

# Temporal Analysis of Onion Prices in major Markets in India

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## Abstract

*In the last two decades, area and production of onion has increased, extending into non-traditional areas. However, there is a marginal increase in productivity. Price analysis of onion revealed that instability of the prices are high in domestic markets as observed in the last two decades period. On the contrary, in a few markets, a positive correlation between arrivals and prices of onion is witnessed indicating the existence of exogenous factors such as more number of traders operating during harvesting season for hoarding of the stock for onward sale in other markets. Price analysis of onion also revealed that there is a cyclic trend of sudden hike in the price of onion. Thus there is a need to curb the exorbitant price rise of onions by intervention of the government based on supply demand dynamics. There is also a need for strengthening the marketing information system and increasing of post-harvest management infrastructure for onion to resolve the issues related to onion supply chain in India, being the world's second largest producer of onion.*

**Key words:** Onion, wholesale prices, crop dynamics, seasonal arrivals and price index, domestic markets.

## Introduction

In the last two decades, among the food commodities, onion is one of the commodities which experienced high volatility in price movement. In general, this commodity is less elastic to price and income and inherently unstable due to weather and institutional risks (Chengappa et al., 2012). In the recent times, onion wholesale prices have exorbitantly increased and touched the historical highs of Rs. 5000-6000 per quintal in domestic markets. The sudden spurt in the price levels of onion has caught wide spread attention of the consumers, middle men, exporters and policy makers in India. Onion being a household vegetable for daily consumption, its price rise has significant impact on trade, exports and household budget allocation (Sohan, Premi and Premi B R, 2017). The glaring volatility in the price of onion is noticed in the years 1998, 2010, 2013, 2015 and 2017, and the concerning fact is that, skyrocketing of price is recurring frequently than previous years (alternate years in the recent times). The price fluctuations were pretty high in consumer markets like Delhi, Kolkata, Mumbai, Pune and Chennai than the markets located in onion production centers. Despite increase in the area and production of onion in India, periodical volatility of prices of onion is noticed due to several factors including vagaries in area allocation and production. Against this backdrop, an attempt has been made in this paper to analyse the factors responsible for price

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volatility such as supply and demand, area, production, rainfall pattern, export demand, Minimum Export Price (MEP) etc.

Accordingly, in this study, emphasis has been given to analyse the price behavior in major markets in India. Besides, the major determinants of this price behavior of onion in major wholesale markets in India is analyzed. Hence this study will throw light on understanding the price trends and seasonality effect on price movement and identifying the major determinants of price volatility. The outcome of the study will help in addressing existing concerns of price rise by formulating suitable policy measures to stabilize the supply and in turn to arrest volatility in prices of onion in domestic markets. The underlying principle is that, based on the outcome of the study, policy suggestions would be recommended to bring in stability in the prices of onion, which will benefit all the stakeholders in the chain including farmers and consumers. Keeping all these factors in view, the present study is taken up with the following specified objectives.

## Objectives

- To analyze the wholesale price volatility of onion in major domestic markets in India.
- To analyze determinants of price volatility of onion (such as area, production, yield, exports, trade limits, rainfall, and policy framework of onion crop).

## Methodology

### Study area

In this study, major onion producing states and marketing centers located in Maharashtra, Karnataka, Madhya Pradesh, Rajasthan, Tamil Nadu, West Bengal and Bihar in India were selected for analyzing the price trend and its volatility in major markets and influence of changing crop dynamics, export performance on price movement for the time period of 2002 to 2017.

### Sources of data

Secondary data on area, production and yield in major producing states in India were collected from Directorate of Economics and Statistics (DES) and State's Season Crop Reports. Information on Indian onion exports was collected from Directorate General of Commercial Intelligence and Statistics (DGCIS) and National Agricultural Co-operative Marketing Federation of India Ltd. (NAFED). For understanding the trends in prices of onion, the wholesale prices and arrivals in major markets in India were collected from the National Horticultural Research & Development Foundation (NHRDF) official website. The data collected from different sources were analyzed by using suitable quantitative statistical methods.

### Data analysis

For understanding of the instability in prices, arrivals and prices seasonal trends of onion in domestic markets, coefficient of variance, correlation coefficient, and seasonal indices were calculated using

secondary data on wholesale prices and arrivals in 12 major markets in India. The data pertains to the year 2002-2017. For better interpretation and understanding of the results, graphical analysis is also carried out.

