

# Factors Affecting Marketed & Marketable Surplus of Paddy: A Case Study in Some Districts of West Bengal

Debashis Sarkar<sup>1</sup> and Debajit Roy<sup>2</sup>

<sup>1&2</sup>Agro-Economic Research Centre, Visva-Bharati

## Abstract

The importance of precise estimation of marketed and marketable surplus has been felt in India in view of its crucial role in forming the economic database for formulation of economic policies/decisions by the government. As available data of marketable surplus has become obsolete, the present survey throws up information not only on marketed & marketable surplus ratios but also on factors that influence them with particular reference to cultivation of paddy in West Bengal. It has been observed that both marketed & marketable surplus ratio tends to increase steadily with increase in farm-size. While average marketed surplus ratio, taking all farms together, stands at 55.30 percent of net availability of paddy or 61.19 percent of current production of paddy, the marketable surplus ratio stands at 43.49 percent of net availability of paddy 36.43 percent of current production. It is evident that factors like farm size, average price received by the farms, access to credit and possession of *pucca* storage have significant positive relationship with marketed/marketable surplus ratio, while factors like household size, indebtedness of farm households exhibit a significant negative relationship with marketed/marketable surplus ratio. On the whole it comes out that marketed/marketable surplus ratio of paddy in West Bengal is much lower as compared to other agriculturally advanced states, and that the ratio of marketed/marketable surplus depends much upon the socio-economic condition of the farmer households.

© 2012 New Delhi Publishers. All rights reserved

**Keywords:** Marketed surplus ratio, Marketable surplus ratio, Socio-economic factors

## Introduction

The importance of precise estimation of marketed and marketable surplus has been felt in India since 1947 in the context for planning for agricultural development, distribution programmes and pricing policies for agricultural commodities. The available data of marketable surplus based on the surveys conducted by the Directorate of marketing and Inspection during earlier decades has largely become obsolete. This has been particularly because of the fact that over the years, there is consistent improvement in the post-harvest technology, knowledge and skill of the farmers and development of various post-harvest infrastructures leading to possible reduction in post-harvest losses. Changing farmers' behaviours, cultivation practices and government policies to reduce the distress sale, could have also changed the

ratio of marketed & marketable surplus. As such, there has been a felt need for revision and updating of information on marketed & marketed surplus ratios to make it more realistic. It is here that the present study throws up information not only on marketed & marketable surplus ratios of paddy but also attempts to identify socio-economic factors that influence them.

## **2. Objectives of the Study**

The main objectives of the study are:

- i) To estimate the marketable and marketed surplus ratio of paddy in West Bengal; and
- ii) To identify factors affecting marketed and marketable surplus of paddy in West Bengal.

## **Methodology**

The primary data for the study was collected through a multi-stage stratified random sampling method. In the first stage, three districts namely Burdwan, Murshidabad and Birbhum were selected purposively as sample districts for the study based on secondary data on production of paddy during triennium-ending year 2010-11. In the second stage, two blocks from each district were selected purposively based on secondary data on production of paddy. From each block, appropriate numbers of villages were selected purposively bearing particular characteristics features representing the blocks/districts. In the third stage, an appropriate number of farm households were selected from the sample villages belonging to different size strata from the exhaustive list of farmers available with the State Agriculture Office in concerned blocks. In total 318 farm households were selected from over 3 districts as sample units for the study, such that each district contains at least 100 households while at the same time each size strata contains at least 20 farms. In all about, 38.99 percent, 30.50 percent 20.44 percent and 10.04 percent of the farms belong respectively to marginal (>0-1 ha.), small (>1-2 ha.), semi-medium (>2-4 ha.) and medium (>4-10 ha.) size-strata.

