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ARTICLES

Marketed Surplus of Different Crops Across Farm Size: A Study in Haryana

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I

INTRODUCTION

For the development of a predominantly agricultural country like India, the importance of the marketed surplus is well recognised. The study of marketed surplus has a number of important aspects such as relation between marketed surplus and production, temporal flow of marketed surplus, the distribution of marketed surplus across different size-groups, etc. This paper makes an attempt to study the determinants of marketed surplus, cropwise and at the aggregate level. The marketed surplus as measured in this study is that part of farm output which is put to sale by the farmer irrespective of his home and other requirements.

The second section of this paper presents the data base and methodology used in the study. Section 3 deals with the background of the study area. The results of tabular analysis are presented in the fourth section while the fifth section presents the results of the multiple regression analysis to work out the factors determining the marketed surplus. The sixth section discusses the average and marginal propensity to sell. The elasticity of marketed surplus with respect to output is also presented in this section. The conclusions of the study are presented in the last section.

II

DATA BASE AND METHODOLOGY

The data used in this study are obtained from the field survey of 400 households in two districts, namely, Kaithal and Sirsa in Haryana, and 201 households from four villages in Kaithal and 199 households from four villages in Sirsa were surveyed during the agricultural year 1993-94, i.e., 1st July 1993 to 30th June 1994. The reference year was a normal year with a few exceptions of flood affecting paddy in Kaithal, and pests affecting cotton in Sirsa district. The area under these two crops was dropped from the analysis wherever these anomalies were observed. The data were collected for the doctoral research work of the author.

The sample design of this study was two-stage sampling, village as a first stage sampling unit and farmer or the household as the second and ultimate unit. The selection of the sample broadly involves the following stages. Before selecting villages for the field survey, all the villages around Kaithal and Sirsa mandis were classified into four groups. The first group

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included all villages situated within a radius of 6 km from the mandi. Villages within the radius of 6 to 12 km were included in the second group. The villages located between 12 and 18 km from the mandi centre were placed in group three. Villages beyond 18 km from the market centre were placed in the fourth group. From each group, one village was chosen randomly. Thus, according to the above respective groups, four villages, viz., Manas, Sewan, Mohna and Taragarh from Kaithal district and another four villages, viz., Bamboor, Bajekan, Randawa and Barokhan from Sirsa district were selected for this study. The basic aim of choosing different villages at different locations was to find out the differences in marketed surplus by farmers at different locations to the mandis.

For the selection of households, all households were further categorised into five sub-classes following the categorisation given in the Agricultural Census 1986. Systematic random sampling method was adopted for the selection of households. While selecting the households, it was tried to represent the district average in percentage of holdings for every category. In total 96 marginal and semi-medium farmers each, 95 small farmers, 74 medium farmers and 39 large farmers were surveyed.

The most outstanding factor in determining the size of marketed surplus is the size of output. In the long run, permanent increase in marketed surplus would be feasible only with the increased production. Besides the size of output, the other most important factors considered in this study are: size of holdings, size of family, level of debt, distance of the village located from the market, proportion of area irrigated and area under tenancy. The analysis has been carried out cropwise as well as at the aggregate level. However, before presenting the findings of the study, it is essential to give a framework of the economy of the state and the districts surveyed.

III

THE STUDY AREA

The Kaithal district is situated in the north of Haryana, while Sirsa is the western most district of the state. These two districts occupy a very important position in the agricultural economy of Haryana. According to village papers (1991), net sown area as a proportion of total area in both the districts was much higher than the state as a whole. As Kaithal district had assured irrigation facilities like canals and tubewells, its cropping intensity was higher (1.76) than the state (1.66). Sirsa district, on the other hand, was lacking in these sources and had lower cropping intensity (1.58) than the state.

In 1990-91 the net irrigated area as a percentage of net sown area in Kaithal and Sirsa districts was respectively 98.6 and 71.3 per cent against the state figure of 72.7 per cent. Similarly, gross irrigated area as a percentage of gross cropped area in the two districts was 96.0 and 77.5 respectively against 71.6 per cent for the state as a whole.

The crops grown in Haryana are divided into two main categories, viz., *kharif* and *rabi*. The main *kharif* crops are rice, bajra and cotton and the main *rabi* crops are wheat, oilseeds, gram and other pulses. Some particulars about the crops grown in the state and in both the districts are given in Table 1. It is clear from the table that wheat and rice were the main *rabi* and *kharif* crops in Kaithal district. These two crops constituted 79 per cent of total cropped area in the district. In Sirsa district, however, cotton and wheat were the main *kharif* and *rabi* crops respectively. These two crops constituted around 62 per cent of total cropped area. Thus wheat, paddy and cotton were the main remunerative crops in the area under

study.

In the mid-sixties high-yielding variety (HYV) seeds were introduced in India. Haryana became one of the pioneers in the adoption of new technology. This led to a phenomenal increase in production in the agricultural sector. The growth of foodgrains production in the post-green revolution period in Haryana stood at 5.4 per cent per annum, which is quite impressive by all standards and it was above the growth rates at the all-India level and in most of the other states.

TABLE 1. CROPPING PATTERN,1992-93

(per cent of gross cropped area)

Crops (1)	Haryana (2)	Sirsa (3)	Kaithal (4)
Rice	12.09	4.25	32.82
Bajra	10.87	1.20	2.60
Wheat	33.55	31.65	45.85
Total cereals	60.00	38.73	81.98
Gram	6.63	10.65	0.28
Total pulses	7.89	10.76	1.10
Total foodgrains	67.85	49.50	83.08
Total oilseeds	10.07	7.87	1.92
Sugarcane	2.36	0.02	2.29
Cotton	9.10	30.43	2.29

Source: Statistical Abstracts of Haryana.

During 1992-93 the productivity of wheat was 40 quintals per hectare in Sirsa and 38 quintals per hectare in Kaithal and in both the districts it exceeded the state average of 36 quintals per hectare. In the case of rice, its productivity in Sirsa district exceeded that of both Kaithal and the state as a whole during the same year.

The farmers of the villages surveyed grew many food and non-food crops. To make the analysis easy and meaningful, all crops have been grouped into six categories, viz., (1) wheat, (2) paddy, (3) coarse cereals, (4) pulses, (5) oilseeds, and (6) cotton. Wheat includes all varieties of wheat while paddy includes basmati and other usual varieties. Coarse cereals include bajra, barley, maize and guar. Oilseeds comprise mustard seed, sunflower, toria and sesamum. Pulses include gram, masar, arhar and moong. Last but not the least, cotton includes American and *desi* cotton. The marketed surplus of all these six individual crops is discussed in physical terms. First, the results of value of aggregate marketed surplus in relation to value of aggregate output are presented. The value of aggregate output here excludes the value of fodder crops and by-products.

