Price and Output Response of Marketed Surplus of Foodgrains: A Cross-Sectional Study of North-Indian Villages

by

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It is now generally recognized that the flow of marketed surplus of foodgrains is one of the crucial limiting factors in the process of industrialization, particularly in those developing economies where export prospects are not very bright and where the need for large imports of capital goods and intermediate products leave little scope for commercial import of foodgrains. It is, therefore, important to understand how marketed surplus of foodgrains responds to changes in production, prices and other relevant variables. For example, the nature of output response of the marketed proportion of foodgrains output would indicate if the problem of marketed surplus becomes more acute or less as agricultural production increases over time; similarly, the nature of price response would indicate the possible impact of different kinds of food price regulations or distribution of imports of food under U.S. Public Law 480 (an oft-debated issue) on the marketed surplus and suggest suitable price policies if the aim of the Government is to increase such surplus in order to feed the industrial population. In spite of the general agreement on the importance of the subject, the literature on empirical estimates of the response coefficients of marketed surplus of foodgrains is still very small. The major reason

for this, of course, is that available data on sales or marketed surplus of foodgrains in most underdeveloped countries are less adequate and satisfactory than most other kinds of agricultural statistics. In view of the lack of time series data for marketed amounts, there have been some studies[1] estimating the price response of marketed surplus through an indirect, and overly aggregative, approach. These estimates are, in general, derived on the basis of the estimated income and price elasticities of demand for foodgrains for the agricultural sector as a whole, the supply elasticity of grain production to current price changes (or expected prices as related to current prices) and a production adjustment lag when changes over time are implied. Because of the indirect nature of the estimates and depending on the approximation assumptions made about the price response of production and time lag of response, the likely magnitude and even the sign of the price elasticity of marketed surplus is still debatable. Besides, from a study of the available sources it seems that the imperfections of the data become less serious as one gets down to more disaggregate levels; and because of significant lack of regional uniformity within a country a disaggregative study is probably more meaningful for policy implications. In view of all this, we have attempted in this paper a cross-sectional[2]

[1] See Raj Krishan [7], Krishnan [5], Behrman [2].

[2] Raj Krishna [8] has alos studied the behaviour of marketed surplus with changes in the size of holding, the level of grain production or farm income fro cross-sections of cultivating households in selected villages. This approach has been extended to the aggregate national level by Dharm Narain [3] who indirectly derived the distribution of marketed
(footnote continued on next page)

(inter-village) study for a set of several North-Indian villages, estimating the response of marketed surplus to variations in average output and price of foodgrains and also to some other possible relevant variables, particularly income of farmers from sources other than foodgrain production.

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Data:

From the socio-economic surveys of villages carried out by the Agricultural Economics Research Centre at University of Delhi we collected data - for twenty seven villages of Punjab and Uttar Pradesh - relating to the marketed proportion of foodgrain production and some of the major economic factors that might influence it. These are described in Appendix Table A.1.

Each observation in Table A.1 relates to all the cultivators (owner, tenant, and mixed) in a village put together. The dependent (Y) and the explanatory variables (X's) are defined as follows:

Y: Total amount of foodgrains (cereals and pulses sold by the cultivators in a village as percentage of production of foodgrains; figures used for both sales and production are in

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surplus according to size-classes of operational holdings in India in 1950-51. In both cases, either the impact of independent variables other than output is presumed unimportant or the objective is to find out the net outcome of the effects of these variables on marketed surplus for size-classes of holdings.

quantity terms (maunds) that are equivalents of 82.3 lbs.)

X_1: Foodgrain production (in maunds) per adult unit of the cultivating population of the village. Per adult unit rather than total amount is considered in order to take account of inter-village differences in size and age-sex composition of the cultivating population. Adult unites are obtained by applying a conversion ratio based on the age and sex structure of the population of the village concerned. A minor (less than or equal to 15 years) is taken as equivalent to 0.8 unit and an adult female to 0.9 unit as far as grain consumption is concerned.