For understanding of instability or variability in the price movement Coefficient of variance was calculated.

**Coefficient of variance of prices** = Standard deviation/ Mean\*100

To analyze the relation, association and strength in arrivals pattern and price movement of onion calculated correlation coefficient in the study.

$$r_{xy} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{\sqrt{n \sum x_i^2 - (\sum x_i)^2} \sqrt{n \sum y_i^2 - (\sum y_i)^2}}$$

r = Coefficient of correlation,

n number of observations

$x_i$  = prices of onion

$y_i$  = arrivals of onion

Seasonal index of prices and arrivals was calculated by

$$SI \text{ for Prices} = \frac{\text{Average price of the commodity in particular month over a period of time}}{\text{Average prices in the year over a period of time}} * 100$$

$$SI \text{ for Arrivals} = \frac{\text{Average arrivals of the commodity in particular month over a period of time}}{\text{Average arrivals of the commodity in the year over a period of time}} * 100$$

### About onion crop

India is the second largest producer of onion in the world. Total area under onion has increased from 0.25 million ha to 1.23 million ha during the period of 1980-2015 with the annual average growth rate of 5.15 per cent. Production also increased during the same period from 2.5 million tonnes to 20.99 million tonnes with annual average growth rate of 7.39 per cent. The average yield of onion in India is 16.45 t /ha, which is far below the average global yield level of 22.06t/ha. In India, onion is mainly cultivated in Maharashtra with lion's share of 37.28 per cent in total onion acreage, followed by Karnataka (14.73 per cent), Madhya Pradesh (9.81 per cent), and Gujarat (4.73 per cent), Rajasthan (4.97 per cent), Bihar (4.48 per cent) and Andhra Pradesh (3.84 per cent). In the case of production, Maharashtra holds the top position by contributing around 29.9 per cent of total onion production in the country followed by, Karnataka

(14.87 per cent), Madhya Pradesh (14.36 per cent), Gujarat (7.31 per cent), Bihar (6.4 per cent), Andhra Pradesh (4.14 per cent) and Rajasthan (3.88 per cent). The highest average productivity of 23-25 MT/ha onion was registered in Gujarat followed by Madhya Pradesh (24.10 MT/ha) and Bihar (23.30 MT/ha), while in the case of other states, it ranged between 12-16 MT /ha during the study period. The growth rate of area and production and yield of onion was calculated for the period 1980-2015, mainly to ascertain the impact of rise in prices on acreage under onion and the results are presented in (Table 1). The data revealed that, at all India level, onion registered positive growth rates of 4.89 per cent, 6.42 per cent and 1.46 per cent in area, production and productivity respectively during 1980-2015. State level analysis reveals that, all the selected states have registered positive growth rates in, area, production and productivity. In India, onion is grown both in rabi and kharif seasons. So the supply is available throughout the year with varying volumes. Onion is an inevitable vegetable ingredient used in recipes to enhance the flavor of the wide varieties of culinary around the world.

**Table 1. TE of Area, production and yield of Onion in major cultivating states in India (2013-15)**

States	Area (m.ha)	Production (m.t)	Yield (t/ha)	Percentage share in total area	Percentage share in total production	Growth rate (1980-2015) in %		
						Area	Production	yield
Maharashtra	0.45	5.91	13.22	37.28	29.90	6.82	7.01	0.18
Karnataka	0.18	2.94	16.47	14.73	14.87	5.49	8.21	2.58
Madhya Pradesh	0.12	2.84	24.10	9.81	14.36	6.45	8.79	2.0
Gujarat	0.06	1.44	25.44	4.73	7.31	5.06	5.18	0.12
Rajasthan	0.06	0.77	12.83	4.97	3.88	6.32	10.04	3.5
Bihar	0.05	1.27	23.35	4.48	6.40	3.89	7.02	3.02
Andhra Pradesh	0.05	0.82	17.62	3.84	4.14	3.82	6.85	2.92
Others	0.24	3.78	13.50	19.98	19.12	-	-	-
All India	1.20	19.77	16.45	100.00	100.00	4.89	6.42	1.46

