Role of agricultural marketing channels in price realization: an empirical analysis of selected crops in India

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Abstract

Purpose – The provision of fair and remunerative prices to farmers through government intervention is one of the key debates to address the farmers' distress in India. This article identifies how different marketing channels are responsible for higher price realization over the officially announced minimum support price (MSP).

Design/methodology/approach – The study uses the NSSO-SAS, 2012–13 and NSSO-SAS, 2018–19 for Aggregate level data and Unit Level Data on the Situation Assessment Survey of Farmers' households. It uses logit regression to determine the factors responsible for better price realization.

Findings – Our major findings indicate that two factors importantly determine better price realization than MSP. Firstly, government agencies provide better prices for crops covered by MSP, such as paddy, wheat and cotton. However, the probability of receiving higher prices increases for some crops if the farmers belong to the upper land size classes and upper social category. Secondly, jowar, bajra, maize and ragi, other important crops that don't benefit from government agencies, may require higher levels of procurement at the state level.

Research limitations/implications – The present study only analyzes selected major crops. Distance is an important factor in choosing a marketing channel that is not incorporated due to unavailability in NSS Data.

Originality/value – The study is based on the latest original empirical evidence and sheds light on the variation in price realization in different agricultural marketing channels in India.

Keywords Price realization, Farmers income, Marketing channels, Minimum support price, Agricultural marketing, India

Paper type Research paper

1. Introduction

This article examines the role of marketing channels for better price realization in crop cultivation. In the Indian context, agricultural marketing reform played an important role in better access to marketing channels and timely product disposal (Chand, 2012). Even after the tremendous increase in food crop production, there have been increasing reports of farmers' suicide due to crop failure, lack of price realization and indebtedness (Reddy and Mishra, 2010). Most Indian farmers are endowed with small and marginal land holdings and the price realization by the farmers is very low due to the prevalence of several intermediaries in the rural economy (Swaminathan and Baksi, 2017).

Agricultural marketing policy has been an important intervention in agricultural development in India. Agrarian development policies with regard to marketing have been categorized into (a) regulatory measures, (b) market infrastructure and (c) price policy (Chand, 2012). In some of the research studies: a primary question remained in understanding the role of agriculture marketing regulation and its relation with the process of economic development (Pal and Bahl, 1993; Minten *et al.*, 2012). Some of these studies suggest that

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regulations can benefit agricultural growth, technology adoption, area expansion, fertilizer use and irrigated areas (Purohit, 2016). The APMRA (Agriculture Produce Marketing Regulation Act) brought forth significant changes and visible improvement in almost all aspects of marketing of farm produce; However, many gains brought by APMRA to improve the competitiveness of agricultural markets was spread out over time and marketing infrastructure was inadequate with respect to the volume of market arrivals (Acharya and Agarwal, 2009; Ahmed *et al.*, 2022).

The government of India announces the Minimum Support Price on the recommendation of the Commission For Agricultural Costs and Prices (CACP), an apex body for pricing policy under the Ministry of Agriculture selected crops. However, government policies are often critiqued for being biased toward the cereals such as paddy and wheat (Pingali, 2015). According to NITI Aayog (2016), there is low awareness of MSP among farmers in different states. Farmers could not realize even one-fifth of the money consumers pay for various agricultural commodities in the market (Government of India, 2017).

Without substantially improved procurement facilities, raising the minimum support price (MSP) for crops alone would not guarantee better income for farmers. If procurement policies and non-price incentives like technology, credit and irrigation are upheld, farm income can be raised sustainably (Narayanamoorthy, 2017).

Narayanamoorthy (2006) highlighted that the condition of farmers deteriorated in terms of lower income realization and high indebtedness using the NSSO-SAS, 2002–03 data. Chand *et al.* (2015) suggest that "growth in farm income after 2011–12 has plummeted to around 1%, which is an important reason for the sudden rise in agrarian distress in recent years."

Chandrasekhar and Mehrotra (2016) have demonstrated no indication of a doubling of farm income from cultivation at the national level in India using NSSO-SAS data from 2002 to 03 and 2012–13. Satyasai (2016) investigated farm income in the context of the Union Government's vow to double income by 2022–2023 and discovered that while nominal income doubles every 5–6 years, doubling real income in just six years is a highly challenging endeavor.

Agriculture is considered the dominant source of income for the farmer's household. The study by Birthal *et al.* (2014) analyzed the NSSO-SAS 2002–03 data and found that approximately fifty percent of the income of farm households comes from non-farm activities. Between 2012–13 and 2018–19, the growth pattern of the total annual income increase among the Indian states is highly concerning. When compared to the total income of the farmer's household, the growth pattern of income from crop production appears even more miserable. (Narayanamoorthy and Sujitha, 2021).

Three pillars underpin India's agricultural market reform: (1) institutions that set the rules of the game, (2) incentives for agents to engage in active market participation and (3) infrastructure to support the modernized trading platform (Agarwal *et al.*, 2017). They concluded that the reforms are unlikely to work unless all three challenges are addressed simultaneously.

At all India levels, the total annual income of agricultural households has grown 2.37%/annum from 2012–13 to 2018–19, less than the total annual income from 2002–03 to 2012–13. Several Indian States have also shown a seriously concerning yearly growth rate during 2012–13 to 2018–19; these facts often puzzle the policymakers to achieve the objective of doubling farmers' income by 2022 envisaged by the Government of India in a 2015–16 document (Narayanamoorthy and Sujitha, 2021).

At this outset, this paper attempts to analyze variation in price realization across different marketing channels. We extend our analysis to understand various farm-level factors, household-level factors and state-level controls such as APMC (Agricultural Produce Market Committee) density, which might determine better price realization for farmers.

