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Effectiveness of Minimum Support Price Policy for Paddy in India with a Case Study of Punjab§

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Abstract

The effectiveness of minimum support price (MSP) for paddy has been examined in different regions of India and its role and contribution towards production in surplus states like Punjab have been studied. Based on the secondary data spanning from 1980-81 to 2006-07, the deviations of farm harvest prices from the MSP have been used as a measure of ineffectiveness and the impact of prices and technology on rice productivity has been examined by using the simultaneous equation model. While the MSP policy has been very effective in surplus producing states like Punjab and Andhra Pradesh, it has not been so effective in the deficit states. In Punjab, the effective implementation of the price policy has helped in improving the production and productivity of rice. Non-price factors such as use of improved varieties, availability of assured irrigation at subsidized rates and high fertilizer-use have been found to be significant determinants of growth in rice production. The study has suggested that without losing sight of the environmental concerns, the Punjab model can be used for increasing the production of rice in other potential areas of the country.

Key words: Minimum support price, paddy, effectiveness of MSP

JEL Classification: Q18, E64

Introduction

The Agricultural Prices Commission (APC) was set up in India in 1965 to advise the government on evolving a balanced and integrated price structure. The policy framework was modified in 1980, when the emphasis was shifted on to the balance between demand and supply of foodgrains. It was reflected in the revised terms of reference of APC (which was later renamed as Commission for Agricultural Costs and Prices) with a shift from maximizing the production to developing a production pattern consistent with the overall needs of the economy (Acharya, 1997).

The Commission for Agricultural Costs and Prices (CACP) recommends Minimum Support Price (MSP) for 25 agricultural crops, the most important of which are paddy, wheat, cotton, oilseeds and pulses. The MSP policy has been a matter of contention since its inception, with a general feeling that MSP favours only the food surplus regions like Punjab and Haryana states from where large stocks of grains are procured for Public Distribution System (PDS) (Chand, 2003). Also, the price policy is considered to have favoured food crops more than the other crops (Singh *et al.*, 2002). As a result, a large chunk of good quality land was shifted from pulses, oilseeds and other important crops to paddy and wheat crops, creating a serious imbalance

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in the demand and supply of several other agricultural commodities (Chand, 2003). In other regions of the country, the price policy is considered to be ineffective as the government has less interest in procurement operations due to small marketable surpluses. It is therefore, argued that the market prices for wheat and paddy rule lower than the MSP in these areas during post-harvest period and shoot up during the lean periods, which is usually not the case in the surplus-producing regions (ADRT, 2003).

In recent years, the MSP policy has been criticized by both farmers and proponents of free trade. Farmers always demand a substantial hike in MSP, whereas pro-free agricultural trade thinkers feel that, most of the times, MSP is not in line with the international prices as well as domestic demand and supply situation. This brings distortions and inefficiencies in the production patterns. Agricultural price policy has been argued to have widened the farm income inequalities also (Singh *et al.*, 1986). It is further contended that the MSP has outlived its utility and is being used more as a political tool than an economic instrument. It therefore becomes imperative to examine the effectiveness of MSP in different regions of the country as well as its contribution towards growth. The present study has investigated these issues for the paddy crop, which is the most important cereal crop from both production and consumption points of view in the country. Since MSP policy is considered to have favoured mostly the surplus states, its role and contribution towards production was examined for the Punjab state as a case study.

Database and Methodology

The study is based on the secondary data on farm harvest prices and minimum support prices of paddy for various paddy-producing states. Based on the data availability, the time period chosen was 1980-81 to 2006-07. The time-series data on prices of paddy (1980-81 to 2006-07) were divided into three sub-periods, viz. period-I (1980-81 to 1989-90), period-II (1990-91 to 1999-2000) and period-III (2000-01 to 2006-07).

The period-I is regarded to be a normal growth period when output prices were incentivized to promote modern production technology and production, while period-II represents an era when the growth in prices was influenced more by political factors. In period-III, the changes in MSP were largely determined by the international prices rather than the economic factors. The trends in farm harvest prices with respect to minimum support price were studied with the help of graphs and growth rates. To study the effectiveness of the price policy during the harvest periods, the deviations of farm harvest prices (FHP) from the minimum support prices were worked out and divided into negative and positive deviations to examine whether market prices ruled lower or higher over the minimum support prices. The negative deviations reflected ineffectiveness of MSP policy for producers. These deviations were adjusted with MSP in order to examine the degree of their departure from the minimum support price. The formulae used for the mean and adjusted negative / positive deviations were as follows:

$$\text{MAPD} \quad \text{or} \quad \text{MAND} = \frac{1}{n}\sum_{i\mp}^{n} \left| \text{FHP}_i - \text{MSP}_i \right|$$

If, FHP > MSP = Positive deviation (PD)

FHP < MSP = Negative deviation (ND)

where,

MAPD = Mean absolute positive deviation,

MAND = Mean absolute negative deviation,

FHP = Farm harvest price (weighted average of major producing districts for each state),

MSP = Minimum support price, and

n = Frequency of positive or negative deviations.

$$\text{AMPD} \quad \text{or} \quad \text{AMND} = \frac{1}{n}\sum_{i=1}^{n}\left(\left| \text{FHP}_i - \text{MSP}_i \right| / \text{MSP}_i \right) * 100$$

where,

AMPD = Adjusted mean positive deviation, and

AMND = Adjusted mean negative deviation.

