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Role of Agricultural Surplus in Farm Development

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The quantum of Agricultural surplus generated depends upon the level of technology adopted, size of population employed in agriculture and the institutional facilities. The amount of agricultural surplus in Chingleput district was Rs. 6,725.58 and Rs. 10,434.16 respectively for irrigated and dry land farms. Nearly 30 per cent of this was used to meet the consumption needs of the dependent members of the family. Out of 100 farms studied, 72 reported negative surplus revealing the poor economic conditions of the farms. This implies the subsistence nature of agricultural production and the need for increasing the investment expenditure for farm development.

The role of agricultural surplus in economic development of developing countries has been discussed in depth by Nicholls (1973) and the concept of agricultural surplus is implicit in a number of treatises on development of subsistence agriculture and of dual economies. For servicing the non-agricultural sectors of our economy by providing wage goods and capital for industrialisation, the size of agricultural surplus, defined as the amount by which agricultural output exceeds the total consumption of agricultural population, is of crucial importance.

The size of agricultural surplus generated during a given point of time depends by and large on the level of technology adopted in agricultural production, size of population employed in agricultural and indirectly institutional structure to facilitate for movement of surplus labour out of agriculture.

The role of agricultural surplus becomes highly relevant to any set of strategies for hormonious sectoral development in India. To be sure, agricultural surplus and development of non-agricultural sector are linked by technology, largely serviced by the latter, and investment efforts. In this paper attempts are made to estimate agricultural surplus and to analyse its broader implications. The results and conclusions can at best serve as basis for some working hypotheses to be tested through a larger research efforts latter.

MATERIALS AND METHODS

The district of Chingleput was selected for the study mainly because of predominance of rice farming depending upon rainfed tanks and dry land farming with ragi and groundnut. By means of cluster sampling, one cluster consisting of Chingleput, Kancheepuram and Maduranthakam

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taluk was selected in this district. From a sample of 200 farms originally drawn for an earlier study a sub-sample of 100 farms were selcted at random at the rate of 50 each under irrigated and irrigated and dry categories. The data were collected by means of interview method with the help of a pretested comprehensive schedule.

To workout the Agricultural surplus farm business expenditures related to both short and long-run decisions on farm development may also be included. This is similar to the concept of agricultural financial surplus as used by Schuh (1974). This surplus may be positive, zero or negative depending upon the magnitudes of size of the variables. Thus, the concept includes the variables : consumption expenditures, investment expenditures and total agricultural output in value terms as independent variables and financial agricultural surplus as dependent variables. All the variables are determined within the system. The multiple regression fitted to estimate the relationship between agricultural surplus (FS_a) and cropping intensity (CI), number of agricultural workers in consumption units (AW) and farm investment in rupees (I_a) for the irrigated (I) and irrigated and dry (II) lands were as follows :

I. $FS_a = -0.20397\ CI^{-0.00311}\ AW^{0.19864}\ I_a^{1.08380***}$

II. $FS_a = 0.09021\ CI^{0.00152}\ AW^{-0.00158}\ I_a^{1.06049***}$

*** significant at one per cent level

Except the investment expenditure other variables were found to be not significant.

Among the independent variables the relationship between output and consumption expenditure the latter may be specified as a linear function of former. Again, the relationship between total income and investment expenditures may show a strong association as the latter, by definition, includes all farm business inputs.

Formally :

Cousumption expenditure

$$C = \alpha_0 + \alpha_1 Y_a \ ; \quad 1 < \alpha \leq 0 \qquad \ldots (1)$$

Agricultural output

$$Y_a + \beta_0 + \beta_1 I_a \ ; \quad I_a > 0 \qquad \ldots (2)$$

Agricultural Financial Surplus

$$FS_a = Y_a - C - I_a \qquad \ldots (3)$$

By substitution

$$FS_a = (\alpha_2 - \alpha_1) + (\beta_2 - 1)\ I_a - \beta_1 Y_a \qquad \ldots (4)$$

Thus the estimating equation is

$$FS_a = b_0 + b_1\ I_a - b_2\ Y_a \qquad (5)$$

Another model was specified to explain the investment behaviour with reference to financial agricultural surplus and total agricultural output. In the rest of the paper the term agricultural surplus is used in the place of agricultural financial surplus. The model is;

$$I_a = \theta_0 + \theta_1 FS_a + \theta_2 Y_a \qquad \ldots (6)$$
$$\theta_1 \geq 0 \ ; \quad \theta_2 \geq 0$$