The fundamental premise of this study is to understand the factors responsible for the deviation in farmers' realized price from the minimum support price (MSP) ensured and announced by the union government.

2. Data and empirical model

The empirical analysis is based on various secondary source data. The central part of the analysis uses a nationally representative survey known as the Situation Assessment Survey (SAS) conducted by the National Sample Survey Office (NSSO), Government of India. For the aggregate level picture of the price realization in different marketing channels, the latest two rounds, i.e. NSSO-SAS 2012–13 and NSSO-SAS 2018–19 data, are used for comparison purposes. This survey provides information on several aspects of agricultural households' cultivation and socio-economic characteristics. The disposal of the crops and the price realization in different marketing channels remain the primary concern, which we have drawn from the survey data.

Along with the NSSO-SAS data, the number of regulated markets and average area (Square kilometers) served per market by state, 2017 is published by Lok (2019), from this, the market density is calculated for the Indian states (Rawal *et al.*, 2020).

For the comparison of aggregate level price realization between the study period NSSO-SAS, 2012–13 and NSSO-SAS 2018–19, all States have been considered, excluding the Union territories. NSSO-SAS 2018–19 data has been taken for the unit-level analysis to study price realization determinants. For the current study, seven union territories and five states, such as Bihar, Sikkim, Manipur, Mizoram and Kerala, have been dropped due to the unavailability of market density data.

Farmers reported selling their products to different marketing agencies. The 2018–19 SAS data marketing channels have been categorized into three agencies.

(1) The local market, input dealers and private processors combination is coded as "Private channels."

(2) The combination of APMC market, cooperatives, government agencies and Farmers' Producers Organizations (FPO) is coded as "Government channels."

(3) The combination of the farmers reported to sell their product in Contract Farming Sponsors/Companies and others is coded as "Others."

Firstly, a detailed cross-tabulation and one-way ANOVA gave us some direction or tendencies within the cross-section data. Eventually, we then analyzed different factors to explain the differences.

The regression analysis begins by analyzing the price realization in different marketing channels in all India aggregate levels. Then the unit-level analysis is done on the price realization in various marketing channels by selected crops: Paddy, Bajra, Jowar, Maize, Ragi, Cotton and Wheat. In 2018–19, for total cereals, the percentage share of the area to the total gross cropped area was 50.34%. Among the whole cereals, paddy(23.02%), wheat(16.01%), maize(4.53%), bajra(3.67%), ragi (0.48%) and jowar (2.13%) consist of 49.84% and cotton's (4.71%) share is highest in the total gross cropped area after cereals' (Government of India, 2021). To study, how else a non-food grain cash crop operates within the MSP regime, cotton has been taken for the study, which is one of the important crops.

Binary logistic regression is used to understand the determining factors explaining the deviation in price realization.

$$ln\left(\frac{p}{1-p}\right) = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \ldots + b_kX_k$$

where p is the probability of an outcome (Price realization more than MSP). [1], b_0 is the intercept and X_1, X_k represents the predictors and b_1 to b_k represents the coefficients which are expected changes in log odds of having the outcome per unit change in X. The detailed descriptive statistics of logistic regression given in Table 12.

A detailed description of predictor variables is given below.

X_1 = Marketing agency has three groups: (1) Private (2) government (3) Others

X_2 = Social groups have three categories: (1) Schedule Caste (SC) (2) Schedule Tribe (ST) (3) Other Backward Class (OBC) and (4) Others

X_3 = Whether the household possesses any Kissan Credit Card (KCC), have two groups: (1) Yes (2) No

X_4 = Whether the household insured any crop under PM Fasal Bima Yojana(PMFBY) during the last 365 days: have three groups (1) Yes (2) No (3) Not applicable (Not applicable is given when the household is not producing any crop which is covered under PMFBY i.e. food crops (cereals, millets and pulses), oilseeds, annual commercial/horticulture crops.

X_5 = Land holding of the household in hector, have five groups (1) Marginal (0–1 ha) (2) Small (1–2 ha) (3) Semi-Medium (2–4 ha) (4) Medium (4–10 ha) (5) Large (>10 ha)

X_6 = Market Density = Density of the regulated market (Area served/number of the regulated market) (see Table A2).

3. Price realization in different marketing channels: aggregate level analysis of India

3.1 Price realization in different marketing channels for cereals: 2012–2018

The price realized by farmers is one of the essential components of the efficiency of agricultural marketing. We observe price variations across different marketing channels. The aggregate level data (NSSO-SAS, 2012–13) shows a variation in the share of sales and average price realization to various marketing agencies. The report shows the disposal of the quantity in different marketing channels. In the first disposal, most of the quantity is disposed of in the market. The market absorbs most of the quantity in the first disposal. Therefore, the analysis considers the first disposal.

In Table 1, in the first disposal period, local private channels are responsible for the majority (42.8%) of the cereals' disposal among all the marketing channels, followed by Mandi (29.9%) cooperatives (14.6%) and input dealers (8.3%). In contrast, the average

Table 1. Proportion of total quantity sold and average prices realized, for cereals, in % and in Rs., all India, 2012–13

Sl. no.	Marketing Channels	First disposal Proportion of quantity	First disposal Average price	Second disposal Proportion of quantity	Second disposal Average price	Third disposal Proportion of quantity	Third disposal Average price
1	Local Private	42.8	12.06	21.58	11.94	3.30	9.75
2	Mandi	29.9	13.05	24.98	10.55	33.17	10.47
3	Input Dealers	8.3	11.65	4.17	12.00	7.23	12.33
4	Cooperative Agency and govt. agency	14.6	13.17	8.85	12.65	40.98	12.80
5	Processor	1.7	14.54	1.30	13.19	1.17	9.70
6	Others	2.7	9.55	39.11	13.29	14.15	12.58

Source(s): Author's calculation from NSSO SAS 70th round data

farmers realized price in the aforementioned marketing channels are local private (Rs.12.06) by Mandi (Rs.13.05) cooperatives (Rs.13.17) and input dealers (Rs.11.65). But the channel processor has a 1.7% share of the sale; the price realization is higher (Rs.14.54). The above facts show the dominance of local private channels, which is one of the inefficient marketing channels due to the role of rent-seeking intermediaries who take out a significant chunk of farmers' profit. Hence the price realization in government channels like Mandi and cooperatives is higher than in the local private channels. Even though the price realization in government channels is higher, local private is the dominant channel for the farmers to dispose of their cereals.