IV

OUTPUT AND MARKETED SURPLUS

Table 2 presents value of aggregate marketed surplus in relation to aggregate output. The table shows that both values of output per hectare and output marketed per hectare are directly related to farm size. The same relationship holds for marketed surplus as a percentage of output and farm size. Whereas marginal farmers marketed 68 per cent of their output, large farmers marketed 91 per cent of their output. On an average, the farmers marketed 87 per cent of the aggregate output. The dominant role of large farmers in total

marketed surplus emerges very clearly from the table. The largest size-class alone accounted for 45 per cent of the marketed surplus, whereas it accounted for only 10 per cent of total households. Further, it is interesting to note that the percentage of marketed surplus was lower than the percentage of area operated upto 10 hectares of land. Beyond that size one finds that the share of marketed surplus was significantly higher than the share of area operated. Thus the rise in the share of marketed surplus over operated area above 10 hectares suggests that there is direct and more than proportionate relationship between holding size and marketed surplus.

TABLE 2. AGGREGATE OUTPUT AND MARKETED SURPLUS (BY FARM SIZE)

(value in Rs.)

Category	Output per hectare	Marketed surplus		Percentage of			
		Per hectare	As per cent of output	Output by each category	Marketed surplus by each category	House-holds	Area operated
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Marginal (00.00-01.00)	2,385	1,615	67.73	3.3	2.6	24.0	3.9
Small (01.01 - 02.00)	2,213	1,637	73.95	7.7	6.5	23.7	9.6
Semi-Medium (02.01 - 04.00)	2,426	2,062	84.99	16.4	16.0	24.0	18.7
Medium (04.01 - 10.00)	2,699	2,369	87.79	29.3	29.6	18.5	30.0
Large (Above 10.00)	3,182	2,889	90.78	43.3	45.3	9.8	37.8
Total	2,771	2,408	86.90	100.0	100.0	100.0	100.0

Table 3 portrays relationship between family size and aggregate marketed surplus. As expected, the table reveals negative relationship between marketed surplus and family size. Negative relationship holds for all categories except for small farmers in whose case after declining from 76 per cent to 72 per cent, marketed surplus rose to 77 per cent with the rise in family size. The rise in marketed surplus might have been caused by a rise in per household output on account of higher area operated as is evident from the table.

The farmers take loans from both institutional and non-institutional sources. Loans provided by institutional sources like co-operative societies are generally for short period for the purpose of seeds and fertilisers. Similarly, loans provided by moneylenders and *arhatias* are also for the duration of one crop and are to be paid back to get loans during the next crop. The farmers who take loans from such sources are induced to sell their produce as soon as possible after the harvest to return the amount of debt. The high level of debt compels the farmers to sell higher proportion of their produce to repay the loans. Specially, the small and marginal farmers are easy targets of such loans.

Table 4 presents aggregate marketed surplus in relation to total debt, institutional as well as non-institutional. It is clear from the table that with the rise in debt, there is a rise in the proportion of output marketed in the case of marginal and small farmers. For the category of small farmers this proportion rises from 72 per cent in the case of those with no debt to

TABLE 3. FAMILY SIZE AND MARKETED SURPLUS (AGGREGATE) (PER HOUSEHOLD)

(value in Rs.)

Category	Upto 5						5 - 10						Above 10					
	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Family size	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Family size	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Family size
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	16)	(17)	(18)	(19)
Marginal	9,829	6,829	0.6	69.5	68	3.7	10,073	6,569	0.7	65.2	29	7.3	4,433	1,633	0.7	36.8	3	12.7
Small	21,537	16,279	1.6	75.6	47	4.3	23,397	16,784	1.7	71.7	44	7.1	26,853	20,590	1.9	76.7	9	12.5
Semi-Medium	47,524	40,417	3.2	85.0	36	4.4	48,268	41,237	3.2	85.4	49	7.4	48,167	40,169	3.3	83.4	15	13.0
Medium	1,23,110	1,12,314	7.6	91.2	13	4.2	1,04,884	91,575	6.5	87.3	53	7.7	1,16,577	1,01,440	6.7	87.0	34	13.3
Large	7,55,000	7,42,966	21.8	98.4	8	4.3	2,96,260	2,74,283	15.4	92.6	46	7.7	2,55,722	2,17,183	15.8	84.9	46	15.8
Total	42,832	37,614	2.3	87.8	40	4.1	74,463	65,147	4.4	87.5	43	7.4	1,23,821	1,05,548	7.6	85.2	17	13.0

TABLE 4. INDEBTEDNESS AND MARKETED SURPLUS (AGGREGATE) (PER HOUSEHOLD)

(value in Rs.)

Category	No debt					Debt upto Rs.50,000					Debt above Rs.50,000				
	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Marginal	8,482	5,552	0.6	65.5	54	11,367	7,923	0.7	69.7	45	4,400	3,300	0.8	75.0	1
Small	21,388	15,316	1.7	71.6	36	23,312	17,389	1.7	74.6	60	27,675	22,575	1.7	81.6	4
Semi-Medium	38,595	30,655	3.2	79.4	25	52,639	45,789	3.2	87.0	59	45,306	37,961	3.4	83.8	16
Medium	1,22,429	1,08,130	6.9	88.3	23	1,02,566	89,144	6.5	86.9	50	1,17,987	1,04,702	7.0	88.7	27
Large	4,94,783	4,75,920	18.4	96.2	26	1,89,366	1,67,104	12.8	88.2	31	2,92,968	2,53,580	16.9	86.6	43
Total	66,596	59,435	3.4	89.2	34	52,841	44,881	3.4	84.9	52	1,42,718	1,23,998	8.5	86.9	14

75 per cent for those who are in debt upto Rs. 50,000 and further to 82 per cent for those with a level of debt above Rs. 50,000. However, it seems that the level of debt does not affect marketing behaviour of large farmers. Because of their higher operated area and higher production, these farmers are able to pay back the amount of loan without falling prey to the pressures of moneylenders. Table 4 shows that large farmers who did not take any loan marketed 96 per cent of their output. This percentage, however, fell to 88 for those large farmers who took loans up to Rs. 50,000 and further to 87 for those who were indebted by more than Rs. 50,000. However, this fall in percentage of output marketed may partly be due to fall in per household area (as is evident from the table).

