CHAPTER III

METHODOLOGY

The methodology of the study on the Extent of Flow of Institutional Credit and its Impact on Agricultural Development in Annur Block of Coimbatore District is given below.

SELECTION OF THE DISTRICT

Coimbatore district has been a pioneering district in Tamil Nadu, in both agricultural and industrial activities. With limited supply of irrigation water, and dependence on very deep wells, farmers of Coimbatore district have shown the best results in farming. Therefore Coimbatore district was purposively selected for this study. The familiarity of the researcher with the farming conditions in the district was another reason for the choice of the district.

SELECTION OF THE BLOCK

The Lead Bank prepares plans and monitors its progress at district level. So its purpose is limited to review the progress in the light of banking business. But the present study aimed to study the extent of flow of institutional credit for agricultural development and to assess its impact at the block level. This required a deeper analysis. Due to the resource contraints especially
time and money, the study was confined to one Community Development Block (simply block hereafter) now called Panchayat Union.

There were 21 blocks in Coimbatore district, and among them, Annur block was chosen for the following reasons:

1. The Government policies pay special attention to the marginal and small farmers for they constitute the bulk of the cultivating class in the country with huge financial needs. As per 1979-80* Agricultural Census, among the 21 blocks in the district, Annur block had the maximum number of marginal and small farmers (Table 1). Therefore, Annur block was selected for it would provide ample scope for studying the benefits derived and problems faced by the marginal and small farmers in getting farm credit in particular and farmers in general.

ii. The study of the flow of credit and its recovery for the cooperative institutions (for which alone blockwise secondary data were available) revealed that there was nil balance for Annur block for 1981-82 at the Coimbatore Central Cooperative Bank level (Table 2**). This was taken as an indicator of the good performance of Village Cooperative Agricultural Credit

*Collected from the Block Statistical Inspector, Annur Panchayat Union, Annur.

**Data were collected from the relevant ledgers of the Coimbatore Central Cooperative Bank at Coimbatore and at its branch in Pollachi.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the Block</th>
<th>Holdings between less than 0.5 and less than 0.50 hectares</th>
<th>Holdings between 0.50 and 1.99 hectares</th>