Where,

FS_a – agricultural surplus in rupees,

I_a — investment in agriculture in rupees,

Y_a — gross income from farming in rupees,

α, β, e — are parameters of the equation,

The signs of coefficients of the variables need explanation. Ideally one would expect e_1 and e_2 to have negative signs in conformity with the surplus transfer hypothesis. Larger the agricultural surplus and total agricultural output, production being at the optimum and at the highest plane of production surface determined by the best available technology, lesser will be the investment outlay in farms and greater will be the investment in non-farm sector. However, in subsistence agriculture with low productivity coupled with low level of technology the reverse is likely and therefore, the model is specified with positive structural coefficients.

RESULTS AND DISCUSSION

The average area of the sample farms is 2.260 hectares for irrigated holdings and 4.085 hectares for holdings containing irrigated and dry lands. The major crop in irrigated area of the sample farms is rice and crops like groundnut and cumbu are raised under rainfed conditions. The average gross income per farm works out to Rs. 8071.88 and Rs. 11,769.80 respectively for irrigated and irrigated and dry land farms. The corresponding per hectare gross income is of the order of Rs. 3571.63 and Rs. 2881.22 respectively. Though the average size of the farm is large, the gross income per hectare is low in the case of irrigated and dry land farms due to the low intensity of cropping. The cropping intensity was found to be 182.10 per cent for the irrigated farms and 143.29 per cent for the irrigated and dry land farms.

The consumption expenditure of the agricultural workers in a family, on an average, works out to Rs. 1346.30 and 1335.64 respectively for the irrigated and irrigated and dry land farms. Though the gross income is more in the irrigatee and dry land farms, no significant difference could be seen in the consumption expenditure of the agricultural workers of the family between the two categories of farms under consideration. Using Lusk's Coefficient, the consumption units were computed which were 1.94 and 1.89 respectively for irrigated and irrigated and dry land farms. This proves that there is no difference in the number of consumption units of agricultural workers per family and consumption expenditures in the two categories of farms.

The amount of agricultural surplus in the two categories of farms works out to Rs.6725.58 and Rs.10,434.16 respectively for irrigated and irrigated and dry land farms. This surplus has to put to use to cover the consumption expenditure of the dependent members of the family and the cost of cultivation of crops raised in the farm. In the present study area, the amount used to meet the consumption expenditure of the dependent members of the family was of the order of Rs. 2189.24 in irrigated farms

and Rs. 2572.50 in irrigated and dry land farms. This works out to 32.55 per cent and 24.65 per cent of the agricultural surplus in the two categories of farms respectively. The number of dependent members per family was found to be 3.94 and 4.76, respectively in irrigated and irrigated and dry land farms. This shows that irrespective of the size of the family in the study area, the number of agricultural workers per family remains the same or in other words, as the size of the family increases, the number of dependents per family also increases.

After meeting the consumption expenditure of the dependent members of the family, the remaining surplus is available to meet the expenses of the farm. The cost of cultivation of crops per farm works out to Rs. 5469.64 in irrigated farms and Rs. 6516.28 in irrigated and dry land farms. Further, 28 farms out of 100 sample farms have reported agricultural surplus and the rest have deficit. It may be concluded that in the aggregate, in the selected area no agricultural surplus is available with farms for further investment in agricultural and/or non-agricultural sectors.

The size of agricultural surplus varied between farms of different resource endowments. Out of 100 farms studied as noted avove, 72 farms reported negative surplus revealing precarious economic conditions and stability. Two functions were estimated, one for all the farms and anotner for farms with positive agricultural surplus. The estimated functions are :

All farms : (N = 100)

$$FS_a = -114.13570 + 0.33948\ I_a^{***} - 0.10795\ Y_a^{*} \quad \begin{matrix}(0.05753)\\(0.05522)\end{matrix}$$

$$R^2 = 0.26 \qquad \ldots (7)$$

Surplus farms : (N = 28)

$$FS_a = -5929.89 - 1.05612\ I_a^{***} + 0.86484\ Y_a^{***} \quad \begin{matrix}(0.17837)\\(0.18396)\end{matrix}$$

$$R^2 = 0.95 \qquad \ldots (8)$$

Similarly, the investment functions estimated are :