Increase in access to irrigation increases the output and hence the marketed surplus. It was observed from the sample data that 65 per cent of the total operated area was fully irrigated, 24 per cent was between 50 and 100 per cent irrigated and the remaining 11 per cent was less than 50 per cent irrigated. Generally, marketable crops are preferred on the irrigated land as it enables the farmers to use purchased inputs like HYV seeds, chemical fertilisers, pesticides and use of machines. Land that has little access to irrigation is generally used for subsistence crops like gram, bajra, jowar, etc. Table 5 presents the relationship between proportion of area irrigated and marketed surplus. It shows that with the rise in unirrigated area, there was a fall in percentage of output marketed by all categories of farmers. On an average, output marketed fell from 88 per cent on fully irrigated land to 76 per cent on less than 50 per cent irrigated land. The fall in marketed surplus at a higher level of unirrigated area was partly due to the tendency of sowing subsistence crops on such areas and partly due to low productivity. The value of output per hectare declined from Rs. 3,123 on fully irrigated land to Rs. 1,434 on less than 50 per cent irrigated land.

Bhoothalingam in his study (1969) had observed that the farmers sowing commercial crops on their fields spent relatively more on agricultural implements than those who sowed subsistence crops. The implication of the above statement is that a rise in farm assets should lead to a rise in marketed surplus. This is a natural outcome as rich farmers having their own tractors and other capital implements are induced to produce more and more products for the market and even sell higher proportion of food crops as compared to the poor farmers. The adoption of new technology, for example, has given rise to capitalistic form of production leading to mechanical farming with the higher use of capital assets and higher proportion of output produced for the market.

Table 6 presents data on marketed surplus with respect to assets other than land. Here, assets include all agricultural implements like tubewell, tractor, trolley, thresher, harrow, bullocks, fodder cutter, animal house, grain storage, etc. The results of the table are quite interesting. Whereas 55 per cent of the marginal farmers owned assets upto Rs. 20,000, no marginal farmer was observed in the asset category of above Rs. 1,00,000. On the other hand, no large farmer was found in the category of upto Rs. 20,000 and 77 per cent of them owned assets above Rs. 1,00,000 and most of them had their own tractors. However, as high as 51 per cent of total farmers fell in the category of Rs. 20,000 to Rs. 1,00,000. The table shows a positive relationship between assets holding and proportion of output marketed. In all the categories, with a few exceptions, every increase in assets holding led to a rise in the percentage of marketed surplus to output. On an average, the percentage of output marketed rose from 78 to 91 as assets holding rose from below Rs. 20,000 to above Rs. 1,00,000 for all size of holdings.

TABLE 5. PROPORTION OF AREA IRRIGATED AND MARKETED SURPLUS (AGGREGATE) (PER HOUSEHOLD)

(value in Rs.)

Category	100 per cent irrigated					Between 50-100 per cent irrigated					Less than 50 per cent irrigated				
	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of house holds
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Marginal	11,264	7,842	0.7	69.6	77	11,725	6,475	0.8	55.2	1	4,235	2,186	0.6	51.6	22
Small	23,950	17,701	1.7	73.9	76	20,956	16,527	1.8	78.9	13	17,345	11,765	1.8	67.8	11
Semi-Medium	53,979	46,864	3.2	86.8	72	38,242	30,389	3.3	79.5	15	26,645	19,697	3.2	73.9	13
Medium	1,24,474	1,10,370	6.3	88.7	61	1,01,466	88,327	7.4	87.0	26	70,682	58,570	7.4	82.9	13
Large	3,50,158	3,20,533	15.6	91.5	66	2,80,791	2,52,082	18.5	89.8	26	96,218	73,543	12.1	76.4	8
Total	73,384	64,297	3.8	87.6	71	98,828	86,237	7.0	87.3	14	27,959	21,340	3.2	76.3	15

TABLE 6. ASSETS OTHER THAN LAND AND MARKETED SURPLUS (AGGREGATE) (PER HOUSEHOLD)

(value in Rs.)

Category	Upto Rs. 20,000					Rs. 20,000 - 1,00,000					Above Rs. 1,00,000				
	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of households	Output value	Marketed surplus	Area (ha)	Marketed surplus as percentage of output	Percentage of house holds
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Marginal	6,975	4,212	0.6	60.4	55	13,129	9,523	0.8	72.5	45	-	-	-	-	-
Small	18,974	14,246	1.7	75.1	35	24,274	17,726	1.7	73.0	63	42,050	34,250	2.0	81.5	2
Semi-Medium	35,036	28,975	3.1	82.7	20	48,540	40,281	3.2	83.0	69	66,998	64,186	3.8	95.8	11
Medium	74,505	65,373	7.4	87.7	10	90,964	77,686	6.1	85.4	35	1,30,473	1,15,930	7.0	88.8	55
Large	-	-	-	-	-	1,73,051	1,51,416	13.7	87.5	23	3,54,774	3,23,752	16.8	91.3	77
Total	19,491	15,192	1.8	77.9	28	44,839	36,834	3.0	82.2	51	2,00,163	1,81,431	10.0	90.6	21

From the above discussion, it is concluded that the farm size and marketed surplus are directly related. Family size and marketed surplus, on the other hand, show inverse relationship. The small and marginal farmers market a higher proportion of their output with the rise in indebtedness but the relationship does not hold in the case of large farmers. As the area under irrigation declines the percentage of marketed surplus also falls. The assets held by the cultivators have a positive relationship with marketed surplus.

Tables 7 shows the relationship of marketed surplus and output for different crops according to size-groups of farms. In the case of wheat, marketed surplus per hectare as well as percentage of output marketed had a positive relationship with farm size. This is due to the fact that wheat is a paramount item of diet in the area under study and small and marginal farmers require higher proportion of output for home consumption. This proportion (percentage of output kept for home consumption) falls in the case of large farmers because of their higher amount of output at an absolute level. Table 7 also presents the share of the size-classes in the marketed surplus and their share in the operated area. The first three categories had higher proportion in the operated area compared to their share in marketed surplus, while the last two categories had higher share in marketed surplus than in the operated area. This suggests that large and medium farmers (the last two categories) are able to generate higher marketed surplus of wheat. In short, around 73 per cent of the total marketed surplus of wheat was contributed by these two categories alone.

In the case of paddy, output per hectare as well as marketed surplus per hectare rose with the rise in the farm size for all the farm size-groups and slightly declined on large farms. The proportion of output marketed, however, rose throughout with the rise in farm size. On an average, 96 per cent of output was marketed by all size-classes (Table 7). Such a high percentage of marketed surplus suggests that rice has become a cash crop in the region.