<th>Holdings between 2 hectares to 4.99 hectares</th>
<th>Holdings between 5 hectares and above (4+5+6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Annanallai</td>
<td>1,521 (26.16)</td>
<td>2,002 (46.19)</td>
<td>1,707</td>
<td>1,131</td>
</tr>
<tr>
<td>2</td>
<td>Annur</td>
<td>16,120 (63.24)</td>
<td>21,212 (85.22)</td>
<td>3,655</td>
<td>245</td>
</tr>
<tr>
<td>3</td>
<td>Avanangi</td>
<td>11,560 (49.69)</td>
<td>17,694 (75.80)</td>
<td>4,922</td>
<td>715</td>
</tr>
<tr>
<td>4</td>
<td>Gudimangaal</td>
<td>2,228 (24.83)</td>
<td>4,485 (50.09)</td>
<td>3,019</td>
<td>1,490</td>
</tr>
<tr>
<td>5</td>
<td>Karamadai</td>
<td>9,268 (31.20)</td>
<td>14,796 (91.74)</td>
<td>2,921</td>
<td>385</td>
</tr>
<tr>
<td>6</td>
<td>Kinnalavangadu</td>
<td>1,369 (18.43)</td>
<td>3,090 (41.24)</td>
<td>2,840</td>
<td>1562</td>
</tr>
<tr>
<td>7</td>
<td>Madathukulam</td>
<td>3,287 (40.41)</td>
<td>5,133 (63.19)</td>
<td>2,012</td>
<td>990</td>
</tr>
<tr>
<td>8</td>
<td>Medasikal</td>
<td>2,210 (28.82)</td>
<td>4,301 (56.08)</td>
<td>2,733</td>
<td>995</td>
</tr>
<tr>
<td>9</td>
<td>Palladam</td>
<td>994 (14.82)</td>
<td>2,704 (40.93)</td>
<td>2,801</td>
<td>1,200</td>
</tr>
<tr>
<td>10</td>
<td>Periyamalapalayam</td>
<td>8,073 (59.23)</td>
<td>11,331 (83.13)</td>
<td>2,020</td>
<td>480</td>
</tr>
<tr>
<td>11</td>
<td>Perur</td>
<td>2,232 (45.59)</td>
<td>3,490 (71.27)</td>
<td>1,155</td>
<td>252</td>
</tr>
<tr>
<td>12</td>
<td>Pollarai (North)</td>
<td>1,687 (24.39)</td>
<td>3,254 (47.05)</td>
<td>2307</td>
<td>1355</td>
</tr>
<tr>
<td>13</td>
<td>Pollarai (South)</td>
<td>1,366 (26.65)</td>
<td>2,917 (52.60)</td>
<td>1238</td>
<td>835</td>
</tr>
<tr>
<td>14</td>
<td>Pongalur</td>
<td>2,222 (23.76)</td>
<td>4,599 (49.19)</td>
<td>3104</td>
<td>1847</td>
</tr>
<tr>
<td>15</td>
<td>Sakkaramakulam</td>
<td>3,275 (43.12)</td>
<td>6,595 (71.53)</td>
<td>2152</td>
<td>473</td>
</tr>
<tr>
<td>16</td>
<td>Sultanpet</td>
<td>1,340 (17.32)</td>
<td>3,234 (41.88)</td>
<td>3206</td>
<td>1237</td>
</tr>
<tr>
<td>17</td>
<td>Sulur</td>
<td>3,247 (29.48)</td>
<td>6,322 (57.39)</td>
<td>3669</td>
<td>824</td>
</tr>
<tr>
<td>18</td>
<td>Thondamuthur</td>
<td>5,060 (39.65)</td>
<td>6,756 (69.39)</td>
<td>2299</td>
<td>681</td>
</tr>
<tr>
<td>19</td>
<td>Tirupur</td>
<td>2,795 (27.55)</td>
<td>5,259 (51.84)</td>
<td>4196</td>
<td>689</td>
</tr>
<tr>
<td>20</td>
<td>Ummalpet</td>
<td>3,312 (26.73)</td>
<td>6,743 (54.41)</td>
<td>4220</td>
<td>1629</td>
</tr>
<tr>
<td>21</td>
<td>Valparai - Estate Area</td>
<td>-- -- -- -- -- --</td>
<td>-- -- --</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