All farms : (N = 100)

$$I_a = 629.85 + 0.77456\ FS_a^{***} + 0.35756\ Y_a^{***} \quad \begin{matrix}(0.13167)\\(0.07719)\end{matrix}$$

$$R^2 = 0.37 \qquad \ldots (9)$$

All farms - Dummy included : (N = 100)

$$I_a = 4142.81453 + 0.82991\ FS_a^{***} + 0.83692\ Y_a^{***} - 1.72441\ D^{***} \quad \begin{matrix}(0.11543) & (0.10963) & (0.31108)\end{matrix}$$

$$R^2 = 0.53 \qquad \ldots (10)$$

*— Significant at 10 per cent
**— Significant at 5 per cent
***— Significant at 1 per cent

In the equation (7), the coefficient of multiple determination is 0.26, showing that 26 per cent of variation alone could be explained for by the independent variables included. One may note that the variations in agricultural surplus were large ranging between positive and negative agricultural surplus reported in the sample farms. The regression coefficient of investment in agriculture was found to be significant at one per cent level whereas that of total agricultural output was significant at 10 per cent level. The signs are as expected.

The partial regression coefficient for investment, when computed as specified in the model-equation (4), is 1.33948 which implies that an investment expenditure of Rs. 100/- would, *ceteris paribus* lead to an increase in the agricultural surplus of Rs. 133.95. Similarly, the coefficient for total agricultural output has to be interpretted.

From the equation (8), it may be noted that the coefficient of multiple determination is as high as 0.95 showing the goodness of fit. However, the signs of the regression coefficients are the opposite compared to that of the model specified. In this case the agricultural surplus being positive, an increase in investment expenditure other things being the same, would reduce the agricultural surplus. Even though the changes in agricultural surplus are marginal i.e., an increase in investment expenditure by Rs. 100 would reduce the agricultural surplus by only Rs. 5 this may plausibly indicate the levels of technology that has been adopted. This is also supported by the positive regression coefficient of the total agricultural output, which shows that an increase in total agricultural output by Rs. 100 would increase the agricultural surplus by Rs. 86.48, other things being equal. In sum, one would generalise, subject to further verification by additional research foucs, of course that the size of agricultural surplus in most of the farms, noted for their subsistence production system and low levels of productivity, additional investment to augment resource base and to improve the techniques of production would likely to increase the size of the agricultural surplus. In cases where some positive agricultural surplus exists, the startegy would seem to be increasing total agricultural output through rationalization of the decision on resource development, allocation and use.

As regards the investment functions, the coefficient of multiple determination are 0.37 and 0.53, respectively which implies the existence of considerable uncertainties over investment expenditure probably due to uncertainties proverbially endemic in the agricultural system. The function in equation (9) shows that the regression coefficients of agricultural surplus and total agricultural output are positive and highiy significant as hypothesized earlier. This function covers all the 100 sample farms with positive and negative agricultural surplus. In the function in equation 10, a dummy variable has been includee to discriminate the positive and negative surplus. This has improved the regression coefficients as well as the coefficient of multiple determination besides the cofficient of the dummy variable being highly significant. The signs of the coefficients of agricultural surplus and the total agricultural output are positive and as expected which implies the subsistence nature of agricultural production system and the need for increased investment expenditure for farm development.

POLICY IMPLICATIONS

From the foregoing discussions some issues relevant to development

policies and strategies are discernible. First, the role of agricultural surplus depends on its size which, in turn, are influenced by levels of technology adopted, and size of agricultural population - earns and dependents, and size of investment in agriculture. A subsistence agriculture generates no surplus to offer to other sectors for their development. The inter-dependent relations among sectors require planned investment strategies for over all development. Thus, creation of substantial agricultural surplus can be accomplished by production and distribution of new technologies for which larger share of national investment must be provided for research and development in agriculture. Further, such strategies have linkages with agri-based industrial development, possibly, in decentralized fashion along rural-urban continum.

Second, the high dependent-earner ratio indicates inadequate job opportunities and insufficient skills of dependents. Investment in human capital will go a long way to build professional skills and labour productivity and prepare for productive mobility. This follows the familiar Schultzian arguments and has great potential for creating agricultural surplus.

Finally, risks and uncertainties in agriculture not only affects the size of agricultural surplus but also its distribution over time. This has relevance to credit and debt cycles which influence the transfer flows of agricultural surplus. Strategies to minimize the impact of risks and uncertainties such as insurance mechanism, buffer stocks management and appropriate production technologies for rainfed agriculture need to be considered.

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