*Source: Directorate of Economics and Statistics, GOI, 2017 data base.*

### Price trend in major wholesale markets in India

In this section the trends in onion wholesale prices and arrivals movement and their seasonal indices, volatility of the wholesale prices of onion have been discussed for major markets in selected states of Maharashtra, Karnataka, Rajasthan, Tamil Nadu, and Bihar in India. In general, prices of agricultural commodities follow a typical seasonal pattern of movement during the crop year. The general pattern of the price movement is lower prices during the post-harvest months and higher prices during the off season and pre-harvest months in a year. In general, the major factors that influence the price movement

are arrivals of the crop, area and production estimates, perishability of the commodity, the cost of storage, availability of storage facilities, trader's stock limits and minimum export price (P.G.Chengappa, 2012). Onion is one of the illustrious commodities which has the typical pattern of the price movement and has experienced significant price rise in the recent times. So, to identify the underlying seasonal pattern of onion, price movement and the instability of the price in selected major markets in India, seasonal index of arrivals and prices of onion and coefficient of variations (C.V) of prices were calculated respectively for the period 2002 to 2017.

In India, in the case of onion, the total arrivals in the top 50 markets account for around 95 per cent of the total arrivals in all the 107 markets (Gummagolmath, 2012). For this study, 12 major wholesale markets namely (Jaipur, Kolkata, Chennai, Mumbai, Pimpalgaon, Lasalgaon, Mahua, Hubli, Pune and Ahmedabad Delhi, Bangalore) which accounted for 60 per cent of the total arrivals in the country were selected for analyzing the seasonality pattern in arrivals and prices of onion for the period of 2002-2017. The main purpose of calculating the seasonal Indices of arrivals and prices of onion is to identify the typical underlying pattern of the arrivals and its influence on the price movement.

### Instability in wholesale prices of Onion

The estimates of coefficient of variation (C.V) of wholesale prices of onion in the major markets of India from 2002 to 2017 period are presented in Table -2. These estimated values of coefficient of variation give the deviation of the prices from the mean value of the prices in a particular year. The estimated values from (Table 2) reveal that, onion wholesale prices have registered higher instability particularly in the years 2005, 2010 and 2013 compared to other years, while during 2016 and 2017, the fluctuations in the prices were lower compared to the previous period. It was also observed that, since 2009, volatility in wholesale prices of onion is comparatively high in a majority of the markets than the previous years and almost all the selected markets witnessed a high volatility in the wholesale prices. Among them, the intensity of volatility is high among Pimpalgaon, Delhi, Lasalgaon Ahmedabad, Mumbai and Pune markets compared to the other markets. The common feature noticed among all the markets was that, the intensity of volatility in prices was high during October- January months.

**Table 2. Coefficient of Variation (C.V) of wholesale prices of Onion in major markets in India**

Market Centre	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Lasalgaon	Pimpalgaon	Hubli	Mahua	Pune	Kolkata	Ahmedabad
2002	32.34	38.65	27.28	23.66	37.72	40.41	41.5	36.22	29.87	42.79	32.16	29.68
2003	41.65	35.87	40.22	30.83	39.87	45.73	47.74	35.18	41.42	46.12	38.13	38.78
2004	42.12	31.38	30.66	23.07	27.05	37.42	35.64	20.39	42.36	26.59	28.54	39.05
2005	60.45	43.53	38.03	39.06	62.21	71.35	67.49	40.55	53.74	56.66	52.55	62.19
2006	25.72	19.95	15.68	23.79	38.49	46.36	43.63	15.93	48.21	41.52	26.17	43.64
2007	35.87	37.63	21.36	20.7	34.65	40.27	39.72	20.57	36.45	34.61	29.35	29.81
2008	41.25	38.58	34.69	33.47	40.19	54.32	54.77	38.4	43.92	54.66	44.21	47.47
2009	34.58	32.4	36.72	40.49	42.43	40.43	39.62	27.48	36.69	44.65	50.16	35.39
2010	55.98	48.55	69.83	49.97	62.29	46.21	44.59	39.98	49.64	65.66	53.66	54.33
2011	68.25	58.63	52.56	57.43	52.93	57.79	52.48	35.9	62.46	62.78	58.28	62.54