Coarse cereals were not the main crops of the region under study. A very high proportion of their production was used for home consumption as well as for cattle. Only 5.7 per cent of the total net sown area was devoted to these crops and only 17 per cent of the households had grown these crops. Table 7 shows that 68 per cent of total output of coarse cereals was marketed. Thus the proportion of marketed surplus of coarse cereals was even less than that of the main food crop like wheat which accounted for 80 per cent of marketed surplus.

The retention requirement of pulses was also quite high as they also form the major food item along with the cereals. Sixty-eight per cent of the total output was marketed by the farmers as shown in Table 7. It is clear from the table that marketed surplus per hectare as well as proportion of output marketed did not rise consistently over farm size. Oilseeds and cotton were the cash crops of the region as they were produced only for the market. Ninety-seven per cent of oilseeds output and 99.6 per cent of cotton output were sold in the market. There was not much difference in marketed surplus of small and large farmers.

TABLE 7. OUTPUT AND MARKETED SURPLUS OF DIFFERENT CROPS BY FARM SIZE

(quintals)

Category	Output per hectare	Marketed surplus		Percentage of			
		Per hectare	As per cent of output	Output by each category	Marketed surplus by each category	House-holds	Area operated
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Wheat			
Marginal	5.09	2.46	48.46	3.9	2.3	22	4.0
Small	4.93	3.35	67.65	9.3	7.9	23	10.0
Semi-Medium	4.65	3.31	71.66	18.9	17.1	26	21.8
Medium	5.33	4.36	82.19	30.7	31.7	19	30.8
Large	5.94	5.21	87.66	37.2	41.0	10	33.4
Total	5.33	4.24	79.58	100.0	100.0	100.0	100.0
				Paddy			
Marginal	4.20	3.84	90.82	2.6	2.5	17	3.0
Small	4.28	3.88	90.73	6.3	5.9	20	7.1
Semi-Medium	4.77	4.48	94.39	17.6	17.2	27	17.9
Medium	5.13	4.93	96.39	29.4	29.5	23	27.8
Large	4.81	4.73	98.14	44.1	44.9	13	44.2
Total	4.85	4.65	96.31	100.0	100.0	100.0	100.0
				Coarse cereals			
Marginal	1.30	0.76	58.62	1.8	1.6	7	1.9
Small	1.59	0.96	59.95	10.8	9.5	18	9.3
Semi-Medium	1.53	0.72	47.39	18.3	12.8	26	16.4
Medium	1.09	0.68	61.81	23.2	21.1	33	28.8
Large	1.44	1.17	81.34	45.9	55.0	16	43.6
Total	1.37	0.92	67.87	100.0	100.0	100.0	100.0
				Pulses			
Marginal	0.76	0.37	48.71	4.7	3.3	11.0	3.7
Small	0.59	0.37	63.66	4.8	4.5	12.1	5.0
Semi-Medium	0.50	0.29	58.43	14.5	12.5	27.5	17.4
Medium	0.58	0.38	66.75	29.1	28.6	29.7	30.4
Large	0.65	0.48	73.77	46.9	51.0	19.8	43.5
Total	0.60	0.41	67.85	100.0	100.0	100.0	100.0
				Oilseeds			
Marginal	1.29	1.25	95.80	3.5	3.5	13.3	4.3
Small	1.00	0.93	94.61	4.6	4.5	16.7	7.5
Semi-Medium	1.49	1.41	96.38	16.2	16.2	24.2	17.6
Medium	1.49	1.41	96.23	31.6	31.4	30.0	34.3
Large	1.94	1.90	97.19	44.1	44.4	15.8	36.3
Total	1.62	1.62	96.59	100.0	100.0	100.0	100.0
				Cotton			
Marginal	1.14	1.14	100.00	4.3	4.3	15.5	3.7
Small	0.77	0.76	98.30	8.5	8.3	24.9	10.9
Semi-Medium	1.00	0.998	99.78	18.0	18.1	24.9	17.9
Medium	0.94	0.93	99.17	30.2	30.1	22.6	31.8
Large	1.08	1.08	100.00	39.0	39.2	12.1	35.7
Total	0.99	0.986	99.57	100.0	100.0	100.0	100.0

V

DETERMINANTS OF MARKETED SURPLUS - REGRESSION ANALYSIS

The analysis of tables presented in the previous section to work out the behaviour of the marketed surplus suffers from limitations because it takes into consideration the aggregate impact of all the variables. Nonetheless, the multiple regression analysis gives us the direction of the relationship as well as quantum of effect of each of the individual variables affecting the marketed surplus.

Regression analysis is carried out on the pooled data for all the categories rather than separate regressions for various farm size categories. Before running the regression analysis zero-order correlation matrix was examined. Those variables that presented very high value of inter-correlation amongst the independent variables were either dropped or taken alternatively to avoid the problem of multicollinearity. The highest inter-correlation among the independent variables was observed among household size and operated area, which was 0.44. The coefficients of correlation were mostly less than 0.1 among most of the independent variables. In addition, the value of coefficients was observed to be stable with changing sample size. Further, the signs of coefficients were right and the 't' values were mostly significant, thus suggesting that the multicollinearity problem was not severely affecting the regression coefficients in the model. However, still to ensure the consistency of coefficients stepwise regressions were run.

The analysis of marketed surplus attempted by earlier studies regressed marketed surplus on output[1] or net operated area (NOA).[2] This study uses both output (OUT) as well NOA as explanatory variables. In addition, marketed surplus as a proportion of output has also been regressed upon NOA. The analysis has been attempted for the aggregate marketed surplus of all the crops in value terms as well as marketed surplus of individual crops in physical terms. In addition to output and NOA, the other independent variables included in the study were: average household size (numbers); distance of the village from the main market (km); unirrigated area as a proportion of gross cropped area (GCA); total loans per acre of area operated (Rs.); and area leased-in (ALI) as a proportion of NOA.

Analysing the results of aggregate output (all crops), it is observed from Table 8 that the value of output was the most important variable determining the value of marketed surplus (MS). The coefficient of output was positive and significant at 1 per cent, indicating that one rupee rise in output leads to an increase in marketed surplus worth 96 paise of the aggregate agricultural output. Household size was the other important variable significant at 1 per cent with a negative coefficient, indicating an additional member in the family reduces marketed surplus by raising retention requirement by Rs. 1,003. If one replaces value of output by NOA in the model, one again finds significant positive relationship at 1 per cent between NOA and marketed surplus. One acre increase in NOA raises the marketed surplus by Rs. 8,077. However, unirrigated area as a proportion of GCA in this model turned out to be significant at 1 per cent with negative sign. This is because of the tendency of the farmers growing subsistence crops on unirrigated land as well as low productivity on unirrigated land leading to lower marketed surplus.