**NOTE:**
1. Column (6) is included in Column (7).
2. Parenthesized figures are percentages to the total given in Column (7).

**SOURCE:**
2. Lead Bank Documents, Cannar Bank, Coimbatore - 1.
<table>
<thead>
<tr>
<th>Place of the Bank Branch at</th>
<th>1979-80 Demand (2)</th>
<th>1979-80 Collection (3)</th>
<th>Balance (4)</th>
<th>1980-81 Demand (5)</th>
<th>1980-81 Collection (6)</th>
<th>Balance (7)</th>
<th>1981-82 Demand (8)</th>
<th>1981-82 Collection (9)</th>
<th>Balance (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anur</td>
<td>32,94,000</td>
<td>6,59,139</td>
<td>26,35,661</td>
<td>38,20,704</td>
<td>33,39,032</td>
<td>4,81,672</td>
<td>10,07,162</td>
<td>10,17,162</td>
<td>-</td>
</tr>
<tr>
<td>Avanashi</td>
<td>51,35,871</td>
<td>7,63,771</td>
<td>43,72,100</td>
<td>64,02,745</td>
<td>46,29,642</td>
<td>17,73,103</td>
<td>27,21,057</td>
<td>16,81,895</td>
<td>10,39,762</td>
</tr>
<tr>
<td>Coimbatore (Coimbatore-12)</td>
<td>94,69,283</td>
<td>15,86,631</td>
<td>79,02,652</td>
<td>91,90,526</td>
<td>55,72,672</td>
<td>36,17,854</td>
<td>36,83,952</td>
<td>17,20,596</td>
<td>21,73,354</td>
</tr>
<tr>
<td>Kinnambakkamavu</td>
<td>57,50,331</td>
<td>1,53,974</td>
<td>55,94,357</td>
<td>58,07,200</td>
<td>27,11,587</td>
<td>30,95,613</td>
<td>37,83,107</td>
<td>21,50,367</td>
<td>16,32,740</td>
</tr>
<tr>
<td>Kotur</td>
<td>20,84,417</td>
<td>2,04,941</td>
<td>18,79,476</td>
<td>20,44,854</td>
<td>8,08,770</td>
<td>12,36,084</td>
<td>14,07,460</td>
<td>8,98,415</td>
<td>8,09,945</td>
</tr>
<tr>
<td>Kovalamparamar</td>
<td>39,46,236</td>
<td>6,49,244</td>
<td>32,97,692</td>
<td>37,36,701</td>
<td>21,19,748</td>
<td>16,16,953</td>
<td>24,88,298</td>
<td>17,95,561</td>
<td>6,95,727</td>
</tr>
<tr>
<td>Mettuppalayar</td>
<td>63,11,350</td>
<td>46,418</td>
<td>62,64,932</td>
<td>62,71,931</td>
<td>25,82,293</td>
<td>36,89,638</td>
<td>36,90,249</td>
<td>6,24,534</td>
<td>30,65,719</td>
</tr>
<tr>
<td>Palladam</td>
<td>131,42,559</td>
<td>30,30,534</td>
<td>101,12,025</td>
<td>121,98,366</td>
<td>37,71,206</td>
<td>84,27,180</td>
<td>99,65,386</td>
<td>12,64,687</td>
<td>87,01,298</td>
</tr>
<tr>
<td>Perumanickam-palayam</td>
<td>31,74,242</td>
<td>69,561</td>
<td>31,04,681</td>
<td>35,29,745</td>
<td>23,51,034</td>
<td>11,78,711</td>
<td>12,91,961</td>
<td>3,89,540</td>
<td>9,02,421</td>
</tr>
<tr>
<td>Ponnaiyam</td>
<td>127,05,761</td>
<td>21,73,553</td>
<td>105,32,208</td>
<td>129,01,165</td>
<td>62,35,962</td>
<td>66,65,203</td>
<td>96,53,820</td>
<td>40,96,347</td>
<td>55,57,473</td>
</tr>
<tr>
<td>R.S.Pure (Coimbatore-1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Urban branch</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sullur</td>
<td>49,56,521</td>
<td>4,19,292</td>
<td>45,37,239</td>
<td>56,59,672</td>
<td>40,12,261</td>
<td>15,27,111</td>
<td>21,94,218</td>
<td>10,97,542</td>
<td>10,97,542</td>
</tr>
<tr>
<td>Tiruppur</td>
<td>104,51,461</td>
<td>15,49,003</td>
<td>89,02,458</td>
<td>100,81,876</td>
<td>54,31,357</td>
<td>45,40,521</td>
<td>62,07,177</td>
<td>15,30,468</td>
<td>46,68,703</td>
</tr>
<tr>
<td>Udhumalpet</td>
<td>211,69,405</td>
<td>7,04,819</td>
<td>204,64,586</td>
<td>217,83,576</td>
<td>43,79,046</td>
<td>174,04,556</td>
<td>176,27,977</td>
<td>21,58,494</td>
<td>154,69,483</td>
</tr>
</tbody>
</table>

**NOTE**: (1) One year period refers to Cooperative year i.e., from first July of a Calendar year to 30th June of the successive Calendar year.  
(2) Figures are pertaining to agricultural loans only.  
* Functioning of most of the branches confined to individual blocks only.  

**SOURCE**: Ledgers of the Coimbatore Central Cooperative Bank, Head Office, Coimbatore - 16.
Societies and the cooperative attitude and repayment ability of the farmers in the block.

iii. Data of overdues from the Annur block area from the Avanashi Primary Land Development Bank Ltd* for five years revealed a declining trend. It was 71.77 percent in 1978-79; 65.00 percent in 1979-80; 45.51 percent in 1980-81; 52.63 percent in 1981-82 and 38.68 percent in 1982-83 in the total overdues of the bank.** Thus there was a healthy trend.

iv. Annur block had limited number of financial institutions serving it when compared to other blocks in the district.*** This would facilitate collection of secondary data for the study.

v. Annur block with a town panchayat and 21 village panchayats was totally rural in character devoid of any big industrial or commercial complexes.

*Served Annur, Avanashi and Karamadai blocks in the past; and at present serves Annur and Avanashi blocks.

**Data were collected from the Tamil Nadu State Cooperative Land Development Banks branch at Coimbatore and at its primary unit at Avanashi.

