
</tbody>
</table>

The productivity of irrigation, manures and fertilizers was substantially high on both the type of farm categories, i.e. borrowers and non-borrowers. This indicates that there is greater scope for employment of these resources on the farms. The productivity of above resources on the non-borrowers farms is still greater because of its lesser application on these farms. The next important input factor, the productivity of which is higher than its factor cost, is pesticides which gave much higher return on non-borrowers farms due to its rather scanty use.
Fig. 5. MARGINAL VALUE PRODUCTS OF DIFFERENT INPUT FACTORS IN DISTRICT ALIGARH DURING 1970-71

BORROWERS

<table>
<thead>
<tr>
<th>INPUT FACTORS</th>
<th>MARGINAL VALUE PRODUCTS (IN RUPEES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.91</td>
<td>7.92</td>
</tr>
<tr>
<td>1.80</td>
<td>0.38</td>
</tr>
</tbody>
</table>

INDEX
HIRED HUMAN LABOUR.
IRRI. MANURES AND FERTILIZERS.
PESTICIDES.

LINE OF FACTOR COST.

NON-BORROWERS

<table>
<thead>
<tr>
<th>INPUT FACTORS</th>
<th>MARGINAL VALUE PRODUCTS (IN RUPEES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.91</td>
<td>5.96</td>
</tr>
<tr>
<td>1.93</td>
<td></td>
</tr>
</tbody>
</table>

INDEX
TRACTOR AND MACHINE CHARGES.
IRRI. MANURES AND FERTILIZERS.
PESTICIDES.

LINE OF FACTOR COST.
Estimation of marginal value product:

The marginal value products of different input variables were estimated by taking partial derivatives of returns with respect to the input concerned at the mean level of input factors. The general form of the equation was:

\[ Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3} \ldots X_n^{b_n} \]

The partial derivatives of returns \( Y \) with respect to the input \( X_i \) was obtained as under:

\[ \text{MVP of } X_i = b_i \frac{\overline{Y}}{\overline{X}_i} \]

Where:
- \( b_i \) = Elasticity of production of \( X_i \) input factor,
- \( \overline{Y} \) = Mean level of output,
- \( \overline{X}_i \) = Mean level of the respective independent variable.

Comparison of marginal value products of resources with their factor cost.

With the help of estimated production, effort has been made to examine the economic efficiency of farmers as users of farm resources. In case there is no resource constraint, maximum profit could be achieved by increasing the use of irrigation, manures and fertilizers and that of pesticides to a point where its marginal value product is equal to its price (factor cost). The marginal value products of all the resources in the equation which have significant impact on farm crop returns were compared with their corresponding factor costs. The results are presented in table VIII-3.
Table VIII-3: Marginal value products and the ratio of marginal value products to their acquisition cost on borrowers and non-borrowers farms. (in rupees)

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Borrowers</th>
<th>Non-borrowers</th>
<th>Ratio of MVP to Factor Cost</th>
<th>Ratio of MVP to Factor Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hired human labour (hrs.)</td>
<td>0.17</td>
<td>0.38</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tractor &amp; machinery (Rs.)</td>
<td>-</td>
<td>-</td>
<td>1.61</td>
<td>1.53</td>
</tr>
<tr>
<td>Irrigation, manures and fertilizers (Rs.)</td>
<td>8.32</td>
<td>7.92</td>
<td>9.36</td>
<td>8.91</td>
</tr>
<tr>
<td>Pesticides</td>
<td>1.89</td>
<td>1.80</td>
<td>6.26</td>
<td>5.96</td>
</tr>
</tbody>
</table>

Factor cost for all but hired human labour is Rs. 1.05 and the factor cost of hired human labour is Re. 0.45.

Table VIII-3 indicates that means should be explored to augment the supply of irrigation, manures and fertilizers and that of pesticides on each category of the farms. There also exists a scope for hiring of tractor and machinery which would still enhance the level of output on the farm, on one hand, and would replace the use of human labour, on the other, the marginal value product of which is lower than its factor cost.

Impact of production credit on productivity:

In the previous attempts, the regression of production credit on the use of farm technology which enhances the level of output on the farm, is established. The present attempt, however, aims at working out the productivity of production credit, assuming it as an independent variable. As a matter of fact, the central purpose of
the functional analysis made here is to assess the contribution at the margin to the output by the production credit and to examine its relative effectiveness vis-a-vis owned production fund other than production credit (O.P.C.). In the next attempt, a separate production equation for the non-borrowers was also fitted in order to provide a comparison of productivity of owned production fund other than production credit (O.P.C.) with those of non-borrowers. The production equations are described below:

**Borrowers**:

\[ Y = A \cdot X_1 \cdot X_2 \cdot X_3 \cdot X_4 \cdot X_5 \cdot X_6 \cdot b_1 \cdot b_2 \cdot b_3 \cdot b_4 \cdot b_5 \cdot b_6 \]

**Non-borrowers**:

\[ Y = A \cdot X_1 \cdot X_2 \cdot X_3 \cdot X_4 \cdot X_6 \cdot b_1 \cdot b_2 \cdot b_3 \cdot b_4 \cdot b_5 \cdot b_6 \]

Where, \( Y \) = Gross value of the crop output (in rupees) estimated at harvest price,

\( A \) = Constant in the equation,

\( X_1 \) = Area under high yielding varieties in hectare,

\( X_2 \) = Size of holding in hectare,

\( X_3 \) = Imputed value of family labour (in rupees),

\( X_4 \) = Investment in the form of fixed capital (in rupees) (which includes investment in machinery and implement, irrigation equipment and bullock),