To examine the impact of prices and technology on productivity and production, a model was formulated representing productivity (yield) and acreage response to these variables. Different sets of factors influencing area and productivity of rice under simultaneous equation system were tried and the best model was selected on the basis of value of R-square and significance of different variables. The system of

linear equations was estimated simultaneously with 3SLS (three-stage least square) method employing STATA software. The functional form of the selected econometric model was:

$A_t = f (Y_{t-1}, MSPt/MSP_{t-1}, ETW)$

$Y_t = f (F_{qt}, Time)$

$F_{qt} = f (F_{pt}, Y_{t-1})$

where,

A_t = Area under paddy ('000 ha) in the year t,

Y_{t-1} = Yield of paddy in the year t-1 (kg/ha),

ETW = Number of electric-operated tube-wells in the year t (in lakhs),

Y_t = Yield of the crop in the year t (kg/ha),

F_{qt} = Fertiliser consumption in paddy in the year t (kg/ha), and

F_{pt} = Ratio of price of fertiliser (in ₹/kg) to MSP of paddy (₹/q) in the year t.

The elasticities were estimated by using the following formula (applicable only for linear production functions):

$$E_i = b_i * \overline{X}_i / \overline{Y}_i$$

where,

E_i = Elasticity of output with respect to the i^{th} variable,

$\overline{Y}$ = Average of dependent variable,

$\overline{X}_i$ = Average of the i^{th} independent variable, and

b_i = Estimated coefficient of X_i.

The price of paddy grew at different rates during the study period. Therefore its impact on gross value product (GVP) was variable. The GVP was therefore decomposed to examine the impact of paddy prices. The change in GVP of paddy was studied for periods I (1981-91), II (1991-2001), and sub-periods III a (2001-05) and III b (2005-08) during which price increase was highly variable. Any change in the GVP of a crop depends basically on the change in price, area under the crop and its yield. The relative contribution of price, area and yield and their interactions in changing the GVP of paddy was measured with the help of the additive decomposition scheme, as used by Vatta and Aggarwal (2000), and is given below:

$$(GVP_n – GVP_o) = [(P_n – P_o)*(A_o.Y_o) + (A_n – A_o)*(Y_o.P_o) + (Y_n – Y_o)*(P_o.A_o) + \{(P_n – P_o)*(A_n – A_o)* Y_o + (A_n – A_o)*(Y_n – Y_o)* P_o + (Y_n – Y_o)* (P_n – P_o)* A_o + (P_n – P_o)*(A_n – A_o)* (Y_n – Y_o)\}]$$

where,

GVP = Gross value product of paddy in the base year (t_o) and ending year (t_n)

P = Farm harvest prices deflated by the combined index for prices paid by farmers with base year 1990-91

A = Area under cultivation in the base and ending years

Y = Yield in the base and ending years

$(P_n – P_o) * (Ao.Yo)$ = Price effect

$(A_n – A_o) * (Y_o.P_o)$ = Area effect

$(Y_n – Y_o) * (P_o.A_o)$ = Yield effect

$(P_n – P_o) * (A_n – A_o)* Y_o$ = Interaction effect of price and area

$(A_n – A_o) * (Y_n – Y_o)* P_o$ = Interaction effect of area and yield

$(Y_n – Y_o) * (P_n – P_o)* A_o$ = Interaction effect of yield and price

$(P_n – P_o) * (A_n – A_o) * (Y_n – Y_o)$ = Interaction effect of price, area and yield

Growth in MSP of Paddy

The MSP for paddy has risen significantly over the past three decades. In 1980-81, the MSP for paddy (common) was ₹ 105/q which increased to ₹ 950/q in 2009-10 (Table 1). The average annual growth rate was 7.73 per cent for the entire period (1980-2009). The MSP for paddy (fine quality) was fixed for the first time in 1990-91 at ₹ 215/q and it increased to ₹ 980/q in 2009-10. The MSP for paddy (fine) experienced an annual growth rate of 6.76 per cent over the period 1990-2009. The period of 1990s experienced a higher growth in paddy prices. Frequent holding of parliamentary elections and rise in production cost of rice were the important factors behind this growth. However, under the falling international prices, the MSP was modified after 2000 and the growth in MSP slowed down sharply during 2000-05. The consequent fall in profitability again forced the government to raise MSP substantially.