## **Review of Literature**

There exist a host of micro-surveys that study marketed and marketable surplus of paddy/rice in the country. These studies largely attempt to provide estimates of marketable surplus ratio and post-harvest losses of paddy in different parts of the country. However, studies relating to West Bengal seem relatively scanty. Among the various micro-studies conducted throughout the country, a few are mentioned here. Among the studies relating to estimation of marketable surplus of paddy, Reddy, M.J.M. (1987) carried out his study in Chittoor district of Andhra Pradesh and reported the marketable surplus in the tune of 4.59 percent for small and marginal category, 31.12 percent for medium category and 52.51 percent for large category of farmers. A similar study was carried out by Upender et al., who reported that

marketable surplus of paddy to be 33.49 percent in small category, 27.96 percent in medium category and 38.56 percent in large category of farmers in Karimnagar district of Andhra Pradesh. For Karnataka, Devaraja, T.S. (1999) reported marketable surplus of paddy to be 45.74 percent in Hasan district. In case of Assam, Ahmed, et al. (1990) reported marketed surplus of paddy to be 48.56 percent, on an average, and reported that the marketed surplus of fine winter paddy was higher than coarse winter paddy. More recently, Reddy A. A. (2009) in a study conducted in Orissa estimated marketed surplus ratio in the tune of 65 percent. However, in Punjab, Rangi, P.S. (1993) reported that the marketable surplus of Paddy in Punjab was 94 percent of the production, much higher than the average marketable surplus of the country. Parmod Kumar (1999) obtained similar extent of marketed surplus for Haryana reporting marketed surplus of paddy in Haryana to be in the tune of 96.31 percent.

In case of larger studies, the first instance of a comprehensive estimate in independent India may be traced back to the 'Market Report 1951', which estimated the marketable surplus ratio of rice at 32.2 percent<sup>1</sup>. Later, the a more comprehensive study in this regard has been conducted by the Directorate of Marketing & Inspection (D.M.I.) under the Ministry of Agriculture, Government of India during the year 1972-73<sup>2</sup>. They conducted a nation-wide survey for estimation of marketable surplus and post harvest losses of foodgrains including paddy, which revealed that the estimated farm-family requirement was 91.13 percent of estimated production; while the marketable surplus was only 8.87 percent. It may be noted however that during the year, 1972-73, the country was facing the problem of deficit. More recently, the D.M.I. conducted another nation-wide survey for estimation of marketable surplus and post harvest losses of foodgrains including paddy for the period of three years i.e. 1996-97, 1997-98 and 1998-99, covering 25 States, 100 districts and 15,000 cultivator households in the country<sup>3</sup>. The estimates of marketed & marketable surplus and post-harvest losses for other foodgrain items have been presented here in table. In sharp contrast to their earlier findings, the study observed that the total farm-family requirement including the losses at farm accounted for 44.54 percent of the total estimated production, while the marketed and marketable surplus stood at 51.97 percent and 55.46 percent respectively. This meant that the carry-over stocks with the producers stood at 3.49 percent of the total production. The total post harvest losses of paddy at producers' level were estimated at 2.71 percent of the total production. A state-wise quantitative analysis shows that West Bengal contributed the highest amount of marketed surplus of paddy with a share of 17.9 percent of the national total, followed by Punjab (15.8 percent) and Andhra Pradesh (15.6 percent). In case of marketable surplus, the same ranking of states holds. However, in case of marketable surplus ratio, the survey indicated that West Bengal stood only 5<sup>th</sup> after Punjab, Haryana, Rajasthan and Gujrat.

### **Results of the Study**

In this section, we attempt to present the findings from our micro-survey as follows-

### Estimates of Marketed Surplus

The estimation of marketed as well as marketable surplus heavily relies on the computational specifications adopted for calculating them. Hence, before proceeding to estimate marketed surplus, we need to clearly specify the concept of marketed surplus here.

‘Marketed Surplus’ is a practical concept and refers to that part of the marketable surplus which is marketed by producer. In particular, ‘Marketed Surplus’ is objective, because it refers specifically to the marketed amount i.e. to the actual quantity which enters the market.

Marketed Surplus is derived from the formula:

$$MS = A - B$$

Here ‘A’ is net availability (consisting of previous year’s carry over stock and current production); and ‘B’ is total amount sold in the market.