In the third model, value of marketed surplus as a proportion of output was taken as the dependent variable. One encounters some interesting results like household size in this model was not significant in determining the proportion of output marketed although NOA and unirrigated area as a proportion of GCA remained significant at 1 per cent with signs

as earlier. The area under tenancy as a proportion of NOA turned out to be significant at 5 per cent with positive sign, thereby indicating higher proportion of output marketed by those who took land on lease. The main reason for such significant positive relationship is that the land under tenancy bears a direct paid out cost to the cultivators and this cost has to be borne out by producing for the market, irrespective of the nature of crops grown on such land.

The variables observed insignificant in all the three equations were distance of village from the market and loans per acre of operated area. Distance turned out to be insignificant because the study area was rich with infrastructural facilities especially transportation. The villages surveyed were well connected to the mandis by metalled roads and the cultivators had sufficient transportation sources, either owned or hired. In the case of borrowing, this variable was not significant as the behaviour of large farmers was not affected by indebtedness as was seen in Table 4. To sum up the discussion, significant variables with positive effect on marketed surplus were value of output, NOA and area under tenancy. The variables with negative effect were household size and unirrigated area.

The value of R^{-2} presented a very interesting comparison in the above three equations. The value of R^{-2} was higher in the first model where output was the explanatory variable, than in the second model where NOA was taken as an explanatory variable. It suggests that marketed surplus is more closely related with output than with the operated area. The relationship of marketed surplus with output is direct while its relationship with operated area is indirect. Further, in the third model, where proportion of output marketed was taken as the dependent variable, the value of R^{-2} fell to 0.24 (from 0.99 in the first model). However, even with low value of R^{-2}, the equations have very important economic significance. It is plausible to see the relationship in terms of proportion of output marketed rather than absolute value of marketed surplus. The former is more important in policy formulation.

Chattopadhyay and Sen (1988, p. A-156), analysing the pattern of marketable surplus of rice, stated: "It is indeed surprising that earlier authors hold that marketable surplus goes up with the increase in farm size either for subsistence crop or for all the crops as a whole. As such, there is no basis whatsoever for establishing such kind of relationship. Per capita availability of cultivated land among the larger farms is certainly higher compared to the smaller ones, but per capita availability of land under a specific crop need not be higher in the larger size groups than the smaller farms." They further state: "The larger size groups prefer to choose commercial crops, viz., potato, jute, cotton, etc. with greater intensity for higher return. Small farmers, on the other hand, have no such kind of choice for the very nature of their holdings and therefore, try to cultivate the whole amount of land for the main subsistence crop only, like rice or wheat to meet their consumption needs."

From this empirical reality, marketed surplus of individual crops was examined in physical terms by regressing MS on output and operated area of the respective crops, along with the other explanatory variables as taken earlier. However, the area under tenancy was excluded from the list of explanatory variables, as it is not known whether any particular crop has been planted on such area or not. Three stepwise regression models have been fitted for each crop and the results are presented in Table 8.

TABLE 8. REGRESSION RESULTS (MARKETED SURPLUS)

Dependent variable	Constant	Output	Net operated area (acres)	House-hold size	Distance located	Un-irrigated area/ GCA	Loan per acre	ALI as a proportion of net operated area	R^{-2}	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				All crops (N = 399)						
MS	-6217	0.954*							0.988	31730*
	(-8.6)	(178)								
MS	280	0.964*		-1003*					0.989	17302*
	(0.2)	(179)		(-6.0)						
MS	-16824		7591*						0.681	851*
	(-4.1)		(29)							
MS	4735		8107*	-3754*					0.693	451*
	(0.71)		(28)	(-4.1)						
MS	11668		8077*	-3851*		-49682*			0.704	316*
	(1.7)		(329)	(-4.3)		(-3.9)				
MS/OUT	0.64		0.007*						0.128	59*
	(40)		(7.9)							
MS/OUT	0.68		0.007*			-0.35*			0.230	60*
	(43)		(7.9)			(-7.3)				
MS/OUT	0.66		0.007*			-0.34*		0.078**	0.239	43*
	(38)		(7.9)			(-7.0)		(2.3)		
				Wheat (N = 371)						
MS	-12.7	0.913*							0.986	26423*
	(-14)	(162)								
MS	-3.2	0.932*		-1.56*					0.988	15608*
	(-2.3)	(164)		(-8.2)						
MS	-16.6		12.7*						0.864	2351*
	(-5.7)		(49)							
MS	-9.2		12.9*	-1.26***					0.865	1191*
	(-1.9)		(45)	(-1.9)						
MS/OUT	0.49		0.016*						0.231	112*
	(29)		(10.6)							
MS/OUT	0.52		0.015*			-0.26*			0.259	66*
	(29)		(10.2)			(-3.9)				
				Paddy (N = 160)						
MS	-3.1	0.994*							0.999	338363*
	(-10)	(582)								
MS	-1.8	0.995*		-0.16**					0.999	173418*
	(-2.9)	(584)		(-2.2)						
MS	-9.9		12.75*						0.640	286*
	(-1.0)		(16.9)							
MS/OUT	0.89		0.003*						0.038	7.3*
	(67)		(2.7)							

(Contd.)