Similarly, in Table 2, NSSO-SAS 2018–19 data shows a similar result as the previous round (NSSO-SAS, 2012–13). The local market is responsible for the major proportion (66.3%) of cereal disposal. The government agencies (APMC + Cooperative + government agency) are responsible for around 27% of the cereals disposal. The average price realization in contract farming sponsors/companies is highest (Rs.30.3), followed by cooperative(Rs.20.8), government agencies(Rs.19.3), APMC(Rs.18.9), FPO(Rs.16.9), Private processor(Rs.16.3), input dealers(Rs.15.9) and the least is Local market (Rs.15.7) (see Table 2).

Even though, on average, farmers realize better prices in government agencies, the majority of the farmers are selling in local private agencies where the average price realization is the least.

Table 1 depicts the proportion of quantity sold along with the average price realized in each marketing channel in the year 2012–13 in all India aggregate levels. A similar table is shown for 2018–19 in Table 2. If we compare the major disposal in both rounds, it is evident

		Major disposal	
Sl. no.	Marketing channels	Proportion of quantity	Average price
1	Local market	66.3	15.7
2	APMC	8.3	18.9
3	Input dealers	1.6	15.9
4	Cooperatives	6.7	20.8
5	Government agency	12.1	19.3
6	FPO	0.1	16.9
7	Private processors	2.8	16.3
8	Contract farming Sponsors/companies	0.9	30.3
9	Others	1.2	18.1

Source(s): Author's calculation from NSSO SAS 77th round data

Table 2. Proportion of total quantity sold and average prices realized, for cereals, in % and in Rs., all India, 2018–19

		First disposal		Second disposal		Third disposal	
Sl. no.	Marketing channels	Proportion of quantity	Average price	Proportion of quantity	Average price	Proportion of quantity	Average price
1	Local Private	42.3	33.4	46.8	27.1	N/A	N/A
2	Mandi	49.4	33.8	2.7	40.7	100	35
3	Input Dealers	7.5	41.1	40.5	21.5	N/A	N/A
4	Cooperative Agency	0.6	29.3	N/A	N/A	N/A	N/A
5	Processor	N/A	N/A	0.4	14.0	N/A	N/A
6	Others	0.3	48.1	9.7	25.7	N/A	N/A

Source(s): Author's calculation from NSSO 70th round data

Table 3. Proportion of total quantity sold and average prices realized, for Pulses, in % and in Rs., all India, 2012–13

that the local private is the dominant marketing channel for the disposal of cereals in both study periods. If we are taking the first disposal, in the kharif season at all India level, there has been an increase in the share of local private channels in total quantity sold, from 42.8% in 2012–13 to 66.3% in 2018–19. Whereas if we take government agencies (Mandi + cooperatives) in 2012–13 in the Kharif season, 44.5% of the total quantity was sold in the government agencies. Whereas in 2018–19, the share of government agencies (APMC + cooperatives + government agencies) came down to 37%. Local private remains the most crucial contributor as a marketing agency, despite of this, the prices received in local private was comparatively lower than the prices received in Mandi, cooperative, APMC and government agencies during 2012-13 and 2018-19.

There has been historical evidence that it was always the private players in terms of exploitative intermediaries, commission agents, local traders and rent-seekers [2] taking out a major chunk of farmer's surplus in the process of agricultural marketing (Chatterjee and Kapur, 2016; Jan and Harriss-White, 2012; Chand, 2012). Markets are therefore involved in the process of exploitation of rural labor and petty rural producers (Jan and Harriss-White, 2012).

However, why the local private marketing channels has been an important contributor to total cereal disposal is beyond the scope of this study. How farmers are realizing different prices in different marketing channels is the study's main objective. How the geography and socio-anthropological factors that have happened within the agricultural marketing in different regions for different crops require further investigation. We are limiting our study to understand whether a state-regulated mechanism(MSP) could enable farmers to realize better prices (section 5.1)?

3.2 Price realization in different marketing channels for pulses: 2012–2019

However, in the case of pulses, if we look into 2012–13 data (see Table 3), Mandi (49.4%) remains one of the dominant marketing channels for the major disposal. But the share of local private is still significantly high (42.3%). At the same time, the average price realization is higher in Mandi (Rs.33.8) as compared to the local private (Rs.33.4). In contrast, in 2018–19 (see Table 4), local private (78%) is the dominant player in the major pulses disposal. If we are taking the first disposal in the Kharif season at all India level, there has been a sharp increase in the share of local private agencies in total quantity sold, from 42.3% in 2012–13 to 78.3% in 2018–19. In 2012–13, 50% of the major disposal was sold in government agencies (Cooperative + APMC). Whereas in 2018–19, the share of government agencies (APMC + cooperative + government agency) has declined to 15.7% out of total major disposal. Hence, we can see a clear trend of the rising dominance of local private as a major disposal agency and the declining importance of government agencies for major pulse disposal from 2012–13 to 2018–19. The average price realization in local private agencies remains much lesser than the APMC, cooperatives and government agencies in both studies.