**Table 1.** Estimates of Marketed Surplus Ratio

Farm Size	Birbhum	Burdwan	Murshidabad	All Districts
Marginal	35.22(36.81)	49.63(54.11)	46.70(48.01)	44.15(46.59)
Small	56.41(61.77)	59.22(66.93)	60.61(67.26)	58.66(65.18)
Semi-Medium	67.25(80.13)	59.52(71.12)	69.02(72.50)	64.77(74.55)
Medium	85.04(91.27)	63.32(76.80)	71.20(72.46)	69.12(78.56)
All Farms	52.50(58.13)	56.54(64.90)	56.68(60.05)	55.30(61.19)

*Note:* Figures in parenthesis indicate Marketed Surplus Ratio with respect to Current ProductionSource: Field Survey

Our estimates of marketed surplus reveal that the marketed surplus ratio tends to increase steadily with increase in farm-size across all selected districts. Taking all districts together, it is observed that marketed surplus ratio for the marginal farms stands at 44.15 percent of net availability of paddy, which for the small, semi-medium and medium farms stand at 58.66 percent, 64.77 percent and 69.12 percent respectively. As proportion to current production, the marketed surplus ratio for the marginal farms turn out to be 46.59 percent, which for the small, semi-medium and medium farms are found to be 65.18 percent, 74.55 percent and 78.56 percent respectively. Average marketed surplus ratio, taking all farms together, stands at 55.30 percent of net availability of paddy or 61.19 percent of current production of paddy. There are, however, considerable differences in the estimates marketable surplus ratio among the districts. In fact, the difference between average marketed surplus ratios among the size classes is more prominent in district Birbhum, followed by district Murshidabad and Burdwan. In district Birbhum, the marketed surplus ratio for the marginal farms turns out to be as low as 35.22 percent of net availability of paddy (36.81 percent of current production), which for the medium farms stands at as high as 85.07 percent of net availability (91.27 percent of current production).

### Estimates of Marketable Surplus

In contrast to ‘marketed surplus’, the concept of ‘Marketable Surplus’ is a theoretical concept which represents the surplus which the farmer/producer has available with himself for disposal once the genuine requirements of the farmer for family consumption, payment of wages in kind, feed, seed and wastages have been met. The concept of ‘Marketable Surplus’ is subjective because the feature of retention of the farmer is a matter of subjective guess.

Here, Marketable Surplus is derived from the formula:

$$A - B = MS$$

Where ‘A’ stands for production and ‘B’ includes all the items mentioned above except that “quantity required for consumption” has been treated to include the quantity required for “*family consumption*” as explained above and MS stand for “*marketable surplus*”. This quantity is actually available for non-farm consumption and is, therefore, true marketable surplus.

**Table 2.** Estimates of Marketable Surplus

Farm Size	Birbhum	Burdwan	Murshidabad	All Districts
Marginal	9.05(5.04)	31.86(25.81)	29.22(27.76)	23.91(20.15)
Small	46.61(39.52)	51.55(38.72)	52.39(47.37)	50.05(41.86)
Semi-Medium	61.40(52.67)	55.35(35.66)	64.60(60.12)	59.96(48.19)
Medium	81.33(79.19)	60.22(50.11)	68.71(66.59)	66.04(59.17)
All Farms	37.76(31.77)	46.79(35.33)	45.44(42.29)	43.49(36.43)

*Note:* Figures in parenthesis indicate Marketable Surplus Ratio with respect to Current Production. Source: Field Survey

Under such circumstances, our estimates of marketable surplus reveals that taking all farms together, the marketable surplus ratio stands at 43.49 percent of net availability of paddy. As ratio to current production, the marketable surplus ratio comes down further to 36.43 percent. Just as in case of marketed surplus, the estimates of marketable surplus also tend to increase sharply over increase in size classes. In particular, the marketable surplus ratio for the marginal farms is estimated at 23.91 percent of net availability, which for the small, semi-medium and medium farms turn out to be 50.05 percent, 59.96 percent and 66.04 percent respectively. As ratio to current production, the marketable surplus ratio for the marginal farms stands at 20.15 percent of current production, which for the small, semi-medium and medium farms turn out to be 41.86 percent, 48.19 percent and 59.17 percent respectively. However, there are obvious differences in the estimates of marketable surplus for the size classes across the districts. In particular, the size-wise variation of marketable surplus ratio is more pronouncing in Birbhum district, followed by Murshidabad and Burdwan districts. It is interesting to find that in Birbhum district, the marketable surplus ratio for the marginal farms turns out to be as low as 9.05 percent of net availability (or 5.04 percent of current production), which for the

medium farms stands at 81.33 percent of net availability (or 79.19 percent) of current production.

