

## **Growth, Impact and Effectiveness of Administered Prices for Major Crops in Punjab**

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### **Abstract**

*The study based on secondary data from 1960-61 to 2019-20 was carried out to examine the behaviour patterns, relationships and variability in Minimum Support Price (MSP), Farm Harvest Price (FHP), area, production and yield of three major crops wheat, paddy and cotton (American). The data pertaining to FHP and MSP were collected for the period 1990-91 to 2017-18 based on its availability. The tremendous growth in production of wheat and paddy was recorded in the Punjab, with the contribution of area and yield. The cotton crop lagged behind in terms of both area and production. The positive and significant impact of MSP in area, production and yield of wheat, paddy and cotton was observed in the state. FHP and MSP has close association for wheat, paddy and cotton indicated the effectiveness of MSP in price policy. The real MSP of these crops showed very disturbing position over time; less than one per cent growth in paddy and negative in case of wheat and cotton. Although the FHP was higher than MSP for cotton during all the years but area under the crop has decelerated due to market uncertainty. The cotton crop which is substitute for rice needs price certainty to lower down the market risk. Therefore, MSP policy must have to be continued and more incentives should be given for other crops like pulses, oilseeds and cotton etc. for diversification of cropping pattern.*

**Key Words:** Minimum support price, Farm harvest price, Wheat, Paddy, Price deviation, Crop diversification

**JEL Classification:** Q11, Q12, Q13, C46

### **Introduction**

India's stride towards food self-sufficiency and agricultural growth festered by green revolution was reinforced by institutional and policy support. The primary components of the wide ranging policy action for farmer welfare ever since the 1960s have been MSP (Singh and Bhogal, 2021). Therefore, the agricultural prices occupy a leadership position in the price structure. Not only do they balance between supply and demand, but they also affect the distribution of income and the rate of capital formation in the agricultural sector (Acharya and Agarwal, 2016). It is an important concern that both the price level of agricultural produce and its widespread fluctuations have led the governments of many countries to evolve agricultural policies and intervene in agricultural markets.

Agricultural prices have many economic and political consequences. The agricultural price policy and price support system have come under academic scrutiny due to the recent changes towards liberalization of the Indian economy (Sudhakar and Wale, 2017). The price intervention scheme

operated through MSP was expected to influence the crop pattern, correcting the imbalances across crops, providing floor level support prices, and establishing price expectations of the producer (Deshpande, 2003). The price fluctuations in agriculture make this business as risky. High volatility in the prices of agricultural commodities may have an unfavorable impact on the economic development of agriculture sector (FAO, 2010; Singh *et al*, 2002). Variation in agricultural prices across regions and overtime is quite high in India. In finding comparative instrument of agricultural policy to stabilize prices, it is necessary to distinguish between various types of price fluctuations. The farmers always ask for a substantial hike in the MSP. In contrast, it is felt by pro-free agricultural trade thinkers that MSP does not work in line with the international prices and domestic demand and supply situation (Chand, 2003). It is further contended that the MSP has outlived its utility and is being used more as a political tool than an economic instrument (Ali *et al*, 2012). The present study has explored these issues for the crops such as wheat, paddy, and cotton (A), which are the important crops from both production and consumption point of view. The present study aimed to investigate the trend patterns in area, production, yield, MSP, and FHP of major

crops in Punjab; and to analyze the effectiveness, impact and variability in prices of selected crops in Punjab.

### Data Sources and Methodology

The study was based on secondary data and three major crops wheat, paddy and cotton (A) were selected. The time series data regarding area, production and yield of wheat, paddy and cotton (A) were collected from [india-stat.com](http://india-stat.com) for the period from 1960-61 to 2019-20. The data pertaining to FHP and MSP were collected for the period 1990-91 to 2017-18 because the data was available till the year 2017-18 only, from various issues of Statistical Abstract of Punjab, Government of Punjab, Agricultural Statistics at Glance, Government of India.