Hence if we compare the disposal of cereals and pulses, which is protected by the price assurance scheme, i.e. MSP, the role of local private marketing channels have increased tremendously, which could be the reason for the declining average income of the farmers shown in several studies (Narayanamooorthy, 2006; Chand *et al.*, 2015; Narayanamoorthy and Sujitha, 2021). Even though government agencies provide better price realization, most of the farmers are selling to the local private due to the presence of rent-seeking intermediaries and the prevalence of commission agents and pre-harvest contracts with money lenders (Singh and Bhogal, 2015; Singh and Dhaliwal, 2011). Agricultural market connectivity and rural infrastructure must be improved and market inequalities must be eliminated by consistent market regulation throughout all states. Therefore, the accessibility of marketing channels is one of the important factors responsible for better price realization (Satyasai and Pereira, 2019). Study by Bora *et al.* (2018), using NSSO-SAS 2012–13 data, shows that factors

like farmers' socio-economic condition explain the access to marketing channels. Therefore, our following study focuses on the unit-level analysis to understand the determinants of better price realization.

3.3 Price realization in different marketing channels for cotton: 2012–19

The vagaries of the weather can have a significant impact on cotton cultivation. Cotton may be seen as a "private crop" because private factors primarily drive cotton production, prices, demand and supply nationally and internationally (Sinha, 2022). The Cotton Corporation of India (CCI), which was established in 1970, represents the state in this market to provide necessary pricing support to cotton producers (CCI, 2018).

Table 5 represents the proportion of quantity sold and price realization in cotton for 2012–13. Local private (48.55%) dominates the share of the disposal of cotton, followed by Mandi(25.69%) in the first disposal period. However, the average price realization is highest in Mandi. The share of local private agencies has increased dramatically, from 48.55% in 2012–13 to 69.01% in 2018–19, demonstrating the growing dominance of local private over time. In 2012–13, government agencies' (cooperative + Mandi) share of cotton disposal was 33.8%, whereas in 2018–19, the share of government agencies (APMC + cooperative + government agency) declined to 12.3% of total major disposal. The private processor gave the highest price realization to cotton farmers in 2018–19 as they are the final buyer in the supply chain. Even if local private leads the percentage of cotton disposal, the average price realization in government agencies such as APMC

		Major disposal	
Sl. no.	Marketing channels	Proportion of quantity	Average price
1	Local market	78.3	41.5
2	APMC	13.3	44.6
3	Input dealers	1.1	45.7
4	Cooperatives	0.5	55.1
5	Government agency	1.9	46.6
6	FPO	0.1	56.3
7	Private processors	2.5	49.1
8	Contract farming sponsors/companies	2.2	42.2
9	Others	N/A	N/A

Source(s): Author's calculation from NSSO 77th round data

Table 4. Proportion of total quantity sold and average prices realized, for Pulses, in % and in Rs., India, 2018–19

		First disposal		Second disposal		Third disposal	
Sl. no.	Marketing channels	Proportion of quantity	Average price	Proportion of quantity	Average price	Proportion of quantity	Average price
1	Local Private	48.55	39.02	23.36	38.28	12.47	25.54
2	Mandi	25.69	39.34	16.81	37.24	N/A	N/A
3	Input Dealers	15.34	39.20	12.17	37.77	N/A	N/A
4	Cooperative Agency	8.11	38	4.72	40.96	N/A	N/A
5	Processor	2.19	37.85	N/A	N/A	N/A	N/A
6	Others	0.09	34.72	42.92	40.18	87.92	30.11

Source(s): Author's calculation from NSSO 70th round data

Table 5. Proportion of total quantity sold and average prices realized, for cotton, in % and in Rs., all India, 2012–13

(Rs. 50.41) and government agency (Rs. 54.98) is higher than the local private (Rs. 49.75) in 2018–19 (see Table 6).

Several factors, such as the weather, technology, nature of the firm business and market structure, influence the value of the cotton crop. The farmers wish to switch from growing cotton, a private crop, to growing paddy, a public crop, which provides more income security (Sinha, 2022).

4. Role of marketing channels in average price realization: unit-level analysis of selected crops

The unit-level data from NSSO-SAS 2018–19 is used for the average price calculation across the select major crops: paddy, jowar, bajra, ragi, maize, cotton and wheat. Table 7 compares the selected crops' average price realization in the three marketing channels with the given MSP in 2018. The price realization in the government channel is more than in the local private for all the selected crops. The overall mean price realization for all the selected crops is less than the MSP price announced for 2018. Out of all the seven selected crops, paddy, wheat and cotton show a very less gap between the MSP announced and the total average price realized. This is so because paddy and wheat are more favored by the government's policies and the procurement system. Since the cotton market is tightly controlled and directly connected to the CCI, which might be helping in higher price realization.

Table 8 represents the share of the quantity disposed of in the different marketing channels. The private channel dominates the disposal of crops for all the selected crops. The crops like paddy and wheat have the highest procurement coverage through a regulated market because government policies favor these two crops to ensure food security through

Table 6.
Proportion of total quantity sold and average prices realized, for Cotton, in % and in Rs., India, 2018–19

Sl. no.	Marketing channels	Major disposal	
		Proportion of quantity	Average price
1	Local market	69.01	49.75
2	APMC	9.66	50.41
3	Input dealers	6.79	48.32
4	Cooperatives	0.35	46.39
5	Government agency	2.29	54.98
6	FPO	0.005	38.75
7	Private processors	9.87	59.83
8	Contract farming sponsors/companies	0.15	55.81
9	Others	1.80	52.97

Source(s): Author's calculation from NSSO 77th round data

Table 7.
Average price realized in, Rs/Kg, different marketing channels, all India, 2018–19