Comparing the estimates marketable surplus ratio with marketed surplus ratio we find that taking all farms together the average marketable surplus ratio is lower than the average marketed surplus ratio by a good margin, which indicate towards a gross picture of distress sale in case of West Bengal agriculture. In particular, the difference between marketed and marketable surplus ratio stands at about 12 percent in terms of net availability of paddy or at 25 percent of current production. At the same time it should be noted here that as ratio to net availability of paddy the difference between the estimates of marketed and marketable surplus ratios is more pronounced among the smaller size-classes, which in turn indicate a higher degree and occurrence of distress sell among the smaller farms in West Bengal.

### **Factors Affecting Marketed Surplus Ratio**

In this section an attempt has been made to determine the factors that influence the decision of the farm households regarding amount of paddy output to be marketed. This has been done by carrying out a simple regression analysis by treating the ratio of marketed surplus to total quantity produced as the dependent variable, while considering different socio-economic, economic, institutional and technological factors as independent variables affecting ratio of marketed surplus of individual farm households. In particular we may state our simple model as-

*MS (Y) = f [farm-size ( $X_1$ ), age of the decision maker ( $X_2$ ), education of the decision maker ( $X_3$ ), household size ( $X_4$ ), income from non-farm sources ( $X_5$ ), gross cropped area ( $X_6$ ), intensity of cropping ( $X_7$ ), average price received ( $X_8$ ), dummy for pucca storage ( $X_9$ ), dummy for access to credit ( $X_{10}$ ), dummy for indebtedness of farms ( $X_{11}$ )]*

Here, the independent variable Y is the Marketed Surplus Ratio (in percentages) of individual farms, and the independent variables are as stated. It should be noted here that the dummy variable for storage type ( $X_9$ ) assumes the value 1 if the storage type is *pucca* storage, else assumes the value of 0. Likewise, the dummy variable for access to credit assumes the value 1 if the farm has access to credit from any of the sources of credit, else assigned 0. Similarly, the dummy variable for state of indebtedness of farm households assumes the value 1, if the farms are have outstanding loan against them from any source; else assumes the value 0. It should be noted here that as some of the farm households do not actually market their product (the entire product is retained for home consumption), we have intentionally left them out from our exercise. In particular, out of the total of 318 farm households covered under the study, here we consider 289 farm households who have marketed at least some part of their product.

The result of the regression exercise stated above is presented here in the following table. From the results of our regression exercise reveals that the model developed by us fits to our data only moderately, as the value of R is just about .60. At the

same time, the model only partially explains variations in the dependent variable as caused by independent variables considered in the model (as revealed by poor  $R^2$  value).

Nevertheless, considering the model as a moderate fit for raw field level agricultural data, some important results come out. The exercise reveals that farm-size has a significant positive effect on marketed surplus ratio, which means that higher the size of farms, the higher is the proportion of paddy output marketed, which might result from greater economic power for the larger farms. Similarly, average price received also shows a significant positive relationship with marketed surplus ratio, which means that higher realization of higher price for the farms, *ceteris paribus*, induces them to sell proportionate higher amounts of paddy in the market. Other factors which positively influence marketed surplus ratio include dummy for *pucca* storage of farms and dummy for access to credit. In fact, those farms with *pucca* storages hold back their stock mainly for selling at higher prices in future, which in turn is reflected in a significant positive relationship with marketed surplus ratio. Similarly, the farms accessing credit are mostly able to hold back their stock in speculation of higher prices. As such they are often in a position to sell proportionately higher amounts of paddy.

On the other hand, it is important to note that household size shows a significant negative relationship with marketed surplus ratio. This is particularly because of the fact that a larger household size denotes more mouths to feed, which is often met by higher retention of output, which in turn negatively impacts the ratio of marketed surplus. Again, it is interesting to find out that indebtedness of farmer households also exerts negative impact on marketed surplus ratio. In fact, farms which are already indebted with outstanding loans against them prefer to meet their consumption demand first by retaining a proportionately larger amount of paddy. This in turn has been reflected in a significant negative relationship between state of indebtedness of farmer households and marketed surplus of paddy.

Other factors like age of the decision maker, education of the decision maker, income from non-farm sources, gross cropped area and intensity of cropping do not reveal any statistically significant relationship with marketed surplus ratio in the model specified by us.