TABLE 8 *(Concld.)*

Dependent variable	Constant	Output	Net operated area (acres)	House-hold size	Distance located	Un-irrigated area/ GCA	Loan per acre	ALI as a proportion of net operated area	R^{-2}	F
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
				Coarse cereals (N = 69)						
MS	-3.03	0.946*							0.940	1077*
	(-5.8)	(33)								
MS	-1.45	0.969*		-0.22**					0.943	575*
	(-1.7)	(33)		(-2.3)						
MS	0.949		2.01*						0.316	33*
	(0.52)		(5.7)							
MS	-9.35		2.04*		0.64**				0.366	21*
	(-2.1)		(6.0)		(2.5)					
MS/OUT	0.37		0.026**						0.041	3.98**
	(5.6)		(2.0)							
				Pulses (N = 90)						
MS	2.97	0.181*							0.238	29*
	(3.2)	(5.4)								
MS	-0.69		1.132*						0.553	112*
	(-0.8)		(10.6)							
MS/OUT	0.27		0.022*						0.094	10.3*
	(5.2)		(3.2)							
				Oilseeds (N = 118)						
MS	-0.32	0.989*							0.999	88615*
	(-3.8)	(294)								
MS	0.10	0.992*		-0.06*					0.999	47430*
	(0.7)	(300)		(-3.5)						
MS	-0.34	0.993*		-0.06*	0.03*				0.999	33227*
	(-1.5)	(305)		(-3.8)	(2.6)					
MS	-4.4		5.1*						0.820	539*
	(-4.0)		(23)							
MS	-0.05		5.13*		-0.28**				0.825	279*
	(-0.02)		(23)		(-2.0)					
MS/OUT	0.74				0.01*				0.069	8.4*
	(12)				(2.9)					
MS/OUT	0.69		0.01**		0.01*				0.09	7.1*
	(11)		(2.3)		(3.0)					
MS/OUT	0.76		0.02**	-0.01**	0.01*				0.12	6.4*
	(11)		(2.9)	(-2.1)	(3.2)					
				Cotton (N = 178)						
MS	-0.05	0.999*							0.999	553889*
	(-1.4)	(744)								
MS	0.34		2.37*						0.59	261*
	(0.25)		(16)							
MS	2.67		2.36*				-0.0009*		0.61	143*
	(1.8)		(16.5)				(-3.2)			
MS/OUT	1.0					-0.10*			0.062	12.8*
	(139)					(-3.6)				

Figures in parentheses are respective t values.
*, **, *** Significant at 1, 5 and 10 per cent level respectively.

It is noted that the output of each crop is the most significant variable affecting the marketed surplus of the respective crop. Except pulses, the magnitude of the coefficient of output exceeds 0.90, indicating rise in output by one kg leads to rise in marketed surplus by more than 0.90 kg. Paddy, oilseeds and cotton were highly commercial crops as their coefficients of output exceeded 0.990. Regressing marketed surplus on the cultivated area of the crop instead of output showed that area was also highly significant in all the crops with a positive coefficient. The coefficient of NOA cropwise shows that one acre increase in net operated area leads to thirteen quintals rise in marketed surplus of wheat and paddy each, two quintals rise in coarse cereals and cotton each and five quintals and one quintal increase in marketed surplus of oilseeds and pulses respectively. However, for the reasons stated above, the value of R^{-2} was much higher when output was taken as independent variable than the area under the crop. In the case of pulses, however, area cultivated gave a better fit to output. This may be due to the fact that pulses being irregular crops of the region and mostly grown on unirrigated land, put pressure on the farmers to sell higher amount when grown on a larger area, irrespective of the level of output and retention requirements.

There was a significant negative relationship between household size and marketed surplus in the case of all crops except cotton and pulses. Cotton being a commercial crop has no reason to be associated with family size. In the case of pulses, household size and marketed surplus were not significantly related, may be due to irregular nature of this crop.

Marketed surplus falls significantly with the rise in proportion of unirrigated area to gross cropped area only in the case of wheat and cotton. Distance located from the village was insignificant in the main crops like wheat, paddy, cotton and even pulses. In the case of irregular crops like oilseeds and coarse cereals, the coefficient was significant with negative sign in one equation and positive sign in others. The reason may be their irregular nature as well as non-availability of competent markets for the product. Last and the least, loan per acre turned out to be insignificant in almost all the crops, therefore denying any extra pressure on the farmers in selling their produce due to indebtedness.[3] Thus the most important variables affecting the marketed surplus cropwise were output and area cultivated of the respective crop with positive or direct effect and family size with negative or indirect effect.

VI

AVERAGE AND MARGINAL PROPENSITY TO SELL (APS AND MPS) AND ELASTICITY OF MARKETED SURPLUS

An important question raised about the behaviour of marketed surplus has remained whether its relationship with output is proportionate and linear or non-proportionate and non-linear. Narain (1961) in his pioneering study on rural economy of India found that the marketed surplus as a proportion of value of output declined upto size class 10-15 acres and then rose with the size of holdings. Thus he found that the marketed surplus as a proportion of output made a U shape curve across farm size. Krishna (1965) in his study of subsistence crop of rice or wheat observed that in most cases there exists a strong linear and in some cases non-linear relation between marketable surplus and output. Hati (1976) fitted two non-linear equations and grafted them into one. The results were revealing when presented graphically. Marketable surplus was found to be negative for the first part of the curve which included land holdings upto 0.66 hectares. For holdings between 0.66 and 1.98 hectares, the curve flattened at about 5 per cent of marketable surplus. In the case of farm holdings

above 1.98 hectares, the proportion of marketable surplus rose at an increasing rate as farm size increased.

Nadkarni (1980), in his micro-level study on millet region of Maharashtra based on farm management data, found that marketable surplus was negative for jowar and bajra and for total foodgrains in the smallest two size-classes of below two hectares and 2 to 4 hectares and in the case of jowar even for the next size-class of 4 to 6 hectares. However, in the case of wheat, the marketable surplus was positive for all the size-classes. Bardhan (1970) using the village level cross-section data observed that the volume of marketed surplus was a quadratic function (with positive second order derivative) of average level of foodgrains production.

It is to be pointed out that very few studies are available with farm level data on marketed surplus at the aggregate level as well as at the individual crop level. Most of the studies made their generalisations on the basis of one or two subsistence crops.[4] The present study makes an attempt to find out the relationship between marketed surplus and output produced on the basis of value of all crops (aggregate) as well as physical amount of individual crops. As stated above, there was no significant distress sale prevalent in the region and so, no distinction is made between the marketable surplus and marketed surplus. The amount that was put for the sale by the farmers was taken to be as marketed surplus.[5]

It is clear from the tabular analysis that marketed surplus and output (farm size) has a non-linear relationship. It is clearly indicated by Tables 2 and 7 that marketed surplus as a percentage of output for the aggregate level and for wheat, paddy, coarse cereals and pulses was much higher in the case of large farmers as compared to small and marginal farmers. Non-linear relationship also follows from the fact that with the rise in farm size, family size does not rise at the same proportionate rate. Therefore, with the rise in farm size, the proportion of self-consumption part of the farm output falls which results in proportionately higher production for sale at a higher output level (Patnaik, 1975). The plotting of marketed surplus on output (aggregate and cropwise) also indicated quadratic relationship except for oilseeds and cotton, where non-linear form was not clearly found. As quadratic form is also consistent with the economic interpretation, its results are presented in Table 9. The average and marginal propensity to sell and elasticity of marketed surplus (calculated) with respect to output are presented in Table 10. The quadratic equation may be written as:

$$MS = \alpha + \beta Q + \gamma Q^2$$

where Q denotes the total quantity produced and MS the marketed surplus.