The annual compound growth rates of area, production and yield, MSP and FHP for wheat, paddy and cotton crops were estimated. To study the effectiveness of price policy during the study period, the difference between FHP and MSP was calculated (Ali *et al.*, 2012). The difference was divided into negative and positive difference; to examine whether market prices ruled lower or higher. The following formulae was used Mean Absolute Deviation MAD (p) =  $1/n \sum (|FHP_i - MSP_i|)$  When, FHP > MSP = Deviation is Positive If FHP < MSP = Deviation is Negative Where, MAD (p) = Mean Absolute Positive Deviation, MAD (N) = Mean Absolute Negative Deviation, MSP = Minimum Support Price, and N = Frequency of positive or negative deviations. These deviations were adjusted with MSP in order to examine the degree of their deviation from the MSP. The formulae used for the adjusted mean negative/positive deviation was as follows:

$$AMPD \text{ or } AMND = 1/n \sum (|FHP - MSP| / MSP) * 100$$

Where, AMPD = Adjusted Mean Positive Deviation, and AMND = Adjusted Mean Negative Deviation

In order to study the independent relationship and impact of MSP and area, production and yield of wheat, rice and American cotton the following univariate regression were estimated. These equations explain independent relationship among different variables.

$$A_t = a + b P_{t-1}$$

The logarithmic type of equation has been used as:

$$\text{Log } A_t = \text{log } a + P_{t-1} (\text{Log } b)$$

$$\text{Log } P_t = \text{log } a + P_{t-1} (\text{Log } b)$$

$$\text{Log } Y_t = \text{log } a + P_{t-1} (\text{Log } b)$$

Where,  $A_t$  = area of crops at (t)<sup>th</sup> period,  $P_t$  = production of crops at (t)<sup>th</sup> period,  $Y_t$  = productivity of crops at (t)<sup>th</sup> period,  $P_{t-1}$  = minimum support prices of crops taken in per quintal at (t-1)<sup>th</sup> period. The variability in area, production, yield, Minimum Support Price and Farm Harvest Price for wheat, rice and American cotton was computed by using Cuddy Della Index (Singh and Byrlee, 1990). Analysis of

long-term movements for estimating the long term trend in prices, the method of least square estimates was used. In order to study the relationship between MSP and FHP, the Karl Pearson correlation coefficient (r) was calculated.

### Results and Discussion

The high yielding varieties introduced in wheat and paddy during the late 1960s heralded India's green revolution as well as of Punjab. Along with the technology, new institutional structures and price mechanisation enabled the farmers to adopt improved methods of farming.

#### Growth and variation of major crops in Punjab

Punjab agriculture has achieved many landmarks through significantly positive trends inputs use in growth of crops. It has crossed many cross roads but still at the cross road (Singh *et al.*, 1997; Kaur and Sekhon, 2005). It reached very soon by early 1970s, the climax of becoming the granny of India and being called the food basket of the country. It came at a time when Paddock Brothers in their book "Famine 1975" has said that, today India absorb like a blotter 25 per cent of the entire USA wheat crop. It will be beyond the resources of the United States to keep famine out of India during 1970s. Thanks to green revolution and to Punjab, India attained self-reliance in food grains in the 1970s (PSFC, 2006). This can be observed from area, production and productivity growth of various crops in Punjab (Figures 1). The wheat production registered compound annual growth during seventies and eighties at around four per cent per annum (Table 1). However, the remarkably high growth rate of wheat production and yield were observed during 1960s. Both yield and area contributed to higher growth in production. The expansion in area under wheat cultivation was the highest during the initial period of 1960s when growth rate registered at 4.69 per cent per annum. However, during 1970's the growth rate of area under wheat was 2.31 per cent annum, which later slowed down to one per cent and enter negative during 2010-11 to 2019-20. It is interesting to observe a relatively higher growth in yield of major crops i.e. wheat during 1960a, paddy during 1970s and cotton during 1980s.

The production of paddy registered a growth rate of 18.50 per cent per annum during 1970s which was the highest ever achieved for any crop. In case of paddy, growth in yield contributed to production growth of 4.24 per cent per annum during 1960s followed by 5.36 per cent per annum during 1970s. An appreciable growth in area and production of cotton was 9.75 and 8.63 per cent per annum observed during 1970s and 1980s. However, negative growth (-1.31 and -9.93 %) was reflected in the decline in yield of cotton during 1970s and 1990s. The impressive growth in cotton production and yield observed during 1980s was not sustained latter. The positive growth in area resulted in rise of cotton production during 2000s.