**Table 4.4.6.** Multiple Regression Estimate: Exercise 1

Dependent Variable: Marketed Surplus Ratio (Y)			
R: .595			
R <sup>2</sup> : .354			
Adjusted R <sup>2</sup> : .328			
Degrees of Freedom: 288			
Independent Variables:	B	SE of B	t_statistic
Constant	-11.061	19.073	-0.580
Farm-size ( $X_1$ )	9.514	4.395	2.164*
Age of the Decision Maker ( $X_2$ )	-0.112	0.127	-0.882

*Contd.*

Independent Variables:	B	SE of B	t_statistic
Education of the Decision Maker ( $X_3$ )	-0.131	0.385	-0.340
Household Size ( $X_4$ )	-1.480	0.412	-3.596***
Income from Non-farm Sources ( $X_5$ )	0.000	0.000	1.611
Gross Cropped Area ( $X_6$ )	-1.675	2.391	-0.700
Intensity of Cropping ( $X_7$ )	0.096	0.054	1.784
Average Price Received ( $X_8$ )	0.041	0.016	2.565*
Dummy for Pucca Storage ( $X_9$ )	20.655	3.661	5.642***
Dummy for Access to Credit ( $X_{10}$ )	20.939	3.914	5.350***
Dummy for Indebtedness of Farms ( $X_{11}$ )	-13.507	3.905	-3.459***

\*, \*\* and \*\*\* denote significant at .05, .01 and .001 levels Source: Computed with Field Survey Data by SPSS Software

### Factors Affecting Marketable Surplus Ratio

Apart from factors influencing marketed surplus ratio for the farms, an attempt has been made here to identify factors exerting influence on marketable surplus ratio of the farms. Here, we construct the model just as in case of exercise 1, but we treat marketable surplus ratio as the independent variable. As such, we treat all 318 farm households covered under the survey as out sample pool. In particular, we may state the model as -

$$MS(Y) = f[\text{farm-size } (X_1), \text{ age of the decision maker } (X_2), \text{ education of the decision maker } (X_3), \text{ household size } (X_4), \text{ income from non-farm sources } (X_5), \text{ gross cropped area } (X_6), \text{ intensity of cropping } (X_7), \text{ average price received } (X_8), \text{ dummy for pucca storage } (X_9), \text{ dummy for access to credit } (X_{10}), \text{ dummy for indebtedness of farms } (X_{11})]$$

Here, MS (Y) is the marketable surplus ratio (percent) of individual farm households. The independent variables are the same as considered in our preceding regression exercise. Hence, what we try to explain here is the factors that determine the ratio of marketable surplus. The results of the regression analysis have been presented here as follows:

**Table 4.4.7:** Multiple Regression Estimate: Exercise 2

Independent Variables:	B	SE of B	t_statistic
Constant	-46.282	21.792	-2.124*
Farm-size ( $X_1$ )	14.149	4.983	2.839**
Age of the Decision Maker ( $X_2$ )	0.039	0.142	0.277

*Contd.*

Independent Variables:	B	SE of B	t_statistic
Education of the Decision Maker ( $X_3$ )	-0.116	0.448	-0.258
Household Size ( $X_4$ )	-1.221	0.486	-2.514*
Income from Non-farm Sources ( $X_5$ )	0.000	0.000	1.152
Gross Cropped Area ( $X_6$ )	-3.881	2.722	-1.426
Intensity of Cropping ( $X_7$ )	0.158	0.060	2.627**
Average Price Received ( $X_8$ )	0.046	0.019	2.435*
Dummy for <i>Pucca</i> Storage ( $X_9$ )	26.548	4.330	6.131***
Dummy for Access to Credit ( $X_{10}$ )	26.360	4.551	5.792***
Dummy for Indebtedness of Farms ( $X_{11}$ )	-16.253	4.569	-3.557***

\*, \*\* and \*\*\* denote significant at .05, .01 and .001 levels Source: Computed with Field Survey Data by SPSS Software

In this exercise too, the model appears to be moderately fit ( $R=.598$ ) with comparatively poor values of  $R^2$  ( $R^2=.357$ ). However, we accept our model as largely fit, as the regression exercise is carried out on raw field level data.