***Six banks served this block as per Lead Bank documents - Canara Bank at Coimbatore.
vi. Discussions with the officials concerned and farmers revealed that all the major crops of the district were cultivated in this block and the farmers were progressive and cooperative. Hence, this block would stand as a sample block of the district.

COLLECTION OF DATA

The objectives of the study required the collection of both secondary and primary data.

Secondary Data

As the study aimed at the extent of the overall flow of institutional credit to agriculture and allied activities in Annur block, three major institutions viz., cooperatives (25 societies/bank branches), commercial banks (13 branches) and Government agencies (three departments) were covered. They provided crop loans (short term loans), agricultural term loans, (both medium and long term loans), land improvement loans, loan expenditures on soil conservation schemes and agricultural jewel loans.

(1) Cooperatives. The Coimbatore Central Cooperative Bank Ltd met the short term/crop loan (and to some extent medium term loan) of the 22 revenue villages of the block through 19 Village Cooperative Agricultural Credit Societies/Agricultural Service Cooperative Societies in different
villages. The Tamil Nadu State Land Development Bank Ltd met the long term requirements of these villages through the Avanashi Primary Land Development Bank Ltd. Hence data were to be collected from these institutions.

Discussions with the Special Officers of the Coimbatore Central Cooperative Bank and Avanashi Primary Land Development Bank revealed that it would be reasonable to consider the disbursements of the cooperative loans—short/medium/long term loans—from the middle of the seventies because the cooperatives could not fare well in the immediately preceding five years from 1983 due to farmers' agitations and its consequent heavy overdues on the members' side.

(a) Village societies. Data were collected from the village societies for nine years from 1974-75 to 1982-83. The purposewise, sourcewise and beneficiarywise analysis was confined to 1982-83 only. However, data on agricultural jewel loans provided by cooperative institutions were collected for the period from 1979 to 1983. Total overdues at the level of village societies were available for all the nine years. Data pertaining to financial dealings of the village societies at the Coimbatore Central Cooperative Bank level were collected for the last four years for which only such details were available. Besides these,
details relating to members, share capital, deposits, investments, assets and profit/loss were also collected. Thus, the secondary data were collected from the annual reports, audit reports and ledgers of the 21 village societies* and three branches of the Central Cooperative Banks.** They were supplemented by collection, comparison, and verification of the relevant data from the ledgers of branch of the Central Cooperative Bank at Annur and also with the original copies of the audit reports available with the district Cooperative Audit Office at Udhagamund.

(b) **Primary land development bank.** Purposewise, schemewise and villagewise data relating to Annur block alone were culled out from the relevant ledgers of the Avanashi Primary Land Development Bank, since the Bank served two blocks. The data were collected for nine year period from 1974-75 to 1982-83. Beneficiarywise details were confined to 1982-83 only. However, purposewise, schemewise, beneficiarywise and villagewise overdues were collected as on 31-12-1983.

*19 village societies within Annur block providing crop/medium/jewel/loans and two village societies outside the block which extended agricultural jewel loans only to a few villages of the selected block.

**Two branches of the Coimbatore Central Cooperative Bank located at Annur and Avanashi (outside the block) and one branch of the Periyar District Central Cooperative Bank at Punjai-Puliampatti (outside the block) extended agricultural jewel loans to the villages of Annur block.
In respect of short/medium/long term loans, cooperative year i.e., from first July to 30th June of the succeeding calendar year, was followed in the collection of data from the cooperatives. But for agricultural jewel loan provided by the cooperatives, calendar year (i.e., 1st January to 31st December) was followed.

(ii) Commercial banks. A preliminary discussion with farmers of the Annur block villages and different officials of the State Government connected with the block brought out the fact that, apart from the four branches of commercial banks which were assigned targets for lending to agriculture of the block, one newly started bank within the block and eight other branches located outside the block also were extending credit to the farmers of the block. Therefore, purposewise, scheme-wise, beneficiarywise and village-wise data of agricultural credit including jewel loans were culled out from the relevant ledgers of the 13 commercial bank branches for a period of five years from 1979 to 1983.* Purposewise, and village-wise overdues as on 31-12-1983 were also gathered. Calendar year was followed in the collection of data from commercial banks.