Market Centre	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Lasalgaon	Pimpalgaon	Hubli	Mahua	Pune	Kolkata	Ahmedabad
2012	31.92	31.01	42.25	35.55	37.96	49.73	43.93	23.49	38.84	44.02	39.95	42.09
2013	66.79	59.98	44.94	50.6	60.00	62.54	65.97	46.24	48.74	61.34	50.18	58.39
2014	33.36	31.69	40.15	29.39	32.51	28.42	25.11	28.73	24.17	34.4	28.2	26.82
2015	48.64	44.5	31.25	39.44	51.47	55.08	59.24	32.76	40.41	62.35	44.29	48.87
2016	16.81	22.45	22.47	15.61	20.83	23.83	20.61	21.35	24.39	26.77	13.14	17.39
2017	48.47	42.16	43.75	31.13	52.51	57.77	57.25	45.26	42.47	54.88	46.14	47.28

The calculated values of correlation coefficient between the monthly wholesale prices and arrivals of onion in major markets in India are presented in Table 3. In general, in the case of agricultural commodities, prices will have a negative relationship with the arrivals of the commodity. The correlation analysis across the selected markets (2002-2017) reveals that, Bangalore, Chennai Mumbai, Ahmedabad and Hubli markets mostly have a positive correlation coefficient i.e., with the increased arrivals, the prices also were at higher levels in these markets, whereas, in the other selected markets, arrivals and prices were negatively correlated. The year wise analysis of the correlation coefficient between prices and arrivals in selected onion markets explains that, every year about three to four markets in the selected market list are showing a positive correlation among the arrivals and prices. During 2002- 2004 period, Jaipur, Chennai, Delhi, Bangalore Pune and Kolkata registered positive correlation. In 2009, Delhi, Bangalore, Mumbai, Pune, Ahmedabad and Hubli showcased positive correlation. However, in the year 2010, except Lasalgaon, Hubli, and Bangalore markets, in all other selected markets negative correlation between arrivals and prices was noticed. Again in the year 2013, Jaipur, Hubli and Bangalore markets registered a positive correlation. In the years 2016 except Jaipur, Delhi, Bangalore and Hubli markets all other markets showed a positive correlation between arrivals and prices of onion.

On the whole, a few markets namely Bangalore, Chennai, Hubli and Ahmedabad markets have witnessed majorly a positive correlation between arrivals and prices in onion over a period of time. The instances of positive correlation in other markets are very limited. This indicates the paradoxical situation that as the arrivals increase the prices also increased. From this analysis it is evident that, exogenous factors (such as cartels holding the stock in speculation of higher prices on crop failure estimates and traders reluctance to reduce the prices despite increased arrivals in the market) were interfering in the market functioning and kept the prices on higher side in onion despite increased arrivals. Besides, as per the opinion of the traders in those markets more number of traders operated for purchase of onion for onward trade in other parts of the country thus resulting in increase in prices. (Purushottam and Gummagolmath, 2012).

**Table 3. Year wise correlation coefficient of wholesale prices of onion in major markets in India**

Year	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Pune	Kolkata	Ahmedabad	Lasalgaon	Pimpalgaon	Hubli	Mahua
2002	-0.08	0.19	0.33	0.11	-0.01	-0.89	-0.17	-0.08	-0.50	-0.44	0.48	-0.54
2003	0.63	0.40	0.84	0.22	0.08	-0.71	0.09	0.81	-0.55	-0.03	0.36	-0.54
2004	-0.43	-0.58	-0.31	-0.24	0.59	0.70	0.71	0.49	0.46	-0.10	-0.47	0.29
2005	-0.67	-0.08	0.74	-0.28	-0.82	-0.93	-0.42	-0.40	-0.79	-0.79	0.69	-0.53
2006	-0.50	-0.45	-0.01	0.22	-0.54	-0.72	-0.65	-0.21	-0.07	-0.29	0.42	-0.41
2007	-0.38	-0.65	0.02	0.16	-0.69	-0.39	0.25	0.34	-0.52	-0.77	-0.39	0.00
2008	-0.64	-0.67	-0.67	-0.24	-0.62	-0.60	-0.48	0.20	-0.55	-0.42	0.62	-0.44
2009	-0.52	0.11	0.53	-0.14	0.50	0.06	-0.52	0.55	-0.08	-0.07	0.78	0.26
2010	-0.82	-0.22	0.59	-0.63	-0.09	-0.21	-0.61	-0.46	0.05	-0.54	0.80	0.26
2011	-0.48	-0.56	-0.10	-0.40	0.19	0.01	-0.13	-0.48	-0.24	-0.29	-0.15	-0.58
2012	-0.69	0.40	0.54	-0.80	-0.39	-0.81	-0.13	-0.53	0.33	-0.19	0.43	-0.61
2013	0.45	-0.93	0.74	-0.71	-0.84	-0.69	-0.82	-0.80	-0.77	-0.76	0.13	-0.49
2014	-0.09	0.01	-0.11	-0.17	-0.34	-0.78	-0.29	-0.44	-0.35	0.12	-0.17	-0.80
2015	-0.31	-0.39	0.41	0.04	-0.37	-0.73	-0.37	-0.70	-0.90	-0.92	0.11	-0.64
2016	-0.53	-0.30	-0.27	0.23	0.72	0.21	0.56	0.52	0.37	0.30	-0.35	0.47
2017	0.18	-0.38	-0.90	-0.61	-0.65	-0.74	-0.62	-0.85	-0.50	-0.85	-0.62	-0.72