Table 9 reveals that the coefficient of Q^2, i.e., value of γ is significant in all of the crops except oilseeds and cotton. Barring pulses, the sign of γ is also positive. Significant positive coefficient of Q^2 indicates that there is rise in the rate or proportion of output marketed with successive increase in output. This is also clear from marginal propensity to sell (MPS). Rising MPS with the output was found in the case of aggregate output (all crops) and wheat, paddy and coarse cereals. In the case of oilseeds and cotton, coefficient of Q^2 was insignificant, that indicates linear relationship between their output and marketed surplus. So the proportion of additional output marketed remained constant with the rise in output of these two crops (see Table 9). The reason for constant MPS over all ranges of output for oilseeds and cotton is that being cash crops they are generally produced for the market by all size-classes of farmers.

TABLE 9. MARKETED SURPLUS (QUADRATIC) FUNCTIONS

$(MS = \alpha + \beta Out + \gamma Out^2)$

Name of crop	Number of observations	Constant	Output	Output^2	R^{-2}	Minimum subsistence output where MS = 0
(1)	(2)	(3)	(4)	(5)	(6)	(7)
All crops (value Rs.)	400	-2887* (-3.7)	0.878* (86)	0.0000001* (8.4)	0.989	3287 (7.2)
Wheat (quintals)	374	-6.5* (-3.9)	0.823* (41)	0.00016* (4.7)	0.967	7.9 (7.3)
Paddy (quintals)	163	-2.4* (-6.7)	0.984* (293)	0.0000099* (3.4)	0.999	2.4 (7.8)
Coarse cereals (quintals)	70	-1.98* (-3.0)	0.769* (10)	0.0029** (2.5)	0.944	2.55 (8.3)
Pulses (quintals)	91	-1.06 (-1.7)	0.899* (16)	-0.0043* (-14)	0.752	1.20 (8.0)
Oilseeds (quintals)	119	-0.37* (-3.7)	0.995* (134)	-0.000054 (-0.96)	0.999	0.37
Cotton (quintals)	181	-0.01 (-0.3)	0.995* (308)	0.00004 (1.4)	0.9997	0.01
Oilseeds (quintals)	119	-0.32* (-3.8)	0.989* (294)	-	0.999	0.32
Cotton (quintals)	181	-0.05 (-1.4)	0.999* (753)	-	0.9997	0.05

Figures in parentheses in the last column are average family size.
*, ** Significant at 1 and 5 per cent level respectively.

In the case of pulses, coefficient of Q^2 was significant with negative sign, indicating fall in MPS with the rise in output. As pointed out earlier, pulses are subsistence crops and form a significant part of the food basket along with wheat and rice. However, they are not affordable equally by all the farmers. Generally, rich farmers who have higher level of output of these crops, retain proportionately higher amount for home consumption. Therefore, one finds that the proportion of output marketed was higher for the small and marginal farmers. Higher MPS at lower levels of output indicates the pressure of other obligations on the small farmers to sell higher amount of additional output of pulses.[6]

The last column of Table 9 shows the minimum subsistence output. The table shows that the minimum subsistence output, i.e., the output level below which sale becomes zero, was positive in all the crops without any exception. It implies that at a very low level of output, the whole amount is kept for self-consumption and nothing is sold in the market. The results of elasticity of marketed surplus with respect to output are presented cropwise in Table 10. It is evident from the table that the magnitude of elasticity of all crops (aggregate) as well as wheat, paddy, coarse cereals, oilseeds and cotton exceeds unity and is positive for all levels of output above the subsistence level. The economic implication of more than unit elasticity of marketed surplus is that above the subsistence level, any increase in output leads to more than proportionate increase in the volume of sale. Further, initially when output is

TABLE 10. APS, MPS AND OUTPUT ELASTICITY OF MARKETED SURPLUS

(1)	Output (2)	Marketed Surplus (3)	$\hat{MS}$ (4)	$APS = \frac{(\hat{MS})}{Output}$ (5)	$MPS = \frac{\delta \hat{MS}}{\delta Output}$ (6)	$Elasticity = MPS \frac{Output}{\hat{MS}}$ (7)
			All crops (Aggregate)*			
1.	1,750	0	-1,350	-	-	-
2.	4,200	2,100	802	0.19	0.879	4.60
3.	6,600	3,100	2,912	0.44	0.879	1.99
4.	11,400	8,600	7,135	0.63	0.880	1.41
5.	19,600	14,000	14,360	0.73	0.882	1.20
6.	42,800	31,600	34,875	0.81	0.887	1.09
7.	67,200	53,200	56,566	0.84	0.891	1.06
8.	1,07,850	87,350	92,968	0.86	0.900	1.04
9.	7,73,500	7,51,800	7,36,076	0.95	1.030	1.09
10.	11,33,000	11,26,000	11,20,256	0.99	1.100	1.12
			Wheat			
1.	6	0	-1.6	-	-	-
2.	15	9	5.9	0.39	0.83	2.10
3.	30	17	18.3	0.61	0.83	1.36
4.	42	26	28.3	0.67	0.84	1.24
5.	80	68	60.4	0.75	0.85	1.12
6.	140	100	111.9	0.80	0.87	1.09
7.	200	180	164.5	0.82	0.89	1.08
8.	470	450	415.7	0.88	0.97	1.10
9.	600	520	544.9	0.91	1.01	1.12
10.	982	962	956.0	0.97	1.14	1.17
			Paddy			
1.	4	4	1.5	0.38	0.984	2.62
2.	12	10	9.4	0.78	0.984	1.26
3.	32	28	29.1	0.91	0.985	1.08
4.	50	49	46.8	0.94	0.985	1.05
5.	112	109	107.9	0.96	0.986	1.02
6.	152	150	147.4	0.97	0.987	1.02
7.	240	220	234.3	0.98	0.989	1.01
8.	352	350	345.2	0.98	0.991	1.01
9.	672	668	663.3	0.99	0.997	1.01
10.	1,492	1,487	1,487.8	0.997	1.010	1.02
			Coarse cereals			
1.	2	0	-0.4	-	-	-
2.	4	3	1.1	0.29	0.79	2.88
3.	8	4	4.4	0.54	0.81	1.48
4.	23	23	17.2	0.75	0.90	1.21
5.	45	40	38.5	0.85	1.03	1.20
6.	80	78	78.1	0.98	1.23	1.26
			Pulses			
1.	2.4	0	1.0	0.45	0.88	1.97
2.	6	6	4.2	0.70	0.85	1.21
3.	16	15	12.2	0.76	0.76	1.00
4.	32	29	23.3	0.73	0.62	0.86
5.	40	30	28.0	0.70	0.55	0.79
6.	52	48	34.1	0.66	0.45	0.69

(Contd.)