Table 1. Minimum support prices of paddy during 1980-2009

(₹/q)

Year	Paddy (Common)	Paddy (Fine)	Year	Paddy (Common)	Paddy (Fine)	Year	Paddy (Common)	Paddy (Fine)
1980-81	105	-	1990-91	205	215	2000-01	510	540
1981-82	115	-	1991-92	230	240	2001-02	530	560
1982-83	122	-	1992-93	270	280	2002-03	530	560
1983-84	132	-	1993-94	310	330	2003-04	550	580
1984-85	137	-	1994-95	340	360	2004-05	560	590
1985-86	142	-	1995-96	360	375	2005-06	570	600
1986-87	146	-	1996-97	380	395	2006-07	620	650
1987-88	150	-	1997-98	415	445	2007-08	645	675
1988-89	160	-	1998-99	440	470	2008-09	850	880
1989-90	185	-	1999-00	490	520	2009-10	950	980

Period	Compound growth rates (% per annum)	
	Paddy (Common)	Paddy (Fine)
1980-1990	5.97	-
1990-2000	9.26	9.46
2000-2005	2.19	2.07
2005-2009	14.3	13.7
1980/90-2009	7.73	6.76

Note: All the compound growth rates are significant at 5 per cent level

Farm Harvest Prices of Paddy in Surplus and Deficit States

The farm harvest prices (FHPs) in the surplus paddy-producing states of Punjab, Andhra Pradesh (AP) and Uttar Pradesh (UP) moved very close to the MSP over time (Figure 1). Except in UP, where the market price ruled lower than the MSP, the price policy appeared to be successful for producers in the paddy-surplus states. In UP too, the price became equal to the MSP in the year 2005. The government intervention into these markets for its procurement operations was very strong, which ensured MSP to the producers. Almost every grain of the produce brought into the markets, if conformed to the quality specifications, was lifted by the government procurement agencies.

The FHPs of paddy in the deficit states of Tamil Nadu, Karnataka, West Bengal, Bihar and Assam ruled higher than the MSP for many years of the study period due to higher demand than supply (Figure 2). However, in the states of West Bengal, Bihar and Assam the prices started falling below the MSP after the year 2000. In fact, the national food stocks touched all time high during this period and the government started shedding excessive stocks through increasing allocation to states and undertaking subsidized exports. The procurement operations of the government in these were non-significant and therefore MSP was not implemented effectively.

Deviations of FHPs from MSP in Paddy-producing States

To examine the effectiveness of MSP policy for paddy-producers, difference between its FHP and MSP was calculated in different years and is given in Table 2. Punjab experienced positive deviations 23 times in 28 years during 1980-2007. This means that the average FHP was equal to or ruled higher than MSP in 23 out of 28 years. The adjusted difference (positive) between FHP and MSP was as low as 5 per cent of MSP during 23 years and the negative difference was one per cent of MSP in four cases and 2 per cent in the fifth case.