Crops	Government	Private	Other	Overall mean	MSP
Paddy	20.22	15.78	19.73	16.74	17.50
Jowar	20.71	19.47	19.24	19.64	24.30
Bajra	15.94	14.84	15.18	14.96	19.50
Ragi	24.74	22.44	26.00	22.95	28.97
Maize	15.37	15.01	15.18	15.03	17.00
Cotton	51.24	50.70	53.15	50.78	51.50
Wheat(Rabi crop)	18.54	17.47	17.64	17.63	18.40

Source(s): Author's calculation from NSSO SAS 77th round data

the public distribution system(PDS) program. In contrast, for other crops like Jowar, Bajra, Ragi, Maize and Cotton, less than 20% of the crops are procured through the government agency (Table 8). Among these crops jowar, bajra and ragi are Nutri-cereals categories. The price assurance scheme, i.e. MSP, is announced for the 23 crops. From that, paddy, jowar, bajra, ragi and cotton are the Kharif crops, wheat is the rabi crop and all the above crops are under MSP. Evidently, less proportion of produce is sold in the regulatory market agency (Table 8) and the average price realization in the private agency is less as compared to the government agency (Table 7).

4.1 Procurement of nutri cereals

The crops having relatively less procurement by government agencies are nutri-cereals. MS Swaminathan suggested renaming the coarse cereals into nutri-cereals to boost demand by emphasizing the nutritional benefits and encouraging to increase the production due to the climate-resilient features of these crops. And it was renamed in 2018 and millet mission and production and procurement of nutri-cereals have been encouraged worldwide. The commodities listed under nutri-cereals are Sorghum (Jowar), Pearl Millet (Bajra), Finger Millet (Ragi/Mandua), maize, Little Millet (Kutki), kodo millet (Kodo), barnyard millet (Sawa/Jhangora), foxtail millet (Kangni/Kakun), proso millet (Cheena). There was an Enlargement of the food basket by including Nutri-cereals and other neglected crops in the public distribution system (PDS) in the food security act of 2013.

Table 9 shows Nutri-cereals procurement out of total production in major Indian states. In almost all the major states, the proportion of procurement to production is less than 10%, except in Haryana 2018–19 (18%). The aggregate level procurement out of the total output of

Crops	Government	Private	Other	Total
Paddy	32.58	65.14	2.28	100
Jowar	12.15	85.07	2.78	100
Bajra	13.99	84.68	1.33	100
Ragi	19.33	77.65	3.02	100
Maize	10.11	89.56	0.33	100
Cotton	12.32	85.70	1.97	100
Wheat(Rabi crop)	32.06	66.51	1.43	100

Source(s): Author's calculation from NSSO SAS 77th round data

Table 8. Proportion of major dispose quantity by marketing channels, 2018–19, all India, in percent

Major states	2016–17	2017–18	2018–19
Andhra Pradesh	N/A	N/A	N/A
Telangana	N/A	N/A	N/A
Gujrat	N/A	N/A	0.001
Haryana	0.005	0.03	0.186
Karnataka	NA	NA	0.0007
Madhya Pradesh	0.04	0.0008	0.003
Maharashtra	0.002	0.009	N/A
Rajasthan	N/A	N/A	N/A
Bihar	N/A	N/A	N/A
Total procurement/Total production	0.007	0.002	0.006

Source(s): Author's calculation from Government of India (2019)

Table 9. Procurement/ production of Nutri cereals

nutri-cereals is also less than 10%. It shows the inefficiency of government procurement agencies towards nutri-cereals. And hence the price assurance scheme for these products is less effective. Table 10 shows that, even in a government agency for nutri cereals like jowar, bajra, maize and ragi, more than 70% of households do not realize MSP.

Table 10 shows that most households reported lower price realization than MSP in almost all crop price observations. Even in government agencies, which are supposed to ensure MSP for the selected crops, most households report price realization less than MSP except for the household producing paddy. This is because government policies have been biased toward cereals, particularly rice and wheat (Pingali, 2015).

Through procurement, the food corporation of India (FCI) keeps buffer stocks, which helps the poorest of the section to get food at subsidized prices through the public distribution system (PDS). The public procurement agencies are providing better prices to the farmers; therefore, it's efficient for the producers. It is also efficient because some regulation safeguards farmers from exploitative agents and ensures price assurance, which the private market is not providing. Even for rice and wheat, which might get wasted, it is not because of procurement; it is because of the lack of distribution and unavailability of infrastructure to preserve it safely. Despite evidence of rising food insecurity and hunger, the buffer stock is not utilized efficiently. The country's past experiences demonstrate that rural infrastructure, finance assistance, procurement at MSP and the strengthening of supportive institutions such as the Food Corporation of India (FCI) are essential instruments for ensuring food production and food security (Swaminathan and Bhavani, 2013). The MSP is a policy that gives assured prices to farmers in order to safeguard them against market-price variations caused by climate change, a lack of market integration and poor information distribution (Singh and Bhogal, 2021).

Crop diversification will be encouraged through effective public procurement of crops other than wheat and paddy at the MSP. A shift away from these water-guzzling crops, particularly rice, may have the ecological benefit of increasing water sustainability and improving soil health (Bhogal and Vatta, 2021; Sarkar and Das, 2014). But the lack of effective public procurement and MSP of alternate crops (other than wheat and paddy) has been the main reason for the failure to diversify (Bhogal and Vatta, 2021). Therefore, an effective public procurement system will ensure the procurement of nutri-cereals like jowar, maize, bajra and ragi (Jena and Mishra, 2021; Garg *et al.*, 2023).

Table 11 shows the comparison of crop prices by the market agency. The price realization of crops varies across different marketing channels. From Table 11, the price realization for paddy, bajra, maize and wheat significantly differs across marketing channels. This gives the rationale behind understanding price realization across different marketing channels.