X_2: Average price (rupees per maund) at which foodgrains were sold by the cultivators in a village. The village surveys do not quote any market prices as such, but give only the quantities and the values of sales and production of foodgrains. The average 'sale price' (X_2) is derived from dividing the value of total foodgrain sale by the quantity sold. The appropriateness of using this price for explaining cultivators' marketing decisions may be questioned in a situation where a number of foodgrains are raised during any year, none being of overwhelming importance, and the proportion sold is not the same for different grains in different years or in different villages. This is the case in North-West India as distinct from the cases of the rice-growing South and East. In this case, a better index of the average grain price that influences marketing

decisions would probably be one in which the weights used for prices of the different food-rains relate to the volumes of their production rather than their sales. This would be the average price derived from dividing the total value of production of foodgrains by the total volume. We have used both the indexes, and it so happens that in the particular sample they do not make much difference to the results.

X_3: Value of production of commercial crops other than foodgrains defined as per adult unit of the cultivating population in a village

X_4: Average income of cultivators from sources other than the production of crops. Over most parts of Punjab and Uttar Pradesh, livestock products (milk and ghee) form the most important source of income for the cultivators outside the production of crops. Hence X_4 in our model stands for the value of production of milk (and its products) per adult unit of the cultivating population.

X_5: Index of concentration of cultivated acreage in a village. Cultivating households and cultivated area in a village are classified into three size-groups: up to 5 acres, 5 to 15, 15 acres and above. The concentration index is then obtained by summing the differences between the cumulated percentages of households and of cultivated area in each size class, and dividing the sum by 100. The larger the difference between

the percentage of households and the percentage of area in each size class the larger is the index. When the proportion of households in each size class equals the proportion of area in the corresponding size class, the index assumes a value of zero. With rise in concentration of area in upper size classes, the index goes up, the maximum limit being unity.

X_6: Other disposals of foodgrains (i.e., other than sales) minus other receipts of foodgrains (i.e., other than what is produced on the farm) as proportion of foodgrain production. These other disposals consist of rent and wage payments in kind. Some of these disposals may be mutual payments among the cultivators themselves. To exclude these mutual payments and to obtain the net disposals of foodgrains by the cultivators as a group to the pure rent receivers and the agricultural labourers, we have subtracted the sum of 'other receipts' of foodgrains for the cultivators from the sum of 'other disposals' of grains.

Theoretically Expected Signs of Response Coefficients

Let the marketed surplus equation for an individual cultivator or a group of cultivators be

$$S = O_f - C_f - N \qquad (I)$$

where the respective terms are sales, production, consumption and net

other disposal (i.e. payments in kind minus receipts in kind) of foodgrains.

Lt us assume, for the sake of simplicity, the basket of consumption goods purchased by the cultivator to be the numeraire good and its price to be unity. Then from equation I,

$$s = \frac{S}{O_f} = 1 - \frac{C_f(O,P_f)}{O_f} - n \qquad \text{(II)}$$

where his total income is $O = P_f \cdot O_f + P_c \cdot O_c + P_m \cdot O_m$, P_f being foodgrain price, $P_c O_c$ being the value of production of crops other than foodgrains, $P_m O_m$ being the value of production of milk and milk products (which constitute the main source of income outside crop production for the North Indian cultivator), and n is net other disposal of foodgrains as a proportion of output.

From equation II,

$$\frac{\partial s}{\partial O_f} = \frac{C_f}{O_f^2}\left(1-e\cdot\frac{P_f O_f}{O}\right), \qquad \text{(III)}$$

e denoting the cultivator's income elasticity of demand for foodgrains.

Similarly,

$$\frac{\partial s}{\partial P_f} = \frac{C_f}{O}\left(-e + \frac{\sigma}{P_f O_f} O\right), \qquad \text{(IV)}$$

σ being the cultivator's price elasticity of demand for foodgrains defined as positive.

For India as a whole, with e = 0.6 to 0.8[3], σ = 0.2 to 0.5[4], and $P_f O_f/O$ = 0.5 to 0.55[5], which are plausible ranges of values for India, the output response of marketed surplus (i.e., $\frac{\partial Y}{\partial X}$, in terms of the notation used in our Tables) is almost invariably non-negative. And the price response coefficient ($\partial Y/\partial X_2$ in terms of our Tables) may or may not be negative. But the likelihood of obtaining a negative coefficient rises as e and/or $P_f O_f/O$ tend to have larger values within the assumed range and/or as σ tends to have smaller values. Considering the dependence of O on $P_c O_c (X_3)$ and $P_m O_m (X_4)$, $\frac{\partial Y}{\partial X_3}$ and $\frac{\partial Y}{\partial X_4}$ from equation II may be expected to be negative.