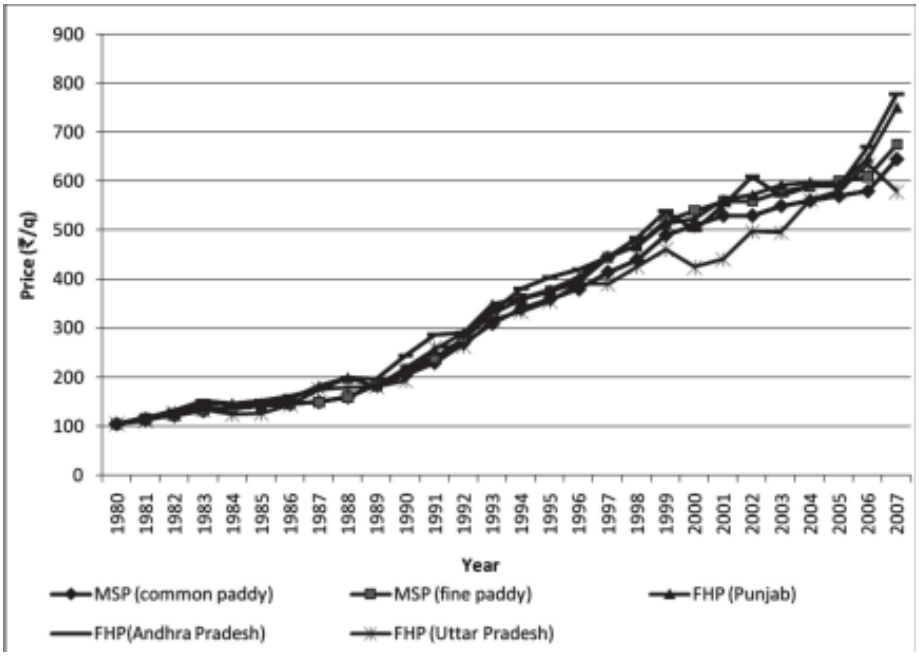

Figure 1. Trends of MSP and FHPs for paddy in surplus states: 1980-2007

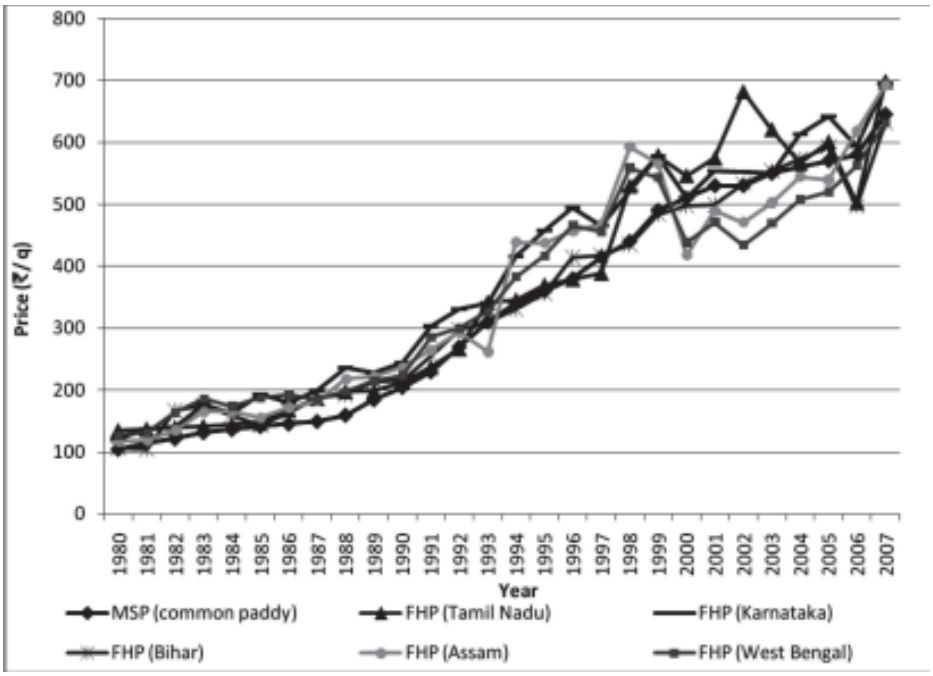

Figure 2. Trends of MSP and FHPs for paddy in deficit states: 1980-2007

This indicated that the government intervention was very strong and did not allow the FHPs to move away from MSP in a significant manner despite large marketed surplus. Due to heavy procurement, the government had strong interest in the Punjab state and did not allow the private trade to play any significant role. Punjab is therefore a classic example of the implementation of the MSP policy backed by effective procurement. In some cases, the farmers did receive prices higher than the MSP but the margin was very small. In fact, the government had abolished procurement price and replaced it with MSP.

In the state of Andhra Pradesh too, the price policy was successful in meeting its objective of ensuring that the farmers did not incur any loss on account of lower FHP than MSP. Only in two cases out of 28, the difference was negative but the magnitude was very small. The FHPs were higher than MSP by 11 per cent (Table 2). The government intervention in AP markets was very strong for its procurement operations and did not allow prices to go lower than MSP.

In Uttar Pradesh, negative deviations (FHP < MSP) were more frequent than positive ones (FHP > MSP) during 1980-2007. In 18 out of 28 years, farmers suffered losses on account of receiving lower prices than MSP (Table 2). In all the sub-periods, the frequency was higher of negative deviations than of positive deviations. The adjusted positive deviation was six per cent of MSP, whereas the negative deviation was eight per cent. In absolute figures, the mean negative difference was ₹ 26/q during these years, indicating the ineffectiveness of MSP policy in the state. It, therefore, appears that the government did not intervene in all the markets of UP effectively. One would have been under the impression that this state would benefit more from the price policy than others due to its higher level of production. However, the price behaviour revealed that on numerous occasions the price policy failed to ensure that the farmers got at least the floor price for their produce. It was because the production in the absolute sense was very high but the proportion of the produce procured was low. Most of the production was being consumed within the state at the household level due to high population pressure. Despite low per capita per day availability of rice, the private trade appeared to prevent price signals to reach the market and through collusion, forced the prices to prevail even lower than MSP in the environment of non-intervention in the market by government procurement agencies. Hence, the price policy has not been effective in the state of Uttar Pradesh.