Table 10. Proportion of household realization of MSP in each marketing channel (2018–19)

	Marketing agency					
	Private		Government		Others	
Crops	% less than MSP	% more than MSP	% less than MSP	% more than MSP	% less than MSP	% more than MSP
Paddy	78.00	22.00	26.00	74.00	49.00	51.00
Jowar	81.64	18.36	90.28	9.72	85.71	14.29
Bajra	91.67	8.33	89.68	10.32	76.92	23.08
Maize	73.85	26.15	72.29	27.71	58.33	41.67
Ragi	87.04	12.96	87.5	12.5	83.33	16.67
Cotton	62.14	37.86	49.26	50.74	54.55	45.45
Wheat	80.31	19.69	52.63	47.37	74.65	25.35

5. Factors determining the above MSP realization

A binary logistic regression has been applied to identify market and non-market factors determining the price realization in all the selected crops over and above MSP during 2018–19. A similar kind of model is applied by Bora *et al.* (2018) for Paddy using NSS0-SAS 2012–13 data. Table 12 furnishes the logistic regression result for all the crops category. The predictive analysis shows that the determinants of realizing better prices differ across the crop.

5.1 Determinant factors for better price realization

Table 12 indicates the detailed results from which our analysis extends the robust understanding of marketing channels while controlling for the socio-economic characteristics of the farmer households. For paddy, cotton and wheat, we observe that a shift from the local private markets to the government agencies improves the likelihood of realizing MSP. This is because the procurement policy is biased towards green revolution crops like paddy and wheat. While for jowar, bajra maize and ragi, there is no significant change in the likelihood of MSP realization with the changes in marketing channels.

In terms of the significant crops where government agencies are efficient, particularly for paddy and wheat, we observe a socio-economic class effect is in play. For paddy, maize, cotton and wheat, the likelihood of MSP realization is more when the farmers are from an upper social group keeping the ST community as the base category.

Again for the dominant crop like Paddy and wheat, which have better procurement systems and MSP realization, along with the bajra, the farmers above the semi-medium class of land holdings are more likely to observe MSP for their produce. Negi *et al.* (2018) studied NSSO SAS 2012–13 data and found that smallholder farmers dispose of their major proportion of produce in informal channels, i.e. local traders and input dealers and receive less price from them as compared to Minimum Support Price. Due to the variation in the choice of marketing channels by different land-size classes of farmers, there is a significant variation in price realization across different marketing channels (Bora *et al.*, 2018).

In this regard, our results indicate two forms of inefficiencies that exist in the marketing channel systems. Firstly, access to government agencies, which are more likely to provide better prices, is skewed, which is important in better price realization. Secondly, for some crops, we could not find a significant result for the marketing channels as a determinant of better price realization because of the negligence of the regulated market to ensure the price assurance scheme. This needs further elaboration on the policy implications.

One-way analysis of variance (ANOVA)

	Between the group(SS)	Within groups(SS)	F	Prob > F	χ^2	Prob > χ^2
Paddy	20157.28	289076.1	403.28	0	314.2419	0
Jowar	47.36564	27137.36	0.54	0.5824	4.3523	0.113
Bajra	251.1389	17943.56	9.7	0.0001	21.1463	0
Maize	403.2475	69497.26	6.06	0.0024	60.3962	0
Ragi	169.9098	14070.72	1.9	0.151	13.8958	0.001
Cotton	942.8552	1770261	0.72	0.4878	628.685	0
Wheat	694.9818	72865.06	30.34	0	517.703	0

Source(s): Author's calculation from NSSO SAS 77th round data

Table 11. Comparison of crop price by market agency

Table 12.
Results from logistic regression explaining the price realization by crops