TABLE 10 (*Concld.*)

(1)	Output (2)	Marketed Surplus (3)	$\hat{MS}$ (4)	$APS = \frac{(\hat{MS})}{Output}$ (5)	$MPS = \frac{\delta \hat{MS}}{\delta Output}$ (6)	$Elasticity = MPS \frac{Output}{\hat{MS}}$ (7)
			Oilseeds			
1.	2	2	1.7	0.83	0.989	1.19
2.	6	6	5.6	0.94	0.989	1.05
3.	10	10	9.6	0.96	0.989	1.03
4.	38	36	37.3	0.98	0.989	1.01
5.	50	48	49.1	0.98	0.989	1.01
6.	90	88	88.7	0.99	0.989	1.00
			Cotton			
1.	1	1	0.95	0.949	0.999	1.05
2.	6	6	5.9	0.991	0.999	1.02
3.	20	20	19.9	0.997	0.999	1.00
4.	44	44	43.9	0.998	0.999	1.00
5.	99	99	98.9	0.998	0.999	1.00
6.	180	180	179.8	0.999	0.999	1.00

* *Note:* Aggregate Output and MS are given in rupees while crop output and crop MS are given in quintals.

at the subsistence level, the value of elasticity is very high. Elasticity declines rapidly towards unity with the rise in output level. However, before reaching to unity, at a sufficiently high level of output, it again starts rising with further increase in output.

The simple interpretation of the above behaviour of elasticity is that initially when output starts rising above the subsistence level, the farmers try to fulfill their basic needs of home consumption, feed, seeds and gifts, etc. This tendency of farmers causes a falling elasticity due to lower proportionate output sold. Once sufficiently high level of output is achieved, despite all these obligations, the farmers sell higher percentage of output. So, elasticity along with APS and MPS starts increasing at such a high level of output. This critical level of output is achieved at more than 6 hectares (15 acres) of operated area.[7]

Narain (1961) observed that during the fifties marketable surplus as a proportion of output, i.e., APS decreased with the increase in farm size upto the size-class of 10-15 acres. Above this size-class, it started increasing steadily.

The crops, viz., oilseeds, cotton and pulses show somewhat different trends in terms of elasticity. Oilseeds and cotton are represented by linear regressions and therefore, elasticity does not show any rising trend. At all levels of output the value of elasticity is near unity and does not differ much over farm size. This indicates that these two crops are cash crops and any increase in output leads to proportionate increase in marketed surplus, irrespective of the farm size. Further, since intercept is negative in the linear regression and 'b' coefficient positive in both the cases, elasticity never falls below unity. In the case of pulses, like MPS, elasticity too falls steadily from 1.97 to 0.69, thereby falling below unity. It indicates that with higher output, proportionately lower amount is put for sale by the farmers, for the reasons mentioned above in the case of falling MPS.

Thus the findings of upward movements of elasticity and rising MPS have far reaching implications. Rising MPS contradicts Raj Krishna's assertion that the small as well as large farmers producing above the subsistence level sell the same additional quantity out of additional output. Rising MPS points out that the supply behaviour of farmers is not similar

and it differs from small to large farmers. To understand the supply behaviour of farmers, one also needs to understand their land distribution. The upward movement of elasticity at a substantially high level of output implies that generally the large farmers sell proportionately higher amount of additional output, as compared to the small farmers. The policy implication is that to foster high growth of marketed surplus, holding size should increase. However, it will have very serious consequences for the employment in the rural areas.

VII

CONCLUSIONS

On the basis of 400 households from eight villages in Kaithal and Sirsa districts (Haryana), the study concludes: Not only the large farmers but also small and marginal farmers produce for the market. The percentage of marketed surplus is higher in the case of cash crops like cotton, oilseeds and paddy as compared to other food crops like wheat, pulses and coarse cereals. The large farmers who constituted 10 per cent of total farmers contributed 45 per cent of total marketed surplus while the marginal farmers constituting 24 per cent of total households contributed only 2.6 per cent of marketed surplus. In the multiple regression, the variable that was most important affecting the marketed surplus was the output level. The other significant variables were operated area, family size, unirrigated area and area under tenancy in that order. While output, operated area and area under tenancy boosted up the marketed surplus, family size and unirrigated area presented a negative relationship with marketed surplus. Not only output and output marketed were directly related, they had a direct and more than proportionate relationship, thereby giving rise to an increasing MPS over all ranges of output. Moreover, elasticity of marketed surplus with respect to output declined initially but at a subsequently higher level of output, it started increasing. Rising MPS and 'U' turn elasticity were observed in the case of aggregate output, wheat, paddy and coarse cereals. MPS and elasticity remained constant in the case of oilseeds and cotton while it declined in the case of pulses. The rising elasticity of food crops at a substantially high level of output indicates that to increase marketed surplus, increase in output of large farmers becomes more important.

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NOTES

1. See, for example, Parthasarathy and Rao (1964), Krishna (1965), and Prasad (1989).
2. See, for example, Muthaiah (1964), Hati (1976), and Chattopadhyay and Sen (1988).
3. Insignificant coefficient of loans rules out any possibility of distress sales even in case of paramount food crop like wheat.
4. Raj Krishna's study has been criticised because of making generalisation on the basis of one or two subsistence crops like rice or wheat. See, for example, Hanumantha Rao (1965), Krishnaji (1965), Majumdar (1965) and Prasad (1965).
5. The data on marketed surplus was collected for the whole year irrespective of the point of time it was sold by the farmers. It was observed that output of all the crops was sold within 6-9 months after harvest.

6. The higher proportion of sale of pulses by the small farmers may be caused by their rising poverty as also indicated by Sen (1996) who observed rise in rural poverty in Haryana based on the data of National Sample Survey on consumer expenditure of 1993 over the previous sample period of 1987. However, higher sale by the small farmers cannot be termed as distress sales as farmers sell under the pressure of cash requirements but never repurchase from the market. Moreover, low level of output of pulses does not necessarily represent the small farmers. Large farmers might also be devoting very few area to pulses.

7. This size of holding is calculated by dividing the level of output where the elasticity takes an upward turn by the productivity per acre.

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