*Commercial banks, in general, took active part in rural lending since 1979.
(iii) Government agencies. Government of Tamil Nadu issued land improvement loan through the Revenue Department. It also met expenditures (hereafter called as loan expenditures) incurred for soil conservation measures and for pest control through Agricultural Engineering and Soil Conservation Department, and Agricultural Department respectively. Data pertaining to these were collected from the revenue records available at Taluk Office at Avanashi and also from the completion reports on soil conservation measures available with the Assistant Executive Engineer, Agricultural Engineering Department. Data were collected from these Government agencies for the period from 1974-75 to 1982-83. Financial year, (April to March next) was followed in the collection of data.

Primary Data

As the study proposed to evaluate the impact of credit in terms of returns per rupee, per hectare, repayment capacity, risk-bearing ability and productivity gains in farms, it was essential to contact the sample farm households in the villages of Annur block.

Selection of sample villages. Annur block had 22 revenue villages with 151 hamlets. The villages were listed in the alphabetical order of their names in English. By simple random sampling method using the random number table one village was selected. It was the third village in the list.
So, every village with odd number in the serial list was selected for the study. Thus, by a systematic random sampling method 11 villages* as listed below were selected to constitute sample villages for the study.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Sample Villages</th>
<th>S.No.</th>
<th>Sample Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Akkaraisengappalli</td>
<td>7</td>
<td>Kuppepalayam</td>
</tr>
<tr>
<td>2</td>
<td>Ambothi</td>
<td>8</td>
<td>Naranapuram</td>
</tr>
<tr>
<td>3</td>
<td>Annur-Mettuppalayam</td>
<td>9</td>
<td>Pachapalayam</td>
</tr>
<tr>
<td>4</td>
<td>Kanuvaikkarai</td>
<td>10</td>
<td>Pilliappampalayam and</td>
</tr>
<tr>
<td>5</td>
<td>Kariampalayam</td>
<td>11</td>
<td>Vadakkalur</td>
</tr>
<tr>
<td>6</td>
<td>Kunnathur</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Selection of sample farms. By giving equal weightage in the selection of sample farms to every sample village, a total of 220 sample farms was selected for the study at the rate of 20 farms per village using simple random sampling method with the help of voters list and by replacing any household who was not a farmer. Primary data, collected from the farmers, related to the fasli year 1392**(i.e., from July 1, 1962 to June 30, 1983).

* Discussions with the officials of Annur block indicated that the sample villages represented the agro-climatic conditions of the block fully.

** Fasli year refers to one year period from first July to 30th June of the successive calendar year.
Formulation of Data Sheet, Schedule and Questionnaire

A detailed data sheet and schedule were prepared, pre-tested and finalised for the collection of secondary and primary data. Personal investigation method was adopted in the collection of both secondary and primary data.

A separate questionnaire was prepared and sent to the special officers of the District Central Cooperative Banks in Tamil Nadu to ascertain their views on making secretaries of the village societies as the staff of the respective central cooperative banks.

PROCESSING OF DATA AND POST-STRATIFICATION OF PRIMARY DATA

The collected (secondary and primary) data were processed and tabulated. Sample farms were post-stratified into five size groups such that each group accounted for approximately one fifth of the total operational area operated by all the 220 farms as indicated below.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Size of Farm (Ha)</th>
<th>Mean Size (Ha)</th>
<th>Number of Farms</th>
<th>Percentage to total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.2024 to 2.0235</td>
<td>1.3924</td>
<td>102</td>
<td>46.36</td>
</tr>
<tr>
<td>2</td>
<td>2.0236 to 3.6423</td>
<td>2.7648</td>
<td>51</td>
<td>23.18</td>
</tr>
<tr>
<td>3</td>
<td>3.6424 to 5.0587</td>
<td>4.3037</td>
<td>33</td>
<td>15.00</td>
</tr>
<tr>
<td>4</td>
<td>5.0588 to 7.4869</td>
<td>6.1749</td>
<td>23</td>
<td>10.46</td>
</tr>
<tr>
<td>5</td>
<td>7.4870 to 22.2582</td>
<td>12.9112</td>
<td>11</td>
<td>5.00</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>220</td>
<td>100.00</td>
</tr>
<tr>
<td>Average</td>
<td>-</td>
<td>3.2278</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
ANALYSIS

Averages, percentages, descriptive tables, diagrams, frequency tables, Lorenz curve, and other conventional tools like standard deviation and co-efficient of variation were applied wherever necessary.