**Table 1. Compound Annual Growth rate of Area, Production and Yield of wheat, paddy and cotton (A) , 1960-61 to 2018-19**

Years	Wheat			Paddy			Cotton (A)		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1960-61 to 1969-70	4.69	12.57	7.58	5.32	9.60	4.24	3.61	3.04	-0.57
1970-71 to 1979-80	2.31	4.67	2.61	12.46	18.50	5.36	-1.32	8.63	-9.76
1980-81 to 1989-90	1.25	4.30	3.00	6.09	6.74	1.28	8.61	11.28	2.44
1990-91 to 1999-00	0.27	2.26	1.98	2.32	2.50	0.098	-9.93	-13.23	-3.66
2000-01 to 2009-10	0.42	0.25	-0.17	0.89	2.67	1.76	7.23	11.60	4.03
2010-11 to 2019-20	-0.02	0.75	0.70	2.01	2.43	1.06	3.71	-5.01	-8.40

The increase in instability in agricultural production is considered adverse for several reasons (Mitra *et al*, 1989; Wahlang *et al*, 2019). It raises the risk involved in farm production and affects farmers' income and decisions to adapt new technologies. Consequently, agricultural growth and instability have remained the subjects of hot debate in the field of agricultural economics in India (Chand and Raju, 2009). The study revealed that variation in area production and yield of wheat and paddy are less than the cotton (Table 2). It was also observed that wheat crop experienced decreasing rate of variation in area, production and yield indicates the low risk at production level. The variation in yield of paddy is quite less compared to area and production over the period. It was observed that cotton crop experienced highest risk in area, production and yield. It was not only the risk was higher but also increased over time. It may be the major cause for non-adoption of this crop at large scale in the state.

### Trends and Growth of MSP and FHP

The prices play a number of functions in an economic system of the country. The main function of agriculture prices is to serve as an allocator of resources, singling to both producer and consumer regarding the level of agricultural production and consumption and as a distribution of income (Acharya and Aggarwal, 2016). The growth of prices over time in case of wheat, paddy and cotton was analyzed. The study revealed that MSP of wheat at current prices has risen

significantly over past four decades from Rs. 142 in 1981-82 to 1735 in 2017-18; and paddy increased from Rs. 115/qlt in 1981-82 to Rs. 1470/qlt in 2017-18. The MSP of wheat witnessed an increasing trend over the years, the annual increment of MSP of wheat was found to be Rs. 54.53 per quintals (Fig 2). The contribution of independent variable, time, to the annual increment of MSP of wheat was 93 per cent over time. The MSP of paddy and cotton also witnessed an increasing trend over the years, the annual increment of MSP of paddy and cotton was found to be Rs. 49.78 and 124.30 per qtl significant at one percent level respectively.

Keeping in view to study the nature and growth for MSP of these three crops the compound growth rates has been worked out. The average annual growth rate of wheat, paddy and cotton were 8.46 per cent, 8.66 per cent and 1.94 per cent for the entire period at current prices. The MSP for wheat experienced low growth rate i.e. about four percent during eighties and during 2011-12 to 2017-18. However during 1990s and 2000s growth of wheat MSP was more than nine per cent per annum during this period Indian economy removed its trade barriers. MSP of paddy followed almost a similar trend in growth, the highest growth was observed during 1990s (9.2 %). It was observed that the lowest growth in prices of wheat, paddy and cotton experienced during 2011-12 to 2017-18. Non-significantly and negative growth rate -6.53 and -0.41 per cent were experienced in case of cotton (A) respectively during 1990s and the latest period.

**Table 2. Index of coefficient of variation in Area, Production and yield of wheat, paddy and cotton in Punjab, 1960-61 to 2019-20**

Period	Wheat			Paddy			Cotton (A)		
	Area	Prod.	Yield	Area	Prod.	Yield	Area	Prod.	Yield
1960-61 to 1969-70	6.09	21.35	12.59	3.41	9.97	7.14	8.30	9.97	3.88
1970-71 to 1979-80	4.08	7.31	4.16	12.40	17.48	8.09	5.21	8.12	3.86
1980-81 to 1989-90	2.00	5.29	3.31	23.58	9.91	6.52	13.99	18.06	17.53
1990-91 to 1999-00	1.44	5.51	4.62	14.24	5.20	3.86	12.55	23.10	21.39
2000-01 to 2009-10	0.63	3.85	3.61	2.12	3.02	2.22	12.41	19.69	14.47
2010-11 to 2019-20	0.24	5.25	5.46	4.21	3.78	3.30	7.64	24.61	26.81