From Equation II it also seems that $\partial Y/\partial X_6$ is likely to be negative since $\partial s/\partial n < 0$. Between two villages or cultivators with similar production condition, a larger volume of net disposal other than sales may arise from any of the following: (a) if the proportion of total cost (wages, rent and others) that is <u>paid in kind</u> is larger, which may be due to institutional reasons, (b) if total paid-out cost itself is

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[3]Based on expenditure elasticities of demand for foodgrains in the rural sector estimated from different rounds of NSS data, and an income elasticity of expenditure assumed to be 0.95 for the rural sector.

[4]Based on estimates by Barpujari and Chandra [1] and Krishnan [4].

[5]Value of foodgrain production as percentage of total value of output of all crops and their byproducts was 53.8 in 1960-61 according to the calculations of National Council of Applied Economic Research [6]. The proportion was slightly smaller than this during the First Plan Period.

larger (which may arise from a larger ratio of leased in to cultivated area, larger employment of labour, or higher rates of rent and wage), (c) if more of the purchased consumption goods and services are obtained through direct barter. In case (c) this 'other disposal' constitutes a part of the marketable surplus, so that even with unchanged output and marketable surplus of grains, the quantity actually marketed will vary inversely with net other disposal. In case (b), net grain production, $X_1(1-X_6)$, and hence cultivator's real income would be smaller where this other disposal is larger; and this would reduce the marketed surplus out of the given gross production provided the cultivator's marginal propensity to consume foodgrain is smaller than unity. In case (a), changes in other disposal would inversely change the marketed proportion of total marketable surplus and of production; a larger proportion of cash payment of costs would lead to larger sales, a part of which may eventually be bought back from the village market by the payee.

The response of marketed proportion of production to X_5, i.e. the degree of concentration in the distribution of land (as a proxy for the distribution or production) among different size-classes, is likely to be positive as long as the response of the marketed proportion to change in production is positivie and if larger-sized holdings are associated with larger levels of grain output per consuming unit.

The theoretically expected signs need not always be statistically obtained, because of at least two factors: (a) some factors other than

those covered by the independent variables considered may have some bearing on the dependent variable, and (b) two or more of the variables taken account of may be related to a third common factor left out which may cause disturbances in the regression estimates.

Notes on Villages:

With these a priori comments about the nature of dependence of marketed proportionof production on the variable under consideration, we may now turn to analyse the inter-village observations presented in Table A.1. As noted in the Table, the reference year is not the same for the different observations, though most of them cluster within the Second Plan period - a period during which the effects of Bhakra Nangal irrigation and of consolidation of holdings were being felt widely in rural Punjab. The non-uniformity of reference year need not make an inter-village analysis of marketed surplus impossible. By including some of the major structural factors among the explanatory variables, one can take care of most of the effect of differences in reference year on the dependent variable. In an analagous way it can be argued that if for the same village the values assumed by the dependent and/or by some of the explanatory variables are found to be different as between two points of time separated by a few years, then they may be treated as constituting practically two different observations for the purpose of the inter-village regression analysis. Village Sohalpur Gara, for example, was enormously different in 1958-59 (when the resurvey was made)

from 1954-55 (year of the initial survey) as a result of the setting up of a sugar mill only over a mile away, and the construction of a road connecting the village with the mill and of two large tubewells that irrigated 68% of the cultivated area where previously there was little irrigation. In an important economic sense the two surveys give us two distinct cases. In the following regression analysis we have first included both of the double point surveys for the villages surveyed twice, and then excluded one of them from the sample. This change in the sample produces little striking difference in the results - which, incidentally, justifies the above argument.