Credit Planning at the Block Level

The total planned investment and planned credit under each agricultural activity for the different farm-size groups were estimated by aggregating the individual planned investment and credit of the sample farmers surveyed with suitable weights to the sizegroups. Care was taken to include only viable projects and genuine credit needs of the farmers in their investment programmes. From this average, planned investments and credits for each farm-size group for each activity were derived. Then these averages were multiplied by the proportionate size of the different groups desiring the particular investment in the total individual farm holdings in the block, as estimated by the Tamil Nadu Agricultural Census, 1979-80.

Formulae applied to find out average planned investment and average planned credit were:

\[ API_g = \frac{TPI_g}{N_g} \]

\[ APC_g = \frac{TPC_g}{NA_g} \]
Where $API_g$ stands for average planned investment in group $g$;

$TPI_g$ stands for the total planned investment in group $g$;

$N_g$ stands for the number of farmers desiring to take up investment programmes in group $g$;

$APC_g$ stands for average planned credit in group $g$;

$TPC_g$ stands for the total planned credit in group $g$; and

$NA_g$ stands for the number of farmers desiring to avail credit in group $g$.

Total number of farm holdings in the block (as per census) was distributed size groupwise, in the same proportion as observed in the sample. Specifically, the formula was:

$$th_{gb} = \frac{TH_b}{TS_s} \times S_{sg}$$

where $th_{gb}$ stands for the total number of individual holdings in group $g$ for $g = 1, 2 \ldots 5$;

$TH_b$ stands for the total number of individual holdings of the entire block (as per census);

$TS_s$ stands for the total number of holdings in the whole sample $= \sum S_g$ for $g = 1, 2, \ldots 5$; and

$S_{sg}$ stands for the number of sample holdings in group $g$ for $g = 1, 2, \ldots 5$.

$$\sum S_g = 220.$$
Formulae applied in estimating the total planned investment and total planned credit were:

\[ \text{TPI}_{gb} = \text{API}_g \times \text{th}_{gb} \times \text{Pig} \]

\[ \text{TPC}_{gb} = \text{TPI}_{gb} \times \text{P}_{cg} \]

Where \( \text{TPI}_{gb} \) stands for the total planned investment of group for the entire block for an activity;

\( \text{TPC}_{gb} \) stands for the total planned credit of a group for the entire block for an activity;

\( \text{API}_g \) stands for the average planned investment of a group for an activity;

\( \text{th}_{gb} \) stands for the total number of individual holdings of a group for the entire block where

\[ \text{Pig} = \frac{\text{Number of sample farmers desiring investment}}{\text{Total number of farmers in the sample group g}} \]

for group \( g = 1, 2, \ldots, 5 \).

\( b \) denotes the block.

\[ p_{cg} = \frac{\text{Total planned credit for that group for that activity}}{\text{Total planned investment for the group for the activity}} \]

for group \(g=1,2,\ldots,5\).

Then sums of the total planned investment and planned credit over all the groups give total planned investment and total planned credit respectively for the block as a whole.

\[
\text{i.e., } TPI = \sum_{g=1}^{5} TPI_{gb} \]

\[
TPC = \sum_{g=1}^{5} TPC_{gb} \]

Where \(g = 1,2,\ldots,5\) groups, as identified above. The estimates were made separately for each of the activities identified for investment by the farmers.

Functional Analysis

A major objective of this study was to estimate demand for farm credit and its elasticity for changes in interest rate and other policy instruments so that policies for bridging the credit-gap might be suggested. Like the demand for other farm inputs, demand for credit would also be a derived demand-derived from the demand for the products that it would help to produce. Credit would be a critical input in farm production but with a difference. Other inputs such as seeds, fertilizers, pesticides, irrigation, human
labour and bullock or machine power would directly contribute to increase productivity of crops sown on the land. But the credit would help the process only indirectly. It would facilitate (by releasing financial constraints of the farmers) choice of income increasing crop and livestock activities, improvement in farm structure including land and wells, and better crop practices such as application of higher doses of fertilizers, timely irrigation, weeding and plant protection. It should be emphasised that credit does not increase farm productivity per se but only indirectly by allowing purchase and use of other inputs at appropriate levels (doses). For example, if credit supply increases by say Rs.1000 per farm, and the prices of inputs increase so much as to increase the cost of cultivation at the existing levels of application of inputs by Rs.1000; then there can be no increase in application of physical inputs and consequently there can be no productivity gains. In this case, credit has helped just in sustaining the present level of inputs and not any increase in them. If application of physical inputs has to increase it depends upon the product-factor price ratio (technical optimum) vis-a-vis the productivity of inputs and further, (when there is scope for increasing application of inputs technically and economically) by the availability of finance to buy enough quantities of the inputs. It is in the latter context credit helps farmers.
The model. The following system of simultaneous equations was specified for estimating demand for credit.