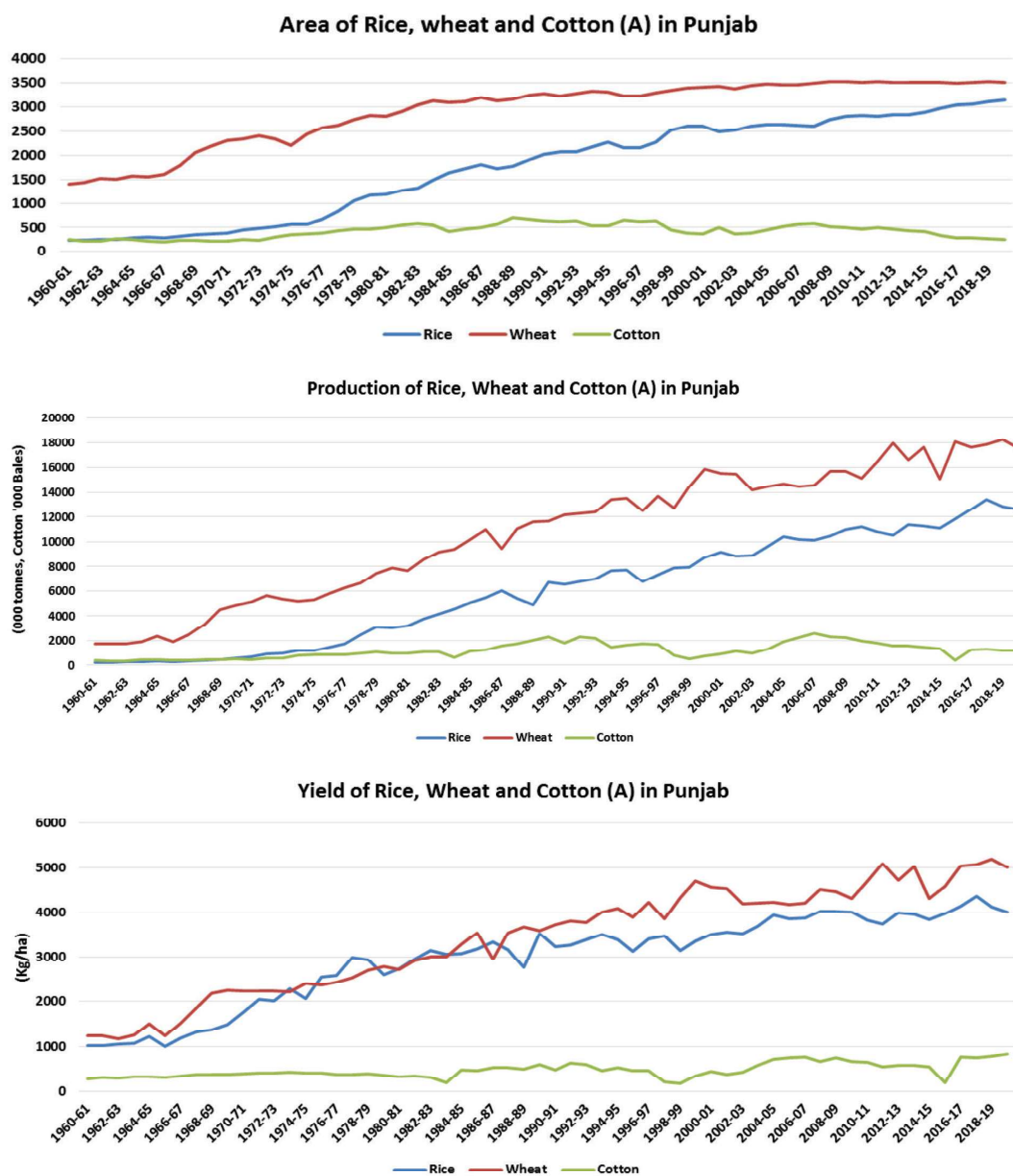


Fig. 1. Area, production and yield of wheat, paddy and cotton in Punjab, 1960-61 to 2018-19