Tamil Nadu, Karnataka, West Bengal, Bihar and Assam are deficit states so far as demand for and supply of rice is concerned. The level of government procurement operations in these states is very low. It is, however, presumed that FHP will remain higher than MSP due to higher demand. In Tamil Nadu, the farm harvest prices ruled above the MSP in 24 cases out of 28 during 1980-2007. The positive deviation worked out to be 11 per cent of MSP. The state had an average positive difference in FHP over MSP of ₹ 35/q, which shows that the rice producers gained from the agricultural price policy. It was only during the 1990s that three cases of negative deviations appeared with an average difference of ₹ 10/q and only one case appeared during 2000-07 with a difference of ₹ 77/q (Table 2). It was the same story in Karnataka, where FHPs ruled above the MSP in all the years. The FHP on an average was 17 per cent higher than MSP, and in absolute terms, the average positive deviation was of ₹ 47/q. Though the government participation in the paddy market of the state was non-significant, low supplies in comparison to higher demand appears to have resulted in higher market prices than MSP.

In West Bengal, the MSP policy for paddy appears to have turned ineffective lately (during 2000-07) from being effective during the 1980s and 1990s. The FHPs remained higher than MSP from 1980-81 to 1999-2000 but became lower than MSP during 2000-07. Secondly, the magnitude of negative difference was very high at 55, indicating that FHP on an average was lower by ₹ 55/q (Table 2). This had happened in spite of the fact that the proportion of production being procured by the government, though being low, had increased in the state in recent years. It could be due to the increased off-take of rice from the buffer-stocks in the state during these years.

In Bihar, the farm harvest prices ruled below MSP in nine cases out of 28 during 1980-2007. One year in the 1980s, four years in the 1990s and four years in the later period experienced negative differences between FHP and MSP (Table 2). Bihar is a rice eating state and the per capita per day production is very low (<175 grams), which has significantly fallen in recent years. There is a huge gap in demand and supply in the state in spite of which FHP remained lower than MSP. This is a clear case of market inefficiency where the demand signals did not reach the producers to determine prices. The proportion of government procurement was also very small.

In Assam, the FHP of paddy has remained lower than MSP in recent years. During the period of 2000-07, the FHP was lower by ₹ 48/q, indicating poor price realization for paddy by the producers. The government did not make any purchases from this state for its PDS. It did not even monitor the price situation and left the farmers at the mercy of private trade, which could not guarantee MSP to them.

Table 2. Deviations of FHP vis-à-vis MSP of paddy in surplus states: 1980-2007*

State	Period	Negative deviations				Positive deviations			
		Frequency	Average (₹/q)	Range (₹/q)	%	Frequency	Average (₹/q)	Range (₹/q)	%
Punjab	I (1980-89)	1	3	3	1	9	13	0 to 38	9
	II (1990-99)	2	4	2 to 5	1	8	9	1 to 19	3
	III (2000-07)	2	11	11 to 16	2	6	26	3 to 77	4
	IV (1980- 2007)	5	6	2 to 16	1	23	15	0 to 77	5
Andhra	I (1980-89)	1	1	1	1	9	15	1 to 38	10
Pradesh	II (1990-99)	0	0	-	-	10	39	21 to 57	10
	III (2000-07)	1	10	10	2	7	34	20 to 133	10
	IV (1980- 2007)	2	6	1 to 10	2	26	30	1 to 133	11
Uttar Pradesh	I (1980-89)	6	7	1 to 16	5	4	13	2 to 25	8
	II (1990-99)	7	14	5 to 29	4	3	16	8 to 31	6
	III (2000-07)	5	65	32 to 89	12	3	23	3 to 55	4
	IV (1980- 2007)	18	26	1 to 89	8	10	16	2 to 55	6
Tamil Nadu	I (1980-89)	0	0	-	-	10	22	6 to 38	15
	II (1990-99)	3	10	1 to 26	3	7	35	6 to 89	9
	III (2000-07)	1	77	77	13	7	56	32 to 151	10
	IV (1980- 2007)	4	35	1 to 77	8	24	35	6 to 151	11
Karnataka	I (1980-89)	0	0	-	-	10	38	15 to 76	26
	II (1990-99)	0	0	-	-	10	71	30 to 114	21
	III (2000-2007)	0	0	-	-	8	30	1 to 72	5
	IV (1980-2007)	0	0	-	-	28	47	1 to 114	17
West Bengal	I (1980-89)	0	0	-	-	10	32	17 to 54	26
	II (1990-99)	0	0	-	-	10	52	17 to 118	15
	III (2000-2007)	8	55	14 to 96	10	0	0	-	-
	IV (1980-2007)	8	55	14 to 96	10	20	44	17 to 118	21
Bihar	I (1980-89)	1	11	11	10	9	25	0 to 45	18
	II (1990-99)	4	6	4 to 10	2	6	17	0 to 34	6
	III (2000-2007)	4	30	11 to 83	6	4	11	4 to 23	2
	IV (1980- 2007)	9	24	4 to 83	6	19	19	0 to 45	9
Assam	I (1980-89)	0	0	-	-	10	26	3 to 58	20
	II (1990-99)	1	48	48	2	9	69	23 to 153	20
	III (2000-2007)	6	48	15 to 92	9	2	43	38 to 47	10
	IV (1980-2007)	7	48	15 to 92	12	21	46	3 to 153	15

Note: *Zero deviations (FHP=MSP) were considered positive deviations indicating success of the MSP policy Average= Average of the difference of FHP from MSP (+ve or –ve) and %= Percentage of average positive or negative deviations over MSP.