**Table 4. Correlation coefficient between monthly onion arrivals and prices in major markets in India (2002-2017)**

Market center	Correlation coefficient
Jaipur	0.01
Delhi	-0.11
Bangalore	0.39
Chennai	0.28
Mumbai	0.06
Lasalgaon	-0.30
Pimpalgaon	-0.34

Market center	Correlation coefficient
Hubli	0.26
Mahua	-0.03
Pune	-0.25
Kolkata	-0.25
Ahmedabad	0.24

### Seasonality in Arrivals and Prices of Onion in major Domestic Markets in India

The results presented in the (Tables 5 & 6) illustrate the monthly trends in prices and arrivals in the selected major onion markets in India. Onion supply is persistent around the year as the crop is cultivated in both the seasons. Despite this phenomenon, higher volatility in the prices of onion is observed in the recent times. In almost all the selected markets, the lowest prices were seen during the months of April and May, and from there prices increased steadily. From the month of September onwards, onion prices increased at a higher pace and reached peak level by December. Then, from January onwards, prices took the declining trend and slowly moved down side due to commencement of arrivals from the rabi crop. This typical price movement pattern is witnessed in all the selected years in the case of onion during the study period (2002-2017). Further, the analysis of onion arrivals in the major markets indicated that, markets were flooded with arrivals in the peak season during the months of May to August from rabi crop and early kharif crop. From this period onwards, slowly the arrivals started declining in the markets. These declining arrivals make the prices move higher. Seasonal indices of market wise arrivals and price are discussed in detail as under.

**Table 5. Seasonal Indices of prices of onion in major consuming markets in India (2002-2017)**

Months	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Lasalgaon	Pimpalgaon	Hubli	Mahua	Pune	Kolkata	Ahmedabad
January	104	101	105	106	95	97	97	97	106	98	99	101
February	89	86	87	86	76	77	78	82	89	70	83	85
March	75	74	67	70	63	60	60	73	74	57	60	68
April	65	67	62	68	59	58	58	68	64	53	62	59
May	56	61	67	67	62	58	61	72	64	58	64	57
June	61	72	87	83	79	78	72	91	72	81	78	75

Months	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Lasalgaon	Pimpalgaon	Hubli	Mahua	Pune	Kolkata	Ahmedabad
July	84	93	105	95	94	98	94	110	91	95	96	94
August	124	127	127	122	130	139	140	139	121	136	126	132
September	150	140	121	124	138	145	150	125	130	140	133	138
October	154	145	125	125	144	148	149	116	137	141	139	132
November	129	125	128	134	140	131	132	116	138	145	135	133
December	111	109	118	121	120	110	110	110	113	127	126	126

**Table 6. Seasonal Indices of arrivals of Onion in major consuming markets in India (2002-2017)**

Months	Jaipur	Delhi	Bangalore	Chennai	Mumbai	Lasalgaon	Pimpalgaon	Hubli	Mahua	Pune	Kolkata	Ahmedabad
January	86	88	81	103	118	164	141	60	164	129	126	108
February	78	86	63	105	104	140	116	45	251	168	134	105
March	88	108	71	107	118	105	84	52	246	156	93	109
April	88	101	70	90	102	98	106	46	232	113	71	118
May	146	107	73	103	94	116	157	50	165	103	108	98
June	123	111	66	105	95	91	111	46	23	83	96	99
July	122	104	66	108	96	88	100	43	11	78	113	96
August	113	90	77	92	83	79	69	40	12	72	100	83
September	94	83	133	100	87	67	81	87	10	64	91	80
October	89	90	215	91	90	61	60	255	11	69	89	88
November	85	124	172	98	101	67	79	296	17	73	79	107
December	88	109	113	98	112	124	130	180	58	91	99	109