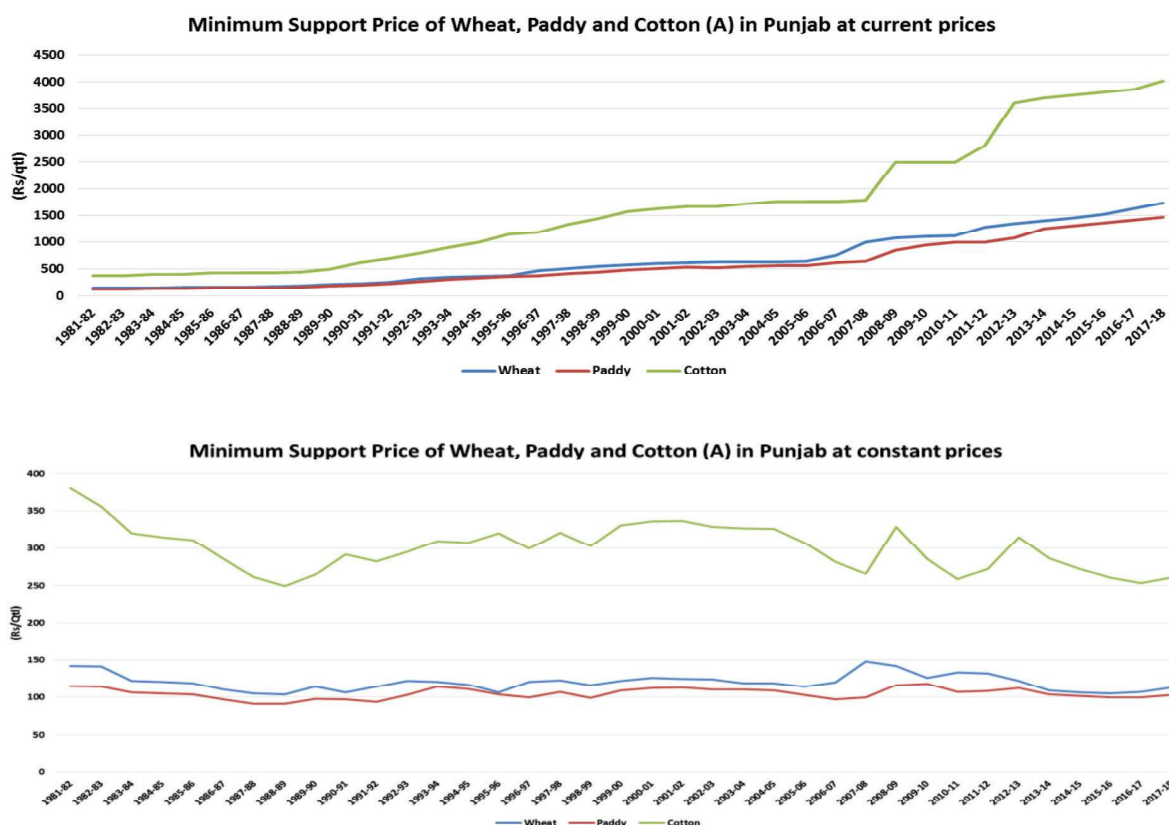
The highest growth rate 7.74 per cent of cotton (A) was found significant at one per cent respectively during the first decade of 2000s. The growth rate of cotton (A) was 1.94 per cent being significant at one per cent level for the overall period. The CAGR of MSP of wheat, paddy and cotton in Punjab during 1981 to 2017-18 were positive except for cotton during 1990s and latest period. The high growth rate in prices of wheat and paddy during 1990s was due to its higher demand globally. This higher growth in prices was mainly due to increase in inflation over time. The reality of this growth can be seen when these was calculated at real prices.

The Compound Annual Growth Rates (CAGR) of MSP of wheat at constant prices significantly decreased over time. It was positive and significant only during 1990s and 2000s, which was less than one per cent. Annual growth in wheat, paddy and cotton (A) at constant prices during 1980s was observed to be significantly negative at 3.24 per cent, 2.34 per cent and 3.75 per cent respectively. Overall, the MSPs of wheat, paddy and cotton (A) at constant prices observed negative and non-significant growth during over all period, it was -0.043 for wheat, for paddy and cotton 0.085 and -0.356 per cent per annum respectively. Thus, it was interestingly that the real growth in MSPs of wheat, paddy and cotton (A)



**Table 3. Results of trend analysis for minimum support price, 1980-81 to 2017-18**

Particular	Intercept	Coefficient	R <sup>2</sup>
Wheat	49.21	54.54	0.94
Paddy	26.03	49.78	0.91
Cotton	251.51	124.30	0.92

**Fig. 2. MSP of wheat, paddy and cotton in Punjab****Table 4. Compound Annual Growth Rate (CAGR) of Minimum Support Price of Wheat, Paddy and Cotton (A) in Punjab, 1981-82 to 2017-18**