Though confined mainly to one region of the country, the selected villages present quite a varied cross-section of economic conditions. Village Lodi Nangal, for example, is electrified, has almost 100% of its cultivated area under irrigation; most of its cultivators keep milch cattle to meet the demand of a government dairy only 15 miles away. The Ferozepur villages have large-sized operated holdings in many of which improved implements, including tractors, are used for wheat cultivation. These villages are in striking contrast to some villages from Uttar Pradesh,like village Palanpur which has very poor soil subject to recurrent floods and small-sized holdings cultivated with backward techniques. As for the size-distribution of cultivated area, in village Dughri only 3 of the 53 cultivating households had holdings equal to or smaller than 5 acres; in Koloyee, on the other hand, about half of the cultivators belonged to this size-class. Operational

holdings in the size-group of '15 acres and above' accounted for 10% or less of all holdings and for 30% or less than all cultivated area in Bjohpur, Dhakia, Mehtiana, Rawatpur and Palanpur ; on the other that this size-class accounted for more than 60% of holdings and more than 80% of cultivated area in Sarai Naga, Patran, Lodi Nangal, and nearly also Rataul Rohe.

There are substantial differences even among villages within the same district and for the same village between two surveys.

Results

As indicated in Table 1 (Regression (a) to (d)), the linear regression estimates of marketed proportion of production on grain production are positive and significant, and on grain price negative and significant throughout. The reamining regression coefficients are of the expected sign except that of Y on X_3 which turns out to be positive though statistically insignificant. The variables with statistically significant influence on marketed proportion of production in the sample of villages are the average production and price of foodgrains, and in some cases also the average income from milk production in a village and net disposal of foodgrain other than through sales as a proportion of production.

Two aspects of these results seem to be rather important. One is that the volume of marketed surplus is a quadratic function (with positive second derivative) of the average level of foodgrain production,

TABLE 1: Marketed Surplus Function: Regression Coefficients for a Cross-section of North Indian Villages

	Constant Term	X_1	X_2 or X_2'	X_3	X_4	X_5	X_6	Degrees of freedom	R	Sample Elasticity of Y to: X_1	Sample Elasticity of Y to: X_2
(a) All 31 cases or Table A.1, with X_2'	24.913*	1.293*	-1.351*	.068	-4.683***	9.549	-.097	24	.821*	.788	-.575
(b) Same as (a), but with X_2	29.887*	1.176*	-1.641*	.738	-4.147	7.514	-.083	24	.840*	.717	-.738
(c) 27 cases, excluding one of each double point surveys and with X_2'	28.814*	1.265*	-1.447*	.527	-8.[illegible]7*	7.021	-.048	20	.832*	.774	-.599
(d) Same as (c), but with X_2	31.308*	1.168*	-1.632*	1.145	-7.343**	5.699	-.013	20	.847*	.719	-.712
(e) All 27 cases of Table A.2 with X_2'	32.740*	.808*	-.926***	.234	-4.350***		-.242	21	.683*	.595	-.330
(f) Same as (e), but with X_2	36.000*	.796*	-1.245***	.554	-4.184		-.233	21	.690*	.585	-.464
(g) 22 Cases of Table A.2, using criterion(ii) and with X_2'	58.842*	.574*	-1.273***	-1.098	-3.608		-.907*	16	.728*	.432	-.448
(h) same as (g), but with X_2	58.655*	.587**	-1.359***	-.828	-3.692		-.863*	16	.727*	.442	-.498
(i) 19 cases of Table A.2, using criterion (iii) and with X_2'	48.656*	.727*	-.840	-.868	-7.430***		-.514	13	.672*	.578	
(j) Same as (i) but with X_2	47.627*	.723*	-.615	-.969	-7.396***		-.560	13	.662*	.574	

* significant at 1-5 percent level, ** significant at 5-10 percent level, *** significant at 10-25 percent level
Source: Tables A.1 and A.2

as indicated by the significantly positive regression coefficient of the marketed proportion of production on production itself. This is analogous to the time-series case of the marginal propensity to sell foodgrain rising with its production. From Table 1, the output elasticity of the marketed proportion of output is between .5 to .8, and the corresponding output elasticity of amount marketed is between 1.5 to 1.8. We may note from our Equation (III) that for the output elasticity of marketed surplus to be more than unity a sufficient condition is that cultivators' income elasticity of demand for foodgrains be less than (or equal to) unity.