**Source:** National Horticultural Research and Development Foundation (NHRDF)

From the above analysis of prices and arrivals pattern in all the selected markets, it is clear that, in Bangalore, Kolkata, Hubli and Chennai markets, prices are increasing with the increasing arrivals of onion in a few months, whereas in other selected markets, increased arrivals has led to decline in the prices. The positive correlation of the prices and arrivals in Hubli, Bangalore Chennai and Kolkata indicates the operation of more number of traders to purchase the onion for onward trade in other markets of the country. This may be attributed to the fact that in these places, onion is grown in kharif as well as rabi season. In other parts of the country it is grown only during rabi season.

### **Onion prices performance in last two decades**

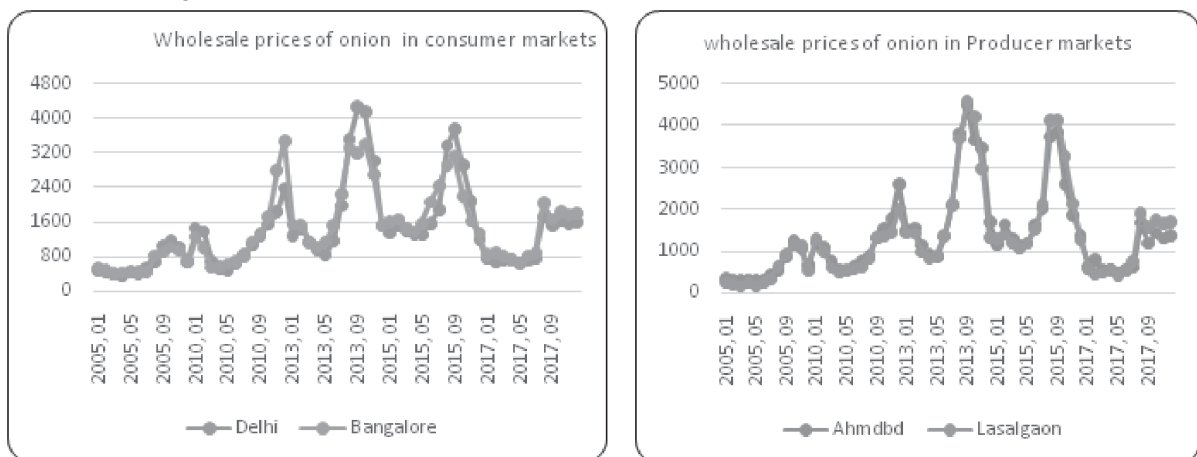
In the recent past, onion is one of the agricultural commodities which is subject to high price fluctuations in major markets in India. In general onion prices follow a typical seasonal pattern in price movement. In addition to that, prices skyrocketed to historical highs in a few years. An in-depth analysis of price movement in onion is discussed below, giving extra emphasis to the years in which prices touched a historical high in the last two decades.

During 1998, the upward movement of the prices of onion commenced and touched a historical high price of Rs.2000 per quintal. In the month of August, the prices started increasing and the trend continued up to December across the major markets in the country. This upward movement of the prices was attributed mainly to estimates of lower onion production and low volumes of produce coupled with delayed and reduced arrivals of fresh kharif crop harvest due to excessive rains. However, prices started declining from December due to improved arrivals and interventions by the government and different agencies through the procurement operations at domestic levels, coupled with regulating the exports to international markets. The exports were curtailed by minimum export price of onion to curb the rising domestic prices. As a result, of these interventions, the prices were moving in the reasonable price range of Rs 300 to Rs.800 per quintal. Again the same pattern of 1998 i.e., surge in the onion prices was repeated during October, 2005 due to the same factors and the prices crossed Rs.1000 per quintal mark in almost all the markets in the country. The main reason for this increase in the prices is delayed sowing of the kharif crop in major producing states (ICAR reports on crop performance). However, the government policy decision of the onion imports changed the upward trend sentiment in the markets and prices started declining. In the year 2005, onion wholesale prices were traded in the range of Rs. 1000 to Rs.1500 per quintal and thereafter on increased arrivals in the major markets and government intervention, prices dropped straight way to Rs. 300 to 500 per quintal during April –May in 2006. However, during this period, the retail prices hovered in the range of Rs. 60-70 per kg in major consuming markets such as Delhi, Bangalore, Jaipur and other markets.