\[(1) \quad CR = a_0 + a_1 C_0 + a_2 r + a_3 D + u_1 \]

\[(2) \quad C_0 = b_0 + b_1 Q + b_2 Q^2 + b_3 Q^3 + u_2 \]

\[(3) \quad Q = d_0 + d_1(OA) + d_2(CI) + d_3(CC) + d_4(HY) + d_5 PF + u_3. \]

For reasons discussed above demand for credit depended upon the cost of farm production (i.e., cost of cultivation of crops plus cost of maintenance of livestock), because it was to meet the cost fully that farmers borrowed. This cost did not include the value of family labour and farm owned inputs because their values were not paid-out, but just imputed. Therefore the cost \( C_0 \) included only paid-out cost and would correspond to the cost \( A-2 \) of Farm Management surveys. In general, a priori expectation was \( a_1 \geq 0 \).

Rationality in borrowing would require the farmers to be responsive to interest rates \( r \). Interest being the cost of borrowing, it was defined to include normal service costs of credit also. Then larger the rate of interest \( r \) lesser would be demand for credit i.e., \( a_2 \ll 0 \). But there were several cases of farmers being in dire need of credit
and they attempted to borrow in time, at any cost. Therefore it was also likely that response to interest rate might not be very elastic.

Institutional credit had received special attention as a substitute for credit from non-institutional sector to release the farmers—particularly small and marginal farmers—from the clutches of usurious money-lenders. Therefore, availability of institutional credit might have encouraged borrowing by farmers not only through lower interest rate but also through preferential supply to target groups. To catch this effect, a dummy variable (D) was specified. It took value 1, if the supply of institutional credit was available and a value zero, otherwise. Coefficient of this variable would measure the impact of supply of institutional credit (rather of special schemes operated by them) on demand for credit by farmers. As the aim of institutional agencies was to encourage borrowings by farmers (priority sector), a priori expectation was that \( a_3 \geq 0 \).

While the demand for credit (CR) was a function of cost (CO) of farm production, the latter depended upon the level of farm production. So conventional cubic cost function was specified, where \( Q \), the level of output was measured in Rs. (due to the problem of aggregating heterogeneous farm products for the farm as a whole). Thus, \( Q \) was gross-farm-income. For estimation purpose \( Q^2 \) and \( Q^3 \)
were substituted by actual values $x_1 = \Omega^2$ and $x_2 = \Omega^3$ so that the estimable form of the function was linear. 

\textbf{A priori} expectations were $b_0 > 0$, $b_1 > 0$, $b_2 < 0$, $b_3 > 0$. The problem of multicollinearity was expected and watched for. Fortunately, it was not serious and estimates could be obtained.

But $Q$, aggregate product of the farm was dependent on several variables. First, it would directly vary with the size of farm as measured by the operational area (OA), suggesting \textit{a priori} expectation of $d_1 > 0$. It would also depend upon the intensity of cropping (CI) and then it was expected that $d_2 > 0$. Further, substitution of grain crops with cash (commercial) crops like cotton, banana, sugarcane and oil seeds would increase farm income; together with it farm expenses also would increase. So an index of commercial crop was constructed and included as a separate variable (CC). The index was percentage of area under commercial crop to the gross cropped area. Larger the index, therefore, larger would be the value of $Q$ and $d_3$ would be expected to be positive. Among food crops high yielding varieties gave larger return per ha. than local varieties. Therefore percentage of area under high yielding varieties to the total area under food crops was included as a separate explanatory variable and called (HY) index. Therefore a priori expectation was that $d_4 > 0$. Finally the value of $Q$ would vary directly with the volume of fertilizers. But the variable included was price of fertilizers and so $d_5 < 0$. 
To allow for stochastic variations, error terms $u_1$, $u_2$, $u_3$ were included in equations (1), (2) and (3) respectively. They were expected to satisfy the classical normal assumptions. The intercept terms in all the equations were expected to be positive.