The other important observation relates to the negative sign of the price response of marketed surplus as a proportion of production (and also in absolute terms[6]). For our sample of villages, the estimated value of the elasticity is -.45 to -.71 from Table 1. As is apparent from Table 1, this negative response of marketed surplus to changes in foodgrain price is net of the effect of changes in the price-ratio between foodgrain and other crops (which affects variable X_3, with given X_2) or, more generally speaking, it is net of the effect of changes in cultivators' income from sources other than foodgrain production (X_3 and X_4).

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[6] For the sample of cases in Table A.1 we noted that average grain price (P_f) and production of grains (O_f) are not significantly correlated (the coefficient of correlation is less than 0.1 in absolute value). This means that the result of $\partial(S/O_f)/\partial P_f$ being negative implies $\partial S/\partial P_f$ also to be negative.

A change in grain price affects marketed surplus both directly and through its effect on the cultivator's income. The consistently negative price elasticity of marketed surplus thus implies, for this cross-section of villages at least, that the rise in income generated, ceteris paribus, by larger grain price leads to a rise in demand for retention[7] of foodgrains large enough to outweigh the negative substitution effect on consumption. This negative price response suggests the possibility that a fall in grains price due to food price regulations or imports may not have an adverse effect on marketed surplus of farmers, contrary to what is sometimes taken for granted. As long as income elasticity of demand for foodgrains remains large in the agricultural sector, this possibility should not be ignored. In this connection it may be worthwhile to find out if the price response coefficient is negative even in the case of a subset of richer cultivators whose income elasticity of demand for foodgrains is likely to be smaller. For this purpose we have carried out some additional estimates of output, price and other response coefficients for the "richer" sub-samples.

In doing this we immediately face the complicated problem of defining 'better-off' cultivators with specific reference to the villages under consideration. We have used three rough - but not very unreasonable - criteria which are discussed in more detail in the note to Table A.2. These are: (i) grouping together - for each village -

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[7] This retention includes that for livestock feeding the income elasticity for which may be fairly high in view of the importance of milk and milk products for many of these villages.

only the cultivators with operational holdings of 10 acres and above (this gives us the 27 cases described in Table A.2); (ii) out of these 27, selecting only the cases (22) for which a 10 acre holding yields an annual income (net of paid costs of cultivation - see note to Table A.3) worth at least about Rs. 1000 which may be regarded as above the subsistence minimum for the period under consideration; (iii) in order to study the marketing behaviour of cultivators who are better-off not only in terms of total farm income but also in terms of grain production, we have picked out 19 cases out of the 22 from (ii) such that in each the level of grain production per adult unit for the larger cultivators (with more than 10 acres) is not less than 15 maunds in a year[8] (i.e. not less than 100 pounds per month).

Comparing regressions (e) - (j) with the results obtained from the earlier, more general sample (regressions (a) - (d)), one finds that the marketed proportion of productionis positively related in a statistically significant way to production level even in the case of the

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[8]The reason for fixing this limit is as follows. From the 15th Round of National Sample Survey of comsumer expenditure data relating to the year 1959-60, we note that the level of average annual foodgrain consumption among the richer sections of the rural population (i.e. the weighted averate for those with monthly per capita consumption expenditure of at least Rs. 15) was about 7.5 maunds per capita and about 8.5 maunds per adult unit. Assuming that this approximates the average level of grain consumption among the larger cultivators (with more than 10 acres) of Punjab and Uttar Pradesh, and adding to this approximate figures for seed, wage payments in kind and livestock feed, one may regard the figure of 15 maunds per adult unit as a rough indicator (probably biased upward rather than downward) of the level of comfortable retention of foodgrains by the better-off cultivating households.

richer subsamples. The estimated output elasticity of marketed surplus (net of the effects of the other variables) is around 1.7. The cross-sectional price elasticity of marketed surplus, though still negative, appears to be statistically less significant than in the case of the general sample. Referring back to equation (IV), we may note that the likelihood of obtaining a negative price elasticity of marketed surplus declines as the income elasticity of demand for foodgrains and/or the importance of foodgrains in total farm income becomes smaller. The value of foodgrains production as a proportion of total income of cultivators from crops and livestock products is only slightly smaller for the richer sample of Table A.2 than for the sample of Table A.1 (39% as against 40%). But the income elasticity of demand, from the available National Sample Survey data, seems to be smaller for the upper income classes than for all the income or expenditure classes put together. This may give us a plausible explanation for the weaker negative price elasticity obtained for the richer subsamples.