Crop	At Current Prices			At Constant Prices (1981-82=100)		
	Wheat	Paddy	Cotton (A)	Wheat	Paddy	Cotton (A)
1981-82 to 1990-91	4.9* (0.6)	5.8 (0.5)	5.69 <sup>NS</sup> (0.4)	-3.24* (0.6)	-2.34* (0.5)	-3.75* (0.7)
1991-92 to 2000-01	9.1* (0.6)	9.2* (0.7)	-6.53 <sup>NS</sup> (0.3)	0.61 <sup>NS</sup> (0.5)	0.70 <sup>NS</sup> (0.7)	1.40* (0.4)
2001-02 to 2010-11	9.3* (1.3)	7.75* (1.4)	7.74* (1.1)	1.39 <sup>NS</sup> (0.9)	0.04 <sup>NS</sup> (0.7)	-2.41* (0.7)
2011-12 to 2017-18	4.14 (0.5)	5.44* (0.7)	-0.41 <sup>NS</sup> (0.14)	-2.75 <sup>NS</sup> (1.3)	-1.53* (0.6)	-2.33 (1.0)
Over all	8.46 (0.4)	8.66* (0.4)	1.94* (0.38)	-0.043 <sup>NS</sup> (0.2)	0.085 <sup>NS</sup> (0.1)	-0.356 <sup>NS</sup> (0.2)

Note: \* represents significant at 1% figures in parentheses indicates standard error

**Table 5. Positive and Negative deviations of FHP vis-à-vis MSP in Paddy, wheat and cotton in Punjab, 1990-2018**

Crops	Period	Positive			Negative		
		Frequency	Average	Range	Frequency	Average	Range
Wheat	1990-1999	-	-	-	9	31.55	10-84
	2000-2009	-	-	-	9	43.66	2-113
	2010-2018	2	171.5	142-201	6	107.34	40-220
	1990-2018	2	171.5	142-201	24	55.04	2-220
Paddy	1990-1999	5	17	12-26	-5	7	1-23
	2000-2009	9	304	45-427	1	-22	-22
	2010-2018	4	36	6-62	1	-242	-242
	1990-2018	18	165	6-427	7	-43	1-242
Cotton (A)	1990-1999	10	528	197-1140	-	-	-
	2000-2009	9	577	300-1833	1	234	234
	2010-2018	7	1110	213-2582	1	228	228
	1990-2018	26	702	197-2582	2	231	228-234

were dismal during the whole period. It was also endorsed by various studies that MSP announced by the government for 23 crops is inadequate (NABARD, 2020; Bhoi and Dadhich, 2019) because MSP fixed by the Union government is not generating sufficient returns over its cost of production.

The growth and instability of prices raises the risk involved in markets and effect on the farmer's production decisions to adopt high paying technologies and make investment in farming. Looking at these consequences, the variability in prices has been calculated, the coefficient of variation for MSP was the highest during 1980s in all the selected crops. The index coefficient of variation of MSP of wheat, paddy and cotton (A) indicated dwindling rate during 38 years from 1980-81 to 2017-18. The findings further revealed that there was fluctuating trend in case of wheat during the whole study period; however paddy observed decline in variability of prices. The variability in the MSP of cotton was observed as higher and unstable, from 39.46 per cent in 1981-82 to 30.39 per cent in 2017-18.

### Effectiveness of the MSP

To examine the effectiveness of the MSP policy for wheat producers, difference between FHP and MSP was calculated for different years. Punjab experienced that farmers sold their wheat crop two years higher than the MSP in 28 years of study period. The adjusted difference (negative) between MSP and FHP was as high as 86 per cent of MSP and the positive difference was 14 per cent. Punjab experienced higher farm harvest price than MSP (18 times) for paddy during 1990-2018, showed the effectiveness of price policy due to intervention of the government. The adjusted difference (positive) between MSP and FHP was as high as 64 per cent and the negative difference was 25 per cent. Punjab experienced positive deviations 26 times in

28 years during 1990-2018 for cotton. Generally, in Punjab almost the market arrival of whole wheat and paddy has been procured by state public procurement agencies on the behalf of Food Corporation of India (FCI) at MSP announced for the public distribution system and to maintain buffer-stocks. The FCI also procured wheat and paddy at the MSP in the state but its share in total procurement decline over time. The effectiveness of price policy can be observed from the positive deviation in case of wheat and paddy.