For want of computer facilities to solve this system of linear equations simultaneously, equation (3) was first estimated. With predicted value of $Q$, equation (2) was estimated. Then, with predicted value of $CO$, equation (1) was estimated, all by ordinary least square method. The results were used to derive interest elasticity of demand for credit. Responses of demand for credit (CR) for changes in $Q$, OA, CI, CC, HY and PF were also estimated and their implications were discussed.

't'-statistics was used to test significance of regression coefficients including intercepts (regression constants), while 'F' test was used to evaluate the statistical significance of $R^2$ - the coefficient of multiple determination. All statistical tests were performed at five percent and one percent levels of significance.

Computation of Farm Technology Index

Farm technology was treated as a continuous variable, because practised in the form of various operations, it allowed different levels of application. Adoption of all
recommended practices in full would define the maximum attainable level of technology available at any time. But technology would in itself be changing through efforts to improve it in the form of research and trials. Therefore technology as adopted by a farmer could be measured with reference to the practices recommended because the recommendations represented the potential at any point of time. Then deviation of actual practice from the potential would measure the difference in adoption of technology.

In crop production, recommendations were in respect of:—
(i) number of ploughings; (ii) pattern of sowing seed; (iii) seed variety used; (iv) seed rate in kilograms per hectare/acre; (v) seed treatment practised; (vi) the nature of compost-pit; (vii) soil-testing carried out or not; (viii) use of chemical fertilizers; (ix) number of irrigations carried out; (x) plant protection measures undertaken; (xi) practising of crop rotation; and (xii) the nature of marketing of produce.

There were recommendations for all or some of these items and these recommendations differed from one crop to another. Therefore, to know the adoption (more precisely the deviation of actual practice from the recommendations) it should be measured cropwise. Then weighted average of these measures would give an aggregate measure of adoption of farm technology in the farm as a whole. The weights
were the share of the area under the crop in gross cropped area. Such an aggregate measure was the technology index and was constructed as below:

i) \( R_j - A_j = \delta_j \)

ii) \( \frac{D_j}{R_j} \times 100 = PT_j \)

iii) \( PTI_c = \frac{1}{12} \sum_{j=1}^{12} PT_j \) Where \( j = 1, 2, \ldots, 12 \) representing crop practices as listed above.

iv) \( PTI_{wc} = \frac{FIT \times \text{Area under the crop}}{\text{Total Area cultivated}} \)

v) \( PTI_f = \sum_{c=1}^{n} \frac{PTI_{wc}}{n} \) where \( n \) is \( (c=1, 2, \ldots, n) \) the total number of crops in the farm.

Where \( R_j \) is recommended level of inputs \( j \);

\( A_j \) is the level of input actually used by the sample farmers;

\( D_j \) is the difference between \( R_j \) and \( A_j \);

\( PT_j \) is the farm technology adopted for \( j \)th item; \( (i.e., \) any one of the 12 crop practices);

\( PTI_c \) is the farm technology index estimated for \( c \)th crop cultivated in a farm.
FTI_{WC} is the weighted farm technology index for cth crop cultivated in a farm, and

FTI_f is the farm technology index for an individual farm as a whole.

Constructed this way, the index would show how the actual practices differed from the possible technology. Therefore, larger the value of the index lesser would be the return to the farmers and vice versa.

Opinion Survey

An opinion survey was part of the enquiry schedule to assess the risk preference of the farmers and to elicit their opinion on borrowing and their suggestions to improve the flow of institutional credit and its recovery. The risk preference was measured by a risk index. Farmers were requested to answer subjective questions on insurance, choice of risky crops, livestock activity and their goal in farming. Responses were recorded in a five point graded scale and revealed their attitude to risk. Average score over all the answers represented their risk aversion - a value 4 representing complete risk aversion and a value 0 representing risk preference.
All the officials in charge of disbursement of loans by the different agencies and also officials connected with the implementation of different agricultural programmes in the block were contacted in person to assess their opinion. Simple frequency tables were used to discuss opinions and suggestions of the farmers, officials of the cooperative and commercial banks, secretaries of the village societies and other bodies concerned. Results of this analysis would provide qualitative information to supplement results of quantitative analysis earlier discussed.
Results and Discussion