All this seems to indicate that at the present stage the agricultural sector as a whole in countries like India may <u>not</u> necessarily market more grains when grain price goes up, but this might be less of a problem for relatively more prosperous regions or farmers. Needless to mention, however, that our study is in terms of a very simplified framework and carried out on the basis of evidence with regards to a specific region; for settling this important policy problem in economic development one would need more conclusive evidence and more extensive study.

Table A.1

Factors Affecting Marketed Surplus as a Proportion of Production of Foodgrains (Y) in 27 Villages of Uttar Pradesh and Punjab

Name of Village	Reference Year	Y	X_1	X_2	X_2'	X_3	X_4	X_5	X_6
Rataul Rohe	1955-56	45.5	27.4	12.73	13.88	1.16	2.79	0.485	10.3
Rataul Rohe	1960-61	36.8	30.7	14.01	14.04	2.08	1.45	0.397	11.3
Palanpur	1957-58	12.9	5.5	15.23	14.64	0.77	0.63	0.459	12.2
Saran	1954-55	18.0	17.6	8.64	7.06	1.01	2.58	0.310	11.7
Saran	1959-60	13.9	15.1	16.08	14.87	1.20	1.16	0.262	14.4
Dughri	1956-57	20.9	16.3	14.00	13.66	2.73	1.14	0.190	20.3
Mehtiana	1957-58	22.4	12.0	14.61	14.62	2.36	0.70	0.230	22.6
Rawatpur	1957-58	24.7	8.3	12.34	12.52	1.15	0.46	0.375	14.7
Sohalpur Gara	1954-55	33.2	13.4	10.63	8.74	1.31	0.81	0.214	7.0
Sohalpur Gara	1958-59	26.2	13.1	12.47	12.59	1.72	0.54	0.328	13.6
Walidpur	1958-59	11.4	10.1	17.44	16.55	6.25	0.80	0.508	17.8
Kukar Majra	1956-57	28.2	19.9	14.92	10.76	2.62	1.45	0.254	20.6
Koloyee	1957-58	17.1	8.8	15.63	14.67	1.81	0.73	0.922	19.8
Ghiana	1954-55	29.2	18.3	9.80	8.31	3.41	0.68	0.355	17.4
Patran	1957-58	40.8	28.5	10.89	11.75	1.52	1.21	0.150	16.3
Noorpur	1955-56	30.4	11.6	11.67	11.69	0.99	0.95	0.377	29.9
Naunera	1954-55	46.7	24.7	6.49	6.69	1.62	1.41	0.385	14.7
Shamaspur	1954-55	9.6	9.1	10.83	8.67	0.74	0.35	0.228	28.1
Meharwani	1954-55	38.1	10.4	11.14	9.70	2.04	1.11	0.256	21.4
Sochiana	1957-58	41.7	28.9	12.82	12.09	1.85	1.39	0.455	28.1
Lodi Nangal	1957-58	35.7	30.5	11.24	11.25	1.88	1.40	0.142	28.7
Bhatian	1960-61	50.2	20.7	14.44	12.57	7.12	0.70	0.458	10.0
Sarai Naga	1955-56	59.2	49.5	15.11	12.95	10.76	2.12	0.195	0.0
Kala Jhar	1956-57	31.9	21.3	13.07	11.97	2.79	1.68	0.410	19.2
Dhakia	1958-59	10.2	7.8	17.86	14.65	1.19	0.22	0.290	9.1
Arwah	1955-56	23.3	11.9	8.34	9.91	0.50	0.46	0.325	18.4
Akoi	1956-57	16.9	20.1	13.75	14.41	3.09	1.78	0.364	12.3
Bahautwas	1955-56	26.6	8.3	6.91	7.08	0.35	0.46	0.517	6.1
Bhautwas	1959-60	4.2	3.2	14.14	13.02	0.51	0.26	0.448	8.4
Bhunderi	1958-59	31.1	11.4	10.29	10.72	1.22	0.44	0.205	15.4
Bhojpur	1954-55	28.5	11.5	12.15	12.63	0.77	0.20	0.196	12.4
Arithmetic Mean		27.9	17.03	12.55	11.89	2.21	1.03	0.345	15.88