In this exercise too, it comes out that farm size has a significant positive influence on marketable surplus ratio for the farms, indicating that the larger farms sell proportionate a larger amount of paddy produced. At the same time, factors like average price received by the farms also shows a significant positive relationship with marketable surplus ratio. As before, factors like access to credit and possession of *pucca* storage facilities appear to have a significant positive relationship with marketable surplus ratio. It further comes out that intensity of cropping also exhibits a statistically significant direct relationship with marketable surplus ratio. This is due to the fact that higher cropping intensity in turn means a higher total output. Now as farm retention for self-consumption remains unchanged, a higher total output through multiple cropping in turn results in a higher marketable surplus ratio.

Here also, the coefficients of household size exhibit a significant negative relationship with marketable surplus ratio. This results from the fact that a higher household size means larger number of mouths to feed, which in turn requires a higher amount of paddy output to be retained for self-consumption. This in effect results in a proportionately lower marketable surplus ratio. Again, indebtedness of farm households also shows a negative relationship with marketable surplus ratio, which implies that if the farms are indebted in nature, they have little marketable surplus left to repay loans after retention for self-consumption.

However, in our model, other factors like age of the decision maker, education of the decision maker, income from non-farm sources and gross cropped area do not reveal any statistically significant relationship with marketable surplus ratio.

### Concluding Observations

The importance of precise estimation of marketed and marketable surplus has been felt in India in view of its crucial role in forming the economic database for

formulation of economic policies/decisions by the government. As available data of marketable surplus has become obsolete, the present survey throws up information not only on marketed & marketable surplus ratios but also on factors that influence them with particular reference to cultivation of paddy in West Bengal.

After a detailed analysis of data by conducting primary survey of about 318 farm households in six eminent blocks from over three major paddy producing districts in West Bengal, the study makes a number of crucial observations. In case of marketed surplus ratio, the study finds that both marketed & marketable surplus ratio tends to increase steadily with increase in farm-size. While average marketed surplus ratio, taking all farms together, stands at 55.30 percent of net availability of paddy or 61.19 percent of current production of paddy, the marketable surplus ratio stands at 43.49 percent of net availability of paddy 36.43 percent of current production. Among the socio economic factors that affect marketed and marketable surplus ratios, the study finds that factors like farm size, average price received by the farms, access to credit and possession of *pucca* storage have significant positive relationship with marketed/marketable surplus ratio, while factors like household size, indebtedness of farm households exhibit a significant negative relationship with marketed/marketable surplus ratio. On the whole it comes out that marketed/marketable surplus ratio of paddy in West Bengal is much lower as compared to other agriculturally advanced states, and that the ratio of marketed/marketable surplus depends much upon the socio-economic condition of the farmer households.

## References

- Ahmed, A. and Arora, V.P.S. 1990. "A study on marketed surplus and its farm level determinant of Paddy in Assam", *Agricultural Marketing*, **33**:2.
- Devaraja, T.S. 1999. "A Study on Marketable Surplus of Paddy in Hassan district of Karnataka", *Agricultural Situation in India*, **56**:3.
- Gill, K.S., Sidhu, D.S. and Sidhu, M.S. 1988. "Storage losses of foodgrain at Farm level in Punjab", *Agricultural Marketing*, **30**:4.
- Krishnamurthy, K. 1973-76. "Post harvest losses in food grains", *Bulletin of Grains Technology*, 11-14.
- Parmod Kumar, 1999. "Marketed surplus of different crops across farm size: A study in Haryana", *Indian Journal of Agricultural Economics*, **54**:4.
- Rangi, P.S. 1993. "Production and Marketing Problems of Rice in Punjab State", *Agricultural Marketing*, **35**:4.
- Reddy, A.A. 2009. 'Research Report on Factor Productivity and Marketed surplus of Major Crops in India: Analysis of Orissa State', Administrative Staff College of India, Hyderabad
- Reddy, M.J.M. 1987. "Marketable Surplus in Paddy – A Regression Analysis", *Agricultural Situation in India*, **41**.
- Singh, T., Tyagi, R.P.S. and Girish, G.K. 1979-86. "Post harvest system of Paddy/Rice in India", *Bulletin of Grain Technology*, **17**:24.
- Upender, M. and Thirupathi, Ch. 1998. "Marketed Surplus of Paddy: A Study at Farm level", *The Bihar Journal of Agricultural Marketing*, **VI**:3.