Impact of Price and Non-Price Factors on Production: The Case of Punjab State

The factors considered responsible for the growth in production of paddy crop, may be categorized as price and non-price factors. A large increase in the price of a commodity results in the transfer of resources including area under that commodity, increasing production. Thus, the growth in MSP of paddy was taken as one of the independent variables in the acreage response equation. The increase in irrigated area is expected to bring larger area under high-yielding varieties, which are more responsive to the use of chemical fertilizers and consequently, higher yield and higher production. As rice is a high water–using crop and power is highly subsidized to the farm sector in Punjab, the number of electric-operated tube-wells was taken as one of the independent variables influencing the area. Therefore, apart from the prices of output, increase in area under high-yielding varieties, increase in irrigated area, higher use of fertilizers, etc. contributed to the growth in paddy production. This section of the paper tries to estimate the impact of these factors on area and yield of paddy in Punjab. The Punjab state was chosen to dissect the growth story into price and non-price factors because MSP policy and modern production technology including high-yielding seeds, irrigation and use of chemical fertilisers were highly successful in this belt.

The area/production choices in Punjab state have undergone significant changes over time. The production of rice has increased manifold since the advent of green revolution (Table 3). Increase in area and yield of rice contributed towards this growth. The area under rice increased from 450 thousand ha in 1971-72 to 2735 thousand ha in 2008-09. The increase in rice productivity was from 2045 kg/ha to 4022 kg/ha during this period. Rice was not a traditional crop in the state but was introduced in the early-1970s.

Price, yield and subsidized access to groundwater were found to be significantly influencing the area under rice in Punjab (Table 4). Due to relatively higher MSP and better yield, increased profitability led to a large shift in the area under rice at the cost of other crops. A higher rate of increase in the MSP of paddy over the previous year increased the area significantly under this crop. A unit increase in the price ratio increased the rice area by 1441 thousand hectares in the state. Since the independent variable was in the ratio terms, its impact on area was not large. For instance, the increase in MSP from ₹ 950/q (with MSPt/ MSPt-1 ratio equals to 1.05) to ₹ 1050/q would increase rice area by only 80 thousand ha. The area under rice with respect to number of electric-operated tube-wells was unit elastic. An addition in the number of electric-operated tube-wells by one lakh contributed to an additional rice area of around 2.33 lakh ha. Area elasticity with respect to the lag yield was also high at 0.60.

After an increase during 1970s and 1980s, rice productivity stagnated during 1990s at around 3000 kg/ha. It is only recently that it has shown some improvement, from 3506 kg/ ha in 2000-01 to 4019 kg/ha in 2007-08. The varietal improvement and subsequent adoption over the years was an important

Table 3. Area, yield, production and use of inputs in rice in Punjab: 1971-72 to 2008-09

Year	Area ('000 ha)	Production ('000 Mt)	Yield (kg/ ha)	Fertilizer-use (kg/ha)	Per cent irrigated area	No. of ETW (lakhs)	CI (%)
1971-72	450	920	2045	NA	71	2.77	140
1974-75	569	1179	2071	84	72	4.39	144
1979-80	1167	3052	2604	166	78	5.85	156
1984-85	1644	5054	3073	193	86	6.47	167
1989-90	1908	6697	3510	188	90	7.65	176
1994-95	2265	7662	3383	195	93	8.6	182
1999-00	2604	8716	3347	194	95	10.62	185
2004-05	2647	10437	3943	213	96	11.68	189
2008-09	2735	11000	4022	223	97	12.46	189

Notes: ETW= Electrically operated tube-wells, , NA= not available

Table 4. Results of simultaneous equation for paddy in Punjab

Particular	Area		Yield		Quantity of fertiliser	
	Coefficient	Elasticity	Coefficient	Elasticity	Coefficient	Elasticity
Constant	-2631.02* (551.30)	-	1636.36* (255.65)	-	198.17* (72.26)	-
Lag yield	0.34* (0.13)	0.60	-	-	0.12^{NS} (0.17)	0.22
Price (MSP_t/MSP_{t-1}) ratio	1441.72* (486.66)	0.85	-	-	-	-
No. of tube-wells	232.90* (22.11)	1.00	-	-	-	-
Quantity of **f**ertilizers	-	-	6.53* (1.78)	0.37	-	-
Time	-	-	20.59* (5.20)	0.11	-	-
Price of fertilizers	-	-	-	-	-18.42* (5.61)	-0.11
R- square	0.94		0.80		0.67	