The adjusted difference (positive) between MSP and FHP was as high as 7.14 per cent of MSP of wheat. On the other hand, the adjusted difference (negative) between MSP and FHP was 85.71 per cent of MSP of wheat. The adjusted difference (positive) between MSP and FHP was as low as 64.28 per cent and 92.85 per cent of MSP of paddy and cotton respectively. On the other hand, the adjusted difference (negative) between MSP and FHP was seven per cent and two per cent of MSP of paddy and cotton respectively. These findings indicate the effectiveness of price policy for wheat and paddy.

### Impact of MSP on area, production and productivity

The major goal of MSP besides saving farmers from distress sale at low prices is to create a favorable environment and incentivize farmers to increase production of the crops for which MSP is announced by adopting better technology and inputs. MSP, if effective is known to positively affect area under crops, production and productivity in agriculture. Therefore, to study the impact of MSP on these variables of wheat, paddy and cotton (A) Karl Pearson correlation has been worked out.

The correlation between MSP and FHP of wheat, paddy and cotton as 0.99, 0.92 and 0.89 respectively, all which are significant at one per cent level. These findings indicated

**Table 6. Relationship between MSP and area of Wheat, Paddy and Cotton (A) in Punjab, 1990-91 to 2017-18**

Crop	$y = \text{Area}$ $x = \text{MSP}_{t-1}$			$y = \text{Production}$ $x = \text{MSP}_{t-1}$			$y = \text{Yield}$ $x = \text{MSP}_{t-1}$		
	Constant	Coefficient	R <sup>2</sup>	Constant	Coefficient	R <sup>2</sup>	Constant	Coefficient	R <sup>2</sup>
Wheat	3256.30	0.17* (0.02)	0.69	12077.91	3.50* (0.35)	0.79	3767.20	0.72* (0.09)	0.68
Paddy	2155.28	0.58* (0.12)	0.74	6964.04	4.08* (0.35)	0.84	3210.10	0.65* (0.09)	0.67
Cotton	631.10	-0.07* (0.014)	0.48	1803.33	-0.13* (0.10)	0.06	461.99	0.04* (0.03)	0.05

\*significant at 1%, figures in parentheses indicates standard error

that there was significant relationship between MSP and FHP of wheat, paddy and cotton (A) in Punjab. The impact of MSP on area of wheat, paddy and cotton (A) in Punjab, revealed that 69 per cent variation in area of wheat, 47 per cent variation in area of paddy and 48 per cent variation in area of cotton (A) was explained by independent variable i.e. lagged MSP. The value of coefficient of wheat, paddy and cotton (A) has been found as 0.17, 0.58, -0.07 respectively. The value of coefficient of wheat, paddy and cotton has been found as 0.72, 0.65, and 0.04 respectively indicating thereby that previous year MSP influences current year's yield of respective crops (Table 6).

### Conclusion and Policy Implications

The MSP of wheat, paddy and cotton increased from year to year yet there is economic squeeze on the farm sector. The tremendous growth in production of wheat and paddy was recorded in the Punjab state, with the contribution of area and yield. The cotton crop lagged behind in terms of both area and production as well as at market level. The index of variability in production of paddy and wheat was lower than the cotton (A) crop. Positive and significant contribution of MSP in area, production and yield of wheat, paddy and cotton (A) was observed in the state. The FHP and MSP has close association for wheat, paddy and cotton (A) indicates the effectiveness of the latter in the price policy. The real MSP of these crops showed very dismal position over time; less than one per cent growth in paddy and negative in case of wheat and cotton. The cotton in the south western districts retained its prominence with cotton (A) dominating to cover more than seven lakh hectare during 1988-89 but reached at less than three lakh hectare due to production and marketing uncertainty. The MSP is essentially floor price set by the Govt. in an effort to stabilize the income of the farmers. The MSP has been effectively implemented in Punjab for paddy and wheat only. Although the FHP was higher than MSP for cotton during all the years but area under the crop has decelerated due to market uncertainty. The cotton crop which is substitute for paddy needs price certainty to lower down the market risk. The situation requires government intervention

to create stable market environment, not only for paddy and wheat but for all crops, to make the Punjab agriculture sustainable in particular and economic development of the country in general. Therefore, MSP policy must have to be continued and more incentives should be given for others crops like pulses, oilseeds and cotton etc. to diversify the cropping pattern. For this purpose policy should formulate that any purchase below MSP should be an offense. The MSP for all the crops should be used as the 'floor price' for bidding auction in the market for all private purchase.

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