Dependent variable (Y_i) Y = 1, if crop price is more than equal to MSP, 0 if otherwise	Paddy (n = 11,504)		Jowar(n = 623)		Bajra(n = 13,89)		Maize(n = 2092)		Ragi(n = 317)		Cotton(n = 2,699)		Wheat(n = 6,364)	
	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Independent Variables (X_i)														
X_1 Marketing Agency														
i. Private														
ii. Government	2.33*** [0.06]	0.000	−0.73 [0.43]	0.08	−0.12 [0.34]	0.72	0.17 [0.18]	0.33	−0.13 [0.66]	0.83	0.56*** [0.12]	0.000	1.15*** [0.07]	0.000
iii. Others	1.27*** [0.11]	0.000	−0.41 [0.65]	0.52	0.94** [0.46]	0.04	0.64*** [0.26]	0.01	−0.02 [0.67]	0.97	0.23 [0.38]	0.53	0.34*** [0.14]	0.01
X_2 Social Group														
i. ST														
ii.SC	0.57*** [0.08]	0.000	−0.67 [0.41]	0.1	−1.46*** [0.44]	0.001	0.44*** [0.17]	0.01	−1.21 [0.64]	0.06	−0.12 [0.16]	0.46	−0.16 [0.16]	0.3
iii.OBC	0.64*** [0.07]	0.000	−1.24*** [0.31]	0.000	−1.03*** [0.29]	0.000	0.21 [0.13]	0.1	−0.34 [0.43]	0.42	0.27*** [0.11]	0.01	0.26** [0.13]	0.05
iv. Others	0.52*** [0.07]	0.000	−0.45 [0.34]	0.18	−1.02*** [0.32]	0.002	0.38 [0.14]	0.008**	−0.21 [0.52]	0.67	−0.01 [0.13]	0.92	0.28** [0.14]	0.04
X3 Possess KCC														
i. Yes														
ii. No	−0.35*** [0.05]	0.000	−0.63*** [0.24]	0.01	0.67*** [0.22]	0.003	0.33 [0.12]	0.009**	0.56 [0.86]	0.51	−0.0004 [0.11]	0.99	0.31*** [0.06]	0.000
X_4 Insured Under PM Fasal														
i. Yes														
ii. No	−0.44*** [0.08]	0.000	−0.86*** [0.3]	0.005	−0.34 [0.33]	0.29	−0.52 [0.17]	0.003**	−0.32 [1.24]	0.79	0.03 [0.11]	0.74	−0.56*** [0.1]	0.000
iii. Not Applicable	0.94*** [0.29]	0.001	−0.28 [1.66]	0.86	0.96 [1.43]	0.5	−0.21 [0.73]	0.76	1.84 [2.1]	0.38	0.38 [0.35]	0.29	−0.33** [0.41]	0.04
X_5 Land Holding														
i. Marginal														
ii. Small	0.06 [0.05]	0.251	−0.11 [0.26]	0.66	0.49** [0.24]	0.04	−0.1 [0.11]	0.37	0.03 [0.39]	0.93	−0.26*** [0.09]	0.007	0.17** [0.07]	0.02
iii. Semi-medium	0.31*** [0.06]	0.000	−0.92*** [0.36]	0.01	0.40 [0.27]	0.15	−0.05 [0.13]	0.67	−0.2 [0.46]	0.65	−0.14 [0.1]	0.18	0.2*** [0.08]	0.01
iv- Medium	0.55*** [0.12]	0.000	−0.12 [0.38]	0.73	1.33*** [0.38]	0.001	−0.22 [0.25]	0.36	−0.54 [0.85]	0.52	0.003 [0.15]	0.98	0.32*** [0.12]	0.008
v-Large	0.69*** [0.34]	0.042	0.4 [0.81]	0.62	1.98** [0.95]	0.03	0.02 [0.64]	0.96	0 [empty]	Empty	0.58 [0.41]	0.15	0.57** [0.29]	0.05
X_6 Market Density	0.0004*** [0.00001]	0.000	0.00007 [0.0006]	0.91	−0.002*** [0.0004]	0.000	0.00009 [0.00001]	0.000**	−0.001 [0.001]	0.26	−0.002*** [0.002]	0.000	−0.0004** [0.0001]	0.02
Constant	−1.58*** [0.11]	0.000	0.62 [0.6]	0.3	−0.54 [0.57]	0.33	−1.16 [0.23]	0.000**	−0.91 [1.53]	0.55	0.47** [0.22]	0.03	−1.19*** [0.21]	0.000
	$p = 0$ Pseudo $R^2 = 0.2180$		$p = 0.0001$ Pseudo $R^2 = 0.0821$		$p = 0$ Pseudo $R^2 = 0.1014$		$p = 0$ Pseudo $R^2 = 0.0234$		$p = 0.75$ Pseudo $R^2 = 0.0334$		$p = 0$ Pseudo $R^2 = 0.0325$		$p = 0$ Pseudo $R^2 = 0.0625$	

Note(s): The figures in brackets below the coefficient are the standard errors. **, *** indicate significance at the 0.05, 0.01 levels, respectively
Source(s): Author's calculation from NSSO SAS 77th round data

Since market density was kept as a control variable, for most crops, that variable does provide state control to the response variable.

6. Concluding remarks and policy implication

Price is a significant factor in the farmers' welfare and agricultural development. When the national commission on farmers (2006) came, MSP was not in the picture. After the announcement of MSP, only paddy and wheat got secure and other crops' price assurance was not that much effective. Farmers have historically received poor prices due to market policies and price distortions. During the covid-19 phase, there have been reports of crop wastage, specifically vegetables, due to the failure of the government to procure the products on time (Tripathi *et al.*, 2023).

This article deals with the farmers' price realization in the Indian context. Primarily, for selected crops in both Kharif and Rabi seasons, we attempt to understand how different marketing channels can influence access to sustainable prices for farmers. A few significant findings result from the empirical analysis in this study.

In light of the recent changes brought forth by the farmers' movements against the farm laws, it is pertinent that a scientific and robust intervention is brought forth as well. Our analysis tried to incorporate two interconnected questions regarding the marketing agency's role in providing better prices in the agricultural produce market. Our findings are as follows.

Firstly, for the crops which are well covered by MSP, such as wheat, paddy and cotton, government channels provide significantly better prices than other channels in India. A study by Bora *et al.* (2018) also concluded with similar results.

Secondly, in the case of certain crops, however, price provision fails even within the government channels. Particularly in the case of jowar and bajra, maize and ragi, even government channels failed to provide MSP to farmers in 2018–19. The procurement mechanism and the incentive structure favor the crops like paddy, wheat and cotton, whereas, for other major cereals, there is a need for more detailed investigation. Therefore, there is a need for crop-specific policy intervention to strengthen the farmers' incentive structure so that they can diversify to other cereal crops like nutri-cereals which are more climate resilient and rich in micronutrients (Pramitha *et al.*, 2023).

Thirdly, among the control variables at the household and state level, social group, land holdings and market density remain an important factor in determining better price access.

Growth rates in the agriculture sector as a whole and across main crops grown in India have stagnated (De Roy, 2017; Joshi, 2015); parallelly cost of cultivation is increasing (Kamra and Ramakumar, 2019; Srivastava *et al.*, 2017. Income of the farmer is declining (Chand *et al.*, 2015; Narayanamoorthy and Sujitha, 2021). We don't have any mechanism to control this since public investment in agriculture has declined (Bathla, 2017). At this outset, when farm income is not improving, the price policy should go beyond the decline that these three components are showing. Therefore government regulation is important and price regulation only works when public procurement by the government is in place. Thus ensuring MSP would eventually enable farmers to access better income, particularly for nutri-cereals which are climate resilient and promote diversification (Pramitha *et al.*, 2023; Jena and Mishra, 2021; Garg *et al.*, 2023). Even after the announcement of MSP, until and unless it is publicly procured, MSP is not an implementation.

