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Price Analysis and Market Integration of Onion Prices in Selected Markets of Maharashtra

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Abstract

Onion is an important vegetable crop of Maharashtra and its prices and arrivals show considerable variation over time. The present study was undertaken to study the seasonal and cyclical variations in onion prices and arrivals and to assess the co-integration among selected onion markets of Maharashtra. Four major markets, namely Ahilyanagar, Lasalgaon, Nagpur and Pune, were selected for the study. The study was based on secondary monthly data on onion prices and arrivals for the period 2005 to 2025. Seasonal indices were estimated using the ratio-to-moving-average method, while cyclical indices were used to examine year-to-year fluctuations. Market integration was examined using the Johansen co-integration test. The results showed a clear seasonal pattern in onion prices in all the selected markets. Price indices were generally higher during August to December and lower during April and May. The highest seasonal price indices were recorded during November in Ahilyanagar, Lasalgaon, Pune and Nagpur. Seasonal variation was also observed in arrivals, with different peak arrival periods across the selected markets. The cyclical analysis showed considerable year-to-year variation in both prices and arrivals. The Johansen co-integration test confirmed the existence of a long-run equilibrium relationship among the selected onion markets. Better storage, market information and coordinated marketing are suggested to reduce the effect of seasonal price fluctuations and improve market efficiency.

Keywords: Seasonal variation, cyclical variation, co-integration, Johansen test

Introduction

Agriculture plays an important role in the Indian economy and provides livelihood to a large number of rural households. Agricultural marketing is equally important because it connects farmers with consumers and helps in price discovery. However, agricultural markets continue to face problems such as seasonal changes in production, inadequate storage, changes in market arrivals and fluctuations in demand and supply. These factors can lead to considerable variation in agricultural prices.

Onion is one of the most important vegetable crops grown and consumed in India. It is used regularly in household consumption as well as in hotels, food processing and other activities. Maharashtra has an important position in onion production and marketing in India. The state has several major onion markets, including Lasalgaon, Pune and other important APMC markets. Lasalgaon is particularly important in onion marketing and has an important role in price formation. Onion prices are known for their frequent fluctuations. The main reasons include changes in production, weather conditions, market arrivals, storage conditions and demand. The problem becomes more serious when a large quantity of onion enters the market during the same period. Farmers with limited storage facilities may be required to sell their produce immediately after harvest, which may result in lower prices.

Seasonal variation is an important feature of onion prices. Prices usually change according to the availability of onion in the market during different months. Earlier studies have also reported that onion prices are generally lower during April and May and higher during the later part of the year. Apart from seasonal variation, onion prices also show year-to-year fluctuations. These cyclical movements may be associated with changes in production, weather conditions, supply, storage and demand. Understanding these movements is useful for farmers, traders and policymakers.

Another important issue in agricultural marketing is market integration. When markets are integrated, price information is transmitted between markets and prices tend to move together over the long run. Market integration is therefore important for efficient agricultural marketing because it provides better price discovery and reduces the possibility of large price differences between markets.

Therefore, the present study was undertaken to analyse seasonal and cyclical variations in onion prices and arrivals and to examine the long-run relationship among selected onion markets of Maharashtra.

Objectives

The study was undertaken with the following objectives:

1. To study seasonal and cyclical variations in arrival and prices of onion.
2. To assess the co-integration among selected markets of onion in Maharashtra.

Methodology

The study was based on secondary data on monthly average prices and arrivals of onion collected for four major

Agricultural Produce Market Committees (APMCs) of Maharashtra, namely Lasalgaon, Pune, Ahilyanagar and Nagpur. The selected markets were identified on the basis of their importance in onion arrivals. Monthly time-series data covering the period from January 2005 to December 2025 were used for the analysis. The required data were obtained from the Agmarknet website.

The collected data were analysed using EViews 12 statistical software, and the results were presented in tabular form for interpretation. Seasonal variations in onion prices and arrivals were examined by estimating seasonal indices using the moving average method. The cyclical movements in the series were studied using the residual method. Further, the long-run relationship among onion prices in the selected markets was examined using Johansen's multiple co-integration test to determine whether the selected markets were integrated or not.

Results and Discussion

Seasonal variation in onion prices

The seasonal indices of onion prices for the selected markets are presented in Table 1.