Further analysis revealed that, during the period 2006-10 , onion prices were moving in the range of Rs. 500 to Rs. 1500 per quintal. The phenomenon of skyrocketing of prices observed during 1998 and 2005 was again repeated during 2010 and the magnitude of increase in prices was higher than the previous situation. The prices touched a historical high of Rs. 2500-3000 per quintal in the year 2010.

The main cause of this unconditional rise in prices is attributed to the reports of 10-20 per cent crop damage due to excess rainfall in Maharashtra and Karnataka states and poor market intelligence on crop performance information, which resulted in the limited arrivals in the markets and stock hoarding by the traders in anticipation of the rise in price (CCI Report). This situation created an artificial supply crunch in the market leading to exorbitant spike in the prices of onion in the wholesale and retail markets. But the rise in price was not for a long period of time and within a short period, the prices took a reverse trend and declined to Rs. 500 levels per quintal in April and May. The price trend remained normal in the next two years in the range of Rs, 500-1500 per quintal based on the seasonality factors in 2011 and 2012.

However, in the year 2013, wholesale prices have increased considerably from the lowest point of Rs. 650 to Rs. 4500-5000 per quintal in major markets across the country. The rise in prices was noticed from the month of July and the bullish upward trend continued till November 2013. In 2013, the onion prices have increased uncontrollably to touch the all-time record level of Rs. 5000 per quintal. The same upward and down ward seasonal price movement in the onion prices repeated in the years 2015 and 2017. The reoccurrence of this trend is in regular intervals with a relatively short interval than the previous situation of 1998 and 2006. In both consumer and producer markets the prices of onion rose to new historical heights with marginal difference, during 2010 to 2017 (Figure -1). The main reasons attributed for this rise in prices are excess rainfall in onion growing states, which resulted in crop damage to some extent. In addition, stock hoarding by the traders, short supply of the produce and lower arrivals in the markets and rising export demand were the other major factors contributing to the rise in the prices of onion in recent times in domestic markets. As per the reports of the Competition Commission of India (CCI), another major reason for exorbitant increase in the prices of onion is that, the onion trade in the country is controlled by a few traders leading to monopsony situation. There is also a speculation that, farmers in Maharashtra have resorted to storage of onion in the low cost storage devised by NHRDF. Moreover, the cultivation of onion has expanded to non-traditional states, the acreage of which is highly fluctuating and thus leading to uncertainties in arrivals.



**Figure 1. Wholesale prices of onion in producer and consumer markets**

From the above analysis it is clear that onion prices moved to some extent in tandem with the arrival pattern in the market but also got influenced by exogenous factors such as stock holding by traders and reluctance to reduce the prices on increased arrivals in expectation of earning higher profits. In addition to these factors, however, there is a need to study the other determining fundamental factors as the factors greatly influence the trends in agricultural prices such as area, production and productivity performance, rainfall pattern, commodity exports (MEP and export ban, procurement etc. (Kretschmer, Bowyer and Buckwell 2012). With this discussion an attempt is made to analyze the influence of fundamental factors on the price movement of onion in the country and detail in the following paragraphs.

### **Determinants of price volatility in onion**

#### ***i) APY crop performance in major producing states and in India***

In India, area and production of onion has continuously increased with the positive CAGR growth rate of 4.89 per cent and 6.42 per cent respectively during the period 1980-2015. However, the productivity increased with a lower magnitude of growth rate compared to area and production with increase of 1.46 per cent year on year for the same period. Hence it can be attributed that, increase in production is mainly due to increase in area and marginally supported by growth in productivity. The phenomenal increase in production and area is mainly due to price incentive offered by onion trade. It has also resulted in expansion of area in non- onion production states. But in the years 2009 and 2012 area and production marginally declined at all India level due to the crop damage on excess rainfall. This decline in production estimates supported the bullish sentiment with the decline in arrivals and prices skyrocketed in domestic markets. For the remaining period, despite bumper crop production, the prices increased to higher levels due to speculative holding by the traders in lean period and ever increasing export demand. At the state level also, area, production and productivity of onion has increased significantly in all the selected major onion producing states in India. Despite positive growth trend in area, production and yield, the prices have significantly increased in the recent times which clearly state the presence of the other exogenous factors in the markets which may have been controlling the prices.