Source: Village Surveys by the Agricultural Economics Research Centre at the University of Delhi

Note: 17 of these villages belong to the state of Punjab, and 10 to Uttar Pradesh.

Table A.2

Factors Affecting Marketed Surplus as a Proportion of Foodgrains Production (Y) for Cultivators with Holdings $\geq$ 10 acres, in 26 Villages of Uttar Pradesh and Punjab

Name of Village	Y	X_1	X_2	X_2'	X_3	X_4	X_6
Rataul Rohe I	47.6	43.3	12.73	12.18	1.59	3.61	10.4
Rataul Rohe II	39.0	57.6	14.02	13.58	3.97	2.28	13.4
Palanpur	13.7	12.6	14.78	14.82	1.91	0.89	16.6
Saran I	19.3	17.6	8.61	6.93	0.99	2.66	10.5
Mehtiana	36.5	14.1	14.60	14.63	3.20	0.97	10.5
Rawatpur	35.0	16.7	11.97	12.32	2.63	0.65	15.5
Walidpur	14.6	17.5	17.60	16.40	11.42	1.31	13.6
Kukar Majra	28.4	22.2	15.43	13.44	3.75	1.32	20.3
Koloyee	29.5	21.9	14.96	16.28	6.33	1.02	12.1
Patran	40.7	21.9	10.94	11.75	1.64	1.23	17.1
Noorpur	35.1	18.1	11.85	11.73	1.44	1.15	28.2
Sochiana I	50.4	42.0	12.96	12.31	2.42	1.44	20.0
Bhatian II	53.4	16.4	14.44	12.52	5.49	0.73	6.6
Sarai Naga	59.2	49.5	15.11	12.95	10.76	2.12	0.0
Kala Jhar	32.0	24.4	13.07	11.97	3.18	1.68	21.5
Akoi	17.4	28.1	13.76	14.39	4.39	2.29	12.7
Bahautwas I	26.7	12.4	7.02	5.56	0.72	0.45	7.2
Bahautwas II	6.0	5.0	14.22	13.89	0.76	0.26	6.4
Bhunderi	40.1	12.7	10.01	10.59	1.27	0.34	19.6
Bhojpur	25.9	13.5	13.06	13.64	1.43	0.49	19.5
Lodi Nangal	37.0	38.9	11.25	11.28	2.40	1.70	27.8
Shamaspur	11.3	11.5	10.97	8.70	0.95	0.45	32.7
Naunera	54.0	36.7	6.56	6.36	2.83	2.12	14.1
Sohalpur Gara I	34.0	32.0	9.84	8.72	4.04	1.06	7.0
Ghiana	29.2	21.6	9,79	8.29	3.99	1.03	16.0
Arwah	25.7	14.1	8.36	10.16	0.62	0.84	19.6
Meharwani	41.5	25.4	11.12	9.80	4.47	1.32	19.0
Arithmetic Average	32.71	24.07	12.18	11.67	3.28	1.31	15.48

NOTE TO TABLE A.2: For much of north-west India covering Punjab and Uttar Pradesh, a cultivator with an operational holding of 10 acres or more is considered to be beyond the stratum consisting of subsistence peasants. Table A.2 presents the relevant data for the group of cultivators with operational holdings of 10 acres and above in each of the villages. Four cases of Table A.1 could not be included in this Table because of inadequate breakdown of available data among different size-classes; these cases are: Saran (1959-60), Sohalpur Gara (1958-59), Dughri and Dhakia.