An overall policy direction cannot solve the price distress unless the government agencies are freed of the shackles of the in-built rent-seeking intermediaries within the marketing channel. Agricultural marketing in the Indian context is often marked with inefficient marketing channels, which are identified by the rent-seeking of several intermediaries. At this outset, policy concerns and subsequent reforms could be attempted. Binaries of free

market versus state intervention might not be helpful if problems of MSP implementation are to be kept in mind.

The present study only analyzes a few selected major crops, most of which are cereals. Other crop groups can also be taken for the investigation to have a more detailed understanding of the factors responsible for better price realization across crop groups. Distance is one of the important factors in the choice of marketing channel. Due to the unavailability of the distance variable in NSS data, it is not incorporated.

Notes

1. In this particular model we are assuming that the farmers are choosing the available market, While the transaction cost involved in this choice is endogenous in nature. Therefore we are considering the sale price as a binary variable so that the choice of agricultural markets doesn't reflect the exact transaction cost in the form of realizing price.
2. Rent-seeking is an economic concept that occurs when an entity seeks to gain added wealth without any reciprocal contribution of productivity. Rent seeking can disrupt market efficiencies and create pricing disadvantages for market participants. The exploitative intermediaries and private traders are termed as rent-seekers.

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Appendix

Table A1. Descriptive statistics for binary logistic regression to explain price realization by cultivators during 2018–19

Dependent variable (Yi)	Type	Unit/ category	Paddy (n = 11,504)	Jowar (n = 623)	Bajra (13,89)	Maize (n = 2092)	Ragi (n = 317)	Cotton (n = 2,699)	Wheat (n = 6,364)
Crops price realization is more than equal to MSP	Categorical	1-if Yes, o-if no	Percentage share out of total observation						
Independent Variables (Xi)									
X1 Marketing Agency	Categorical								
i. Private		1	81.31	83.95	88.12	89.2	84.91	86.22	80.22
ii. Government		2	15.19	11.56	9.07	7.93	7.55	12.56	15.26
iii. Others		3	3.49	4.49	2.81	2.87	7.55	1.22	4.53
X2 Social Group	Categorical								
i. ST		1	20.15	12.68	10.3	26.53	19.5	16.75	7.94
ii. SC		2	13.00	12.36	12.02	11.95	14.47	10.23	12.96
iii. OBC		3	35.00	51.52	49.53	38.67	42.77	46.68	44.09
iv. Others		9	31.86	23.43	28.15	22.85	23.27	26.34	35.01
X3 Possess KCC	Categorical								
i. Yes		1	23.97	23.92	40.89	22.32	9.12	17.12	42.65
ii. No		2	76.03	76.08	59.11	77.68	90.88	82.88	57.35
X4 Insured Under PMFBY	Categorical								
i. Yes		1	7.15	23.32	8.78	8.37	2.52	18.75	8.41
ii. No		2	92.30	86.2	90.86	91.2	96.86	80.1	91.2
iii. Not Applicable		3	0.55	0.48	0.36	0.43	0.63	1.15	0.39
X5 Land Holding	Categorical								
i. Marginal		<1 ha	46.80	34.51	41.61	40.63	49.37	34.86	36.8
ii. Small		1–2 ha	31.78	31.94	29.81	33.41	29.56	31.68	33.12
iii. Semi-medium		2–4 ha	16.77	22.15	21.6	20.36	18.87	23.6	21.95
iv- Medium		4–10 ha	4.07	9.95	6.26	4.92	1.89	8.71	7.15
v-Large		>10 ha	0.58	1.44	0.72	0.67	0.31	1.15	0.97
X6 Market Density	Continuous	Area served/ Market							

Note(s): MSP = Minimum Support Price, ST=Schedule Tribe, SC=Schedule Caste, KCC=Kissan Credit Card, PMFBY= Pradhan Mantri Fasal Bima Yojana, Ha = Hectare

Source(s): Author's calculation from NSSO SAS 77th round data

States	Area	Number of regulated markets	Area served/market (MarketDensity)
Andhra Pradesh	1,62,970	191	853
A&N Islands	8,249		
Arunachal Pradesh	83,743	13	6,442
Assam	78,438	226	347
Bihar	94,163		
Chandigarh	114	1	114
Chhattisgarh	1,36,034	187	727
Dadra and Nagar Haveli	491		
Daman andDiu	112		
Goa	3,702	8	463
Gujarat	1,96,024	400	490
Haryana	44,212	281	157
Himachal Pradesh	55,673	56	994
Jammu and Kashmir	2,22,236	25	8,889
Jharkhand	79,714	190	420
Karnataka	1,91,791	513	374
Kerala	38,863		
Lakshadweep	32		
Madhya Pradesh	3,08,144	545	565
Maharashtra	3,07,713	902	341
Manipur	22,327	0	
Meghalaya	22,429	2	11,215
Mizoram	21,081	0	
Nagaland	16,579	19	873
Delhi	1,484	9	165
Odisha	1,55,707	436	357
Puducherry	562	8	70
Punjab	50,362	435	116
Rajasthan	3,42,240	454	754
Sikkim	7,096		
Tamil Nadu	1,30,058	283	460
Telangana	1,14,840	260	442
Tripura	10,493	21	500
Uttar Pradesh	2,40,928	623	387
Uttarakhand	53,484	67	798
West Bengal	88,752	475	187
Total	32,90,840	6,630	496

Source(s): Rawal *et al.* (2020)

Table A2.
Number of regulated markets and average area (sq kms) served per market, by state, 2017

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