Note: * Means significant at one per cent level. NS - Non-significant.
Figures within the parentheses are standard errors.

contributor to the increase in productivity. Thus, the time variable representing technology was found to be significantly positive, pushing productivity up. It was also seen that increase in the fertilizer-use (N+P+K nutrients) by one kg/ha led to an increase in productivity by 6.53 kg. The fertilizer-use in turn was found to be negatively and significantly influenced by the fertilizer price relative to paddy price with an elasticity of 0.11 (Table 4). Thus, MSP along with input subsidies played a significant role in promoting the use of such inputs, impacting productivity.

However, there appears limited scope of increasing rice production in the state. Wherever water was fit for irrigation and soil type was suitable, rice replaced other crops. Further, there is limited scope of increasing its productivity too with the given genetic stock, as indicated by the small magnitude of the time coefficient representing technology. The environmental issues have also cropped up due to intensive cultivation of rice in the state. Groundwater table is receding at a very fast rate (annual average fall of 90 cm during 2003-04 to 2007-08) and the concentration of nitrate is fast approaching the level of 10 ppm, which is critical for drinking purpose. Increase in the production of rice, therefore, can come only from technological change, shifting the production frontier upward. Under the given scenario, the profitability is expected to become largely price-driven.

Decomposition Analysis of Gross Value of Output

The gross value of output from paddy in the Punjab state is seen to have increased steadily since 1980-81. Increase in area, price, and yield have played a major role in bringing this increase. The subsidized fertilizers and farm power as well as continuous increase in its MSP were huge incentives for paddy cultivation in the state. Consequently, there was a substantial increase in its area over time. However, the area growth cannot go beyond a certain limit determined by net cultivated area, suitability of land, water and other physical resources for the cultivation of a crop. Thus, there was a small decline in the rice area in recent years due to urbanization. The acreage under rice fell by 1.6 per cent during 2005-2008. Similarly, yield growth has tapered off. The growth in paddy prices followed a varying pattern over time, sometimes increasing at a very high rate while in some other years, the increase being very small. In real terms, the price increased during 1980s but declined thereafter. Only in recent

Table 5. Prices, area and yield of paddy in Punjab: 1981-2008

Year/Period	Gross value (in crore ₹)	Real price (₹/q)	Area ('000 ha)	Yield (kg/ha)
		Year		
1980-81	679.4	181	1270	2957
1990-91	1975.2	292	2074	3257
2000-01	2063.9	234	2487	3545
2004-05	2237.3	220	2642	3858
2007-08	2454.5	239	2600	3950
		Net change		
1981 to 1991	1295.8	111	804	300
1991 to 2001	88.7	-58	413	288
2001 to 2005	173.4	-14	155	313
2005 to 2008	217.2	19	-42	92
2001 to 2008	390.6	4	113	405
		Change, %		
1981 to 1991	190.7	61.6	63.3	10.1
1991 to 2001	4.5	-19.9	19.9	8.8
2001 to 2005	8.4	-14.6	6.2	8.8
2005 to 2008	8.8	19.5	-1.6	2.3
2001 to 2008	18.9	4.9	4.5	11.4

Source: Statistical Abstract of Punjab (various issues)

years (2005-08), some increase in real price of paddy has been witnessed again (Table 5). In the following section the contribution of each of these factors has been examined towards gross value of paddy produced (at constant 1990-91 prices) in the state.

During 1980-81 to 1990-91, the gross value from paddy at the macro (state) level increased by almost 191 per cent, showing an average annual increase of ₹ 129.6 crore (Table 6). There was a significant decline in the rate of growth of gross value of output, thereafter. Such increase during 1990-91 to 2000-01 was mere 4.5 per cent with an annual increase of ₹ 8.9 crore. The gross value increased relatively faster after 2000-01 with an annual increase of more than ₹ 43 crore during 2000-01 to 2004-05 and of ₹ 72.3 crore during 2004-05 to 2007-08. The increase in price, area and yield was variable during these sub-periods. The increase in gross value of paddy was largely due to increase in its acreage and real price along with their interaction during 1980-81 to 1990-91. While the area and price effects contributed more than 30 per cent each to the rise in gross value, the interaction between the area and price further raised it by more than 20 per cent.