A household with an annual income of about Rs.1000 may be regarded as above the subsistence minimum for the period under consideration (i.e. the second half of the fifties). In many parts of Punjab and U.P. a 10 acre holding may be expected to yield (under normal weather conditions, and with the prices of the period) a net produce (i.e., net of all paid out costs of cultivation except rent) worth not much less than Rs.1000. Farm Management Survey data for Punjab [9] shows this net value of produce from an acre of land in two surveyed districts to be very nearly Rs.100. This is corroborated by our analysis of net value of produce per acre (in Table A.3) for the selected villages in less than one fifth of which the net value of produce per acre at current prices is significantly below Rs.100. In 5 cases of this Table, viz., Saran, Meharwani, Arwah and Bahautwas (both surveys), a 10-acre holding did not yield at least Rs.900-1000 of net farm income.

The norm for the above-subsistence income should perhaps change with changes in the price conditions and with differing volume and composition of consumption opportunities. A cultivator with, say, Rs.700 of net farm income may not feel as badly placed in a remote, backward village like Bahautwas or Arwah as he would in a prosperous village situated near cities like the villages Sarai Naga or Kukar Majra. From this point of view, it may be quite legitimate not to exclude the 5 cases mentioned above from the sample of Table A.2. Regressions (e) and (f) of Table 1 are based on all the 27 observations listed in Table A.2, while regressions (g) and (h) are computed after excluding 5 of them.

Table A.3

Net Value of Crop Production per Standard Acre in the Selected Villages of Uttar Pradesh and Punjab

Village	Total Land Cultivated (in Standard acres)	Gross Value of Production (Rs.)	Cost (cash and kind) of Cultivation (Rs.)	Net Value of Crop Production (Rs.)	Net Value of Crop Production per Acre (Rs.)
1	2	3	4	5	6
Rataul Rohe (1955-56)*	1037	119363	25888	93375	90.00
Palanpur	465	63704	9964	53740	115.65
Saran	1069	73146	37652	35494	33.20
Dughri	669	149015	37553	111462	166.50
Mehtiana	411	92398	41862	50536	122.80
Rawatpur	560	103651	22629	81022	144.60
Sohalpur Gara (1954-55)	390	57246	20052	37194	95.40
Sohalpur Gara (1958-59)	409	91071	23206	67865	166.00
Walidpur	517	253583	70156	183427	354.44
Kukar Majra	365	114504	19000	95504	261.60
Koloyee	600	98770	19822	78948	131.48
Ghiana	641	137870	79915	57955	90.36
Patran	938	113095	18375	94720	101.00
Noorpur	1085	165071	62329	102742	94.68
Naunera	597	82134	5850	76284	127.68
Shamaspur	64	34988	12021	22967	357.50
Meharwani	587	77170	25800	51370	87.50
Sochiana	390	91451	17724	74727	191.50
Lodi Nangal	382	90770	25130	65941	172.60
Bhatian	441	174953	108063	66890	151.60
Sarai Naga	1668	452532	108850	343682	206.00
Kala Jhar	875	193068	78000	115068	131.50
Dhakia	548	124295	39274	85021	155.00
Arwah	936	67051	5800	62251	66.50
Akoi	667	177857	40819	137038	205.44
Bahautwas	1204	60744	5480	55264	45.90

Table A.3 (continued)

1	2	3	4	5	6
Bhunderi	393	71948	20005	51943	132.00

* All the necessary data for calculating net value of production per acre was not available for the second point survey of Ratual Rohe. But from a consideration of production of crops and prices during the two survey years, it seems that the net value of production per acre during the resurvey year was larger than what it was during the initial year.

Note: Cost of cultivation in Column 4 covers the following items: cash and kind wage payments to permanent and casual labourers (hired), cash and kind payments to artisans (like blacksmiths for repairing implements, masons for repairing wells and other farm buildings), purchased seed, purchased fodder, fertilizers and manures, irrigation charges, land revenue and panchayat taxes (if any), oil for tractors, pumps, etc. The item that is excluded is rent paid by the cultivators. The reason for doing this is as follows. Rent payment has to be deducted (from gross produce) in calculating the net income of an individual cultivator. But when it comes to finding out the net value of produce from an acre of land in a village, rent may be treated more as an item in the distribution of net produce as between cultivators and non-cultivating land owners.

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