#### ***ii) Rainfall pattern***

The analysis of the rainfall pattern impact on crop performance of onion clearly explains that, in the years (2005, 2010, and 2015) excess rainfall received in major onion producing states on standing crop in the months of June-September resulted in lower arrivals during these months. This situation resulted in crop damage to the extent of 20-40 per cent in various states. (ICAR reports). This situation coupled with manipulation in trade practices resulted in price rise to peak levels and touched historical highs in anticipation of the shortage of the produce in the markets. This opportunity was leveraged by the traders to their advantage and they hoarded the stock to create an artificial crunch in the supply for making extra profits.

### **iii) Export of onion**

India is the second largest onion producer in the world, so it exports around 7-10 per cent of its onion to the countries across the world. The exports from India significantly increased manifold from 0.056 million tons in 1950's to 2.46 million tons in the year 2016-17. Correspondingly the export price also increased from Rs.187 per ton to Rs.21,183 per ton during the same period. From the annual export data of onion from India, it is revealed that onion export prices are increasing year on year with increasing export demand and export price of onion sharply increased by 50 per cent in 2013 as compared to the previous year. So here we can conclude that, the rising international demand and price movement have influence on domestic prices of onion. However, by the intervention of the government in terms of setting the Minimum Export Price (MEP) for onion and export trade limits and imports of onion from Pakistan are the few measures that assisted in bringing down the onion prices under control in the domestic markets in India in the recent times.

The increase in MEP has a negative relationship with the price of onion i.e., as the MEP increases, the price of onion declines on increased supply of the produce in domestic markets. The higher Minimum Export Price (MEP) is not a compatible price in the international market as onion export prices of the other major producing countries like China and Egypt are far below the Indian export prices. MEP was fixed at a higher level during 2010 (around \$ 280) and gradually increased to \$ 850 by 2017 to curb the exports and in turn to ensure rising domestic prices and to increase the domestic supply.

### **Conclusion**

In the last two decades, area and production of onion has increased considerably in non-traditional areas under onion cultivation coupled with marginal increase in productivity in Madhya Pradesh, Maharashtra, Punjab, Karnataka, Haryana and Rajasthan taking cues from rising wholesale prices in domestic markets. Time series analysis of prices revealed that wholesale prices have exorbitantly increased and touched a historical high of Rs. 5000-6000 per quintal. This has become a regular phenomenon since 1998. The instability or volatility of the prices are high but sustained only for a short period. Among them the intensity of volatility is high in the case of Pimpalgaon, Delhi, Lasalgaon Ahmedabad, Mumbai and Pune markets as compared to the other markets. In addition to that, in a few markets, positive correlation between arrivals and prices of onion witnessed, clearly indicates the existence of exogenous factors such as more number of traders operating during the harvesting season for hoarding of the stock for onward sale in other markets. Important observation of the price analysis is that, there is a cyclic trend of sudden hike in the prices of onion. Thus there is pressing need not only to curb the exorbitant price rise of onions but by also volatility prescribing the stock holding limit to the traders and by intervention of the government on regulating the export trade by fixing the minimum export price based on supply demand dynamics. There is also a need for strengthening the marketing information system and increasing post-harvest management infrastructure for onion to resolve the issues related to onion supply chain. India, being the world's second largest producer of onion, exports around 7-10 per cent of its total production to various countries across the world. Analysing the direction of the Indian onion trade in the global market, will facilitate further understanding of the impact of export demand on price movement in domestic markets.

## **References**

- Chengappa P.G et al., (2012). Competitive Assessment of Onion Markets in India. Competition Commission of India.
- GoI, (2017). Directorate of Economics and Statistics. <https://eands.dacnet.nic.in/>
- Gummagolmath. K.C. (2012). Trends in Marketing and Export of Onion in India. Research Report 2012-13. National Institute of Agricultural Marketing (NIAM).Jaipur, Rajasthan.
- Kretschmer B., Bowyer C., Buckwell A., (2012). EU Biofuel Use and Agricultural Commodity Prices: A Review of the Evidence Base, Report prepared for Action Aid, Institute for European Environmental Policy, London.
- NHRDF, (2017). National Horticulture Research & Development Foundation. <http://nhrdf.org/en-us/>
- Sohan Premi and B R Premi, (2017). Onion Supply Chain Analysis: Constraints and Way Forward. Rural Pulse, Issue: XXI May-June, 2017. NABARD.