\( X_5 \) = Total amount of production credit on the farm (in rupees),

\( X_6 \) = Owned production fund 'other than production credit' (O.P.C) (in rupees) (which also includes borrowings from private agencies),

\( b_1 \ldots b_6 \) = are regression coefficients of respective independent variable.
The examination of correlation matrix among different variables in the above equation (see appendix VI) revealed higher correlation in case of borrowers between size of holding and that of imputed value of family labour, amount of production credit and also with the amount of owned production fund. Similarly, in the case of non-borrowers also, the size of holding has high correlation with amount of owned production fund. In the second run equation, it was also observed that in the case of borrowers, the regression coefficient of area under high yielding varieties and investment in fixed capital were lesser than their respective standard errors. Thus, in the final run, the size of holding from borrowers and non-borrowers and area under high yielding varieties and investment in fixed capital in the case of borrowers only, were dropped. The final run equation produced the following results:

Table VIII-4: Elasticity of production, coefficient of multiple determination and returns to scale as indicated by 't' on farms in Aligarh district during 1970-71.

<table>
<thead>
<tr>
<th></th>
<th>Area</th>
<th>Imputed</th>
<th>Invest</th>
<th>Production</th>
<th>Owned</th>
<th>R²</th>
<th>Return</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>H.Y.V.</td>
<td>family</td>
<td>fixed</td>
<td>credit</td>
<td>'capital'</td>
<td>fund</td>
<td></td>
<td></td>
</tr>
<tr>
<td>log</td>
<td></td>
<td>'labour'</td>
<td>'value of'</td>
<td>'implied'</td>
<td>'in'</td>
<td>'production'</td>
<td>'investment'</td>
<td>'production'</td>
</tr>
</tbody>
</table>

** Borrowers:**
- 2.0308
- 0.3578
- 0.1609
- 0.5219
- 0.9175

* Non-borrowers:
- 4.1556
- 0.0144
- 0.02407
- 0.0209
- 0.6327
- 0.8530

Figures in parentheses are standard errors of the respective elasticity coefficients.

** Significant at 1.00 per cent level of probability.
* Significant at 5.0 per cent level of probability.
Coefficient of multiple determination:

The examination of $R^2$ value in the case of borrowers revealed that about 91.75 per cent variation in farm income was due to availability of owned production fund (O.P.F.) 'other than production credit' (O.P.C.), family labour and amount of production credit. Likewise, in the case of non-borrowers also, about 85.30 per cent variation in farm income was due to availability of owned production fund (O.P.F.), investment in fixed capital and that of family labour.

Elasticity of production:

The elasticity of production with its test of significance and standard errors for borrowers and non-borrowers farms are presented in table VIII-4. The elasticity coefficients of production for all the independent variables are positive and significant. The highest elasticity coefficient in case of borrowers were observed at the order of owned production fund other than production credit (O.P.C.) (0.5219), followed by imputed value of family labour (0.3578) and production credit (0.1609). In case of non-borrowers, the highest elasticity coefficients were obtained for owned production fund (0.6327) followed by family labour (0.0241), area under high yielding varieties (0.0144) and investment in the fixed capital (0.0209). The borrowers farms show increasing returns to scale while the farms of non-borrowers are found under decreasing returns to scale.

Marginal value product and factor cost of different variables:

The marginal value product of different independent variables and their factors costs are given in table VIII-5.
Table VIII-5: Marginal value product of different independent variables and their factor costs in Aligarh during 1970-71.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Borrowers</th>
<th>Non-borrowers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ratio of MVP to its factor cost</td>
<td>Ratio of MVP to its factor cost</td>
</tr>
<tr>
<td>Area under high yielding varieties (in hectares)</td>
<td>-</td>
<td>97.92</td>
</tr>
<tr>
<td>Imputed value of family labour</td>
<td>4.95</td>
<td>0.23</td>
</tr>
<tr>
<td>Fixed capital</td>
<td>-</td>
<td>0.06</td>
</tr>
<tr>
<td>Production credit</td>
<td>4.71</td>
<td>-</td>
</tr>
<tr>
<td>Owned production fund</td>
<td>3.50</td>
<td>6.14</td>
</tr>
</tbody>
</table>

The factor cost of area under high yielding varieties is Rs. 280.00. The factor cost for other items except fixed capital is Rs. 1.00. The factor cost for fixed capital is Rs. 0.13.

Table VIII-5 reflects that the rates of marginal value productivity of family labour is highest (Rs. 4.95) on the borrowers farms followed by production credit (4.71) and owned production fund (3.50). Thus, the hypothesis that the production credit has higher productivity than those of owned production funds (O.P.F.) of the farms is found correct and hence retained after testing.

In case of non-borrowers, the highest MVP is seen of owned production fund (6.14) followed by investment in fixed capital (0.46) area under high yielding varieties (0.35) and family labour (0.23). It is observed that non-borrowers are in loss with respect to the work done by the family members on the farm, investment in the fixed...
Fig. 6: Marginal Value Products of Different Independent Variables in District: Aligarh During 1970-71

Borrowers

Independent Variables

Non-Borrowers

Independent Variables
capital and area devoted to high-yielding varieties.

Briefly, the functional analysis elaborates that the production credit increases the level of use of irrigation, manures and fertilizers on the farms which coincide with the higher level of productivity of these inputs. Besides, it induces the family members to work on their farms and thus, helps in reducing the hiring of hired human labour which has lower productivity. Unlike this, the owned production fund (O.P.F.) could not establish any such relationship and, therefore, their uses are irrational as they are not allocated in accordance with the productivity of the capital inputs. In this way, the hypothesis developed that production credit enhances the use of those capital inputs which raise the farm output is tested and found correct.