Most of the increase in gross value during 1990-91 to 2000-01 was due to the increase in area under paddy, followed by its yield, while the decline in its real price contributed towards the fall in gross value of production. A severe fall in the real price of paddy during 1991-2001 led to more than four-times fall in the gross value, which was almost compensated by the area effect, while increased yield helped in increasing the value of output by almost two-times. The negative impact of falling real prices continued during 2001-05, but impact of increase in yield and area more than compensated for this and resulted in the increase in gross value of output. During this period, the impact of yield was more than area effect because increase in area started slowing down. The area effect during 2005-08 became negative while price effect turned positive. After 2004-05, the rise in real price again started acting as the prime contributor towards the growth in gross value of paddy production. During 2005-08, almost 92 per cent of the rise in gross value was contributed by the rise in real price and about 24 per cent by the increase in yield, while the decline in area pushed the value down by almost 17 per cent. Thus, the price rise

Table 6. Effect of price (real), area and yield on the gross value of paddy in Punjab: 1981-2008

Period	Change in gross returns (in crore ₹)	Price effect (Real)	Area effect	Yield effect	Interaction effects			
					Price and area effect	Price and yield effect	Yield and area effect	Price, area and yield effect
1981-1991 (I)	1296	419 (32.3)	430 (33.2)	69 (5.32)	265 (20.4)	42 (3.2)	44 (3.4)	27 (2.1)
1991-2001 (II)	89	-394 (-442.7)	393 (441.6)	175 (196.6)	-78 (-87.6)	-35 (-39.3)	35 (39.3)	-7 (-7.9)
2001-2005 (IIIa)	173	-129 (-74.6)	129 (74.6)	182 (105.2)	-8 (-4.6)	-11 (-6.4)	11 (6.4)	-1 (-0.6)
2005-2008 (III b)	217	199 (91.7)	-36 (-16.6)	53 (24.4)	-3 (-1.8)	5 (2.3)	-1 (-0.5)	-
2001-2008 (III)	391	143 (36.6)	94 (24.0)	236 (60.4)	2 (0.5)	5 (1.3)	11 (2.8)	-

Notes: Figures within the parentheses are the per cent effect.

Negative sign indicates the fall in variable over time. For interpretation, absolute values are considered.

Source: Statistical Abstracts of Punjab (various issues).

and area increase were the most important factors increasing gross value of paddy output during 1981-91, while the impact of price turned negative and area and yield emerged prime contributors to the growth in gross value output during 1991-2001. While area and yield were the main determinants of growth during 2001-05, price again emerged as the most important determinant of growth in recent years of 2005-08 in wake of stagnating area under paddy and tapering off growth in its yield.

Conclusions

The state intervention in terms of announcing MSP and procurements in agricultural markets started in mid-1960s due to the imperfection in passing right price signals to producers for increasing production under the environment of gross food deficiency. The era of administered agricultural prices, especially in grains, is still continuing despite the fact that India has achieved food self-sufficiency and market infrastructure has developed significantly over the years. This paper has examined the effectiveness of MSP policy for paddy (rice) in different rice-producing states of India. The study has shown that MSP policy has been very effective in paddy-surplus regions like Punjab and Andhra Pradesh wherefrom country procures large stocks of rice for its public distribution system. However, the policy has not been so effective in paddy-deficit states where producers are left to fend for themselves under the pretext that in such states higher demand than supplies does not allow the market prices to fall below MSP, which was not the case in reality. In recent years, market prices ruled below MSP many a times causing paddy producers to suffer revenue losses in comparison to their counterparts in surplus states in the wake of lower price realization.

The contribution of technology and MSP towards increasing rice production has also been estimated for the Punjab state because price policy is considered to be highly successful in this state. The increase in MSP over the previous year brought additional area under paddy, but the impact was small. It was the effective implementation of MSP policy that ensured marketing of the produce, which consequently raised the productivity and production of rice in the state. Assured marketing at MSP encouraged the use of modern production technology, which increased productivity and improved profitability of rice. Consequently, production of rice increased manifold through area and productivity increases. Non-price factors like improved varieties, assured irrigation at subsidized prices through tube-wells and higher fertilizer-use have been found to be more important determinants of growth in rice production than price factors. Therefore, prices as envisaged created an enabling environment for the

adoption of modern production technology, raising productivity. Higher productivity in combination with increase in MSP raised profitability and encouraged farmers to plant more and more acreage under paddy. However, further increase in rice production with the given technology is limited due to almost no scope of area expansion under rice, only small increases in productivity and depleting groundwater resources. Only upward shift in the production frontier under the environment of assured and remunerative output prices can lead to future growth in rice production in Punjab as was the case in past. Without losing sight of environmental concerns, Punjab model can be used for increasing production of rice in other potential areas of the country.

In nutshell, Minimum Support Price is not being implemented uniformly in all the states. It is relatively more successful in surplus states. Favourable output prices and assured marketing of the produce create an enabling environment for the adoption of modern production technology, which enhances productivity, improves profitability and brings more area under such crops. Therefore, price policy should be implemented effectively in the potential areas to improve the overall production frontier of foodgrains in the country.

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