Table 1: Seasonal indices of onion prices for selected markets

Sr. No	Month	Ahilyanagar	Lasalgaon	Nagpur	Pune
1	Jan	105.23	103.39	97.36	103.84
2	Feb	85.67	86.42	102.60	97.42
3	Mar	62.88	62.98	75.77	72.69
4	Apr	52.33	52.15	82.35	59.01
5	May	54.87	54.40	75.27	57.47
6	Jun	76.55	74.84	85.26	74.86
7	Jul	86.91	87.02	101.34	83.29
8	Aug	114.91	115.38	111.46	101.01
9	Sept	127.60	130.66	116.25	113.04
10	Oct	143.11	148.85	106.99	129.70
11	Nov	151.67	152.70	126.03	168.10
12	Dec	138.25	131.17	119.28	139.53

The seasonal analysis showed that onion prices were generally higher from October to January, while lower seasonal indices were observed during April and May. The

lower prices during these months were associated with increased arrivals after harvest and higher market supply.

4.2 Seasonal variation in onion arrivals

The seasonal indices of onion arrivals are presented in Table 2.

Table 2: Seasonal indices of onion arrivals for selected markets

Sr. No	Month	Ahilyanagar	Lasalgaon	Nagpur	Pune
1	Jan	98.47	130.59	104.90	122.16
2	Feb	99.39	127.79	113.12	146.36
3	Mar	104.57	98.80	101.51	153.45
4	Apr	76.02	92.35	112.50	90.06
5	May	95.45	114.27	113.81	92.54
6	Jun	126.79	112.58	111.19	81.24
7	Jul	133.19	116.54	89.65	86.11
8	Aug	122.52	103.76	73.31	86.89
9	Sept	96.37	88.26	77.27	81.77
10	Oct	78.02	69.20	84.22	87.73
11	Nov	72.12	53.19	100.90	77.14
12	Dec	97.03	92.63	117.57	94.52

The highest seasonal arrival indices were recorded during January to March in the Lasalgaon, Nagpur and Pune market. In case of Ahilyanagar peak arrival were recorded during June to August. Conversely, lower arrival indices were observed from September to November, representing

the lean supply season. In the case of Ahilyanagar and Lasalgaon, comparatively higher arrivals were also noticed during June to August.

Cyclical variation in onion prices

Table 3: Cyclical indices of onion prices for selected markets

Sr. No	Year	Ahilyanagar	Lasalgaon	Nagpur	Pune
1	2005	75.29	113.90	40.15	436.93
2	2006	102.99	127.05	68.63	271.51
3	2007	80.19	116.46	98.59	170.23
4	2008	129.94	94.67	34.69	111.84
5	2009	142.61	139.99	58.52	111.01
6	2010	118.07	93.52	60.49	75.70
7	2011	77.47	76.03	38.36	82.90
8	2012	84.80	103.46	79.09	77.61
9	2013	71.77	65.53	50.36	45.99
10	2014	96.11	58.29	98.25	64.74
11	2015	87.49	84.74	96.88	59.88
12	2016	116.65	92.29	104.92	77.2
13	2017	118.18	139	87.51	73.23
14	2018	116.52	95.52	99	71.55
15	2019	93.67	81.96	63.96	63.06
16	2020	74.39	91.66	49.04	45.95
17	2021	98.33	110.95	215.61	49.58
18	2022	107.56	110.97	186.69	53.23
19	2023	116.99	128.96	220.42	60.96
20	2024	100.85	69.62	249.31	53.17
21	2025	90.06	105.34	286.07	43.61

The table shows that cyclical analysis showed fluctuations in onion prices over the study period. Higher price indices were observed mainly during 2007, 2009, 2010, 2013 and 2015, while lower price indices were observed during 2006,

2008, 2012, 2016, 2018, 2022 and 2023. Onion arrivals were observed throughout the year, but their intensity varied across markets.

Cyclical variation in onion arrivals

The cyclical indices also showed considerable variation in onion arrivals among the selected markets.

Table 4: Cyclical variation of onion arrivals for selected markets

Sr. No	Year	Ahilyanagar	Lasalgaon	Nagpur	Pune
1	2005	75.29	113.90	40.15	436.93
2	2006	102.99	127.05	68.63	271.51
3	2007	80.19	116.46	98.59	170.23
4	2008	129.94	94.67	34.69	111.84
5	2009	142.61	139.99	58.52	111.01
6	2010	118.07	93.52	60.49	75.70
7	2011	77.47	76.03	38.36	82.90
8	2012	84.80	103.46	79.09	77.61
9	2013	71.77	65.53	50.36	45.99
10	2014	96.11	58.29	98.25	64.74
11	2015	87.49	84.74	96.88	59.88
12	2016	116.65	92.29	104.92	77.2
13	2017	118.18	139	87.51	73.23
14	2018	116.52	95.52	99	71.55
15	2019	93.67	81.96	63.96	63.06
16	2020	74.39	91.66	49.04	45.95
17	2021	98.33	110.95	215.61	49.58
18	2022	107.56	110.97	186.69	53.23
19	2023	116.99	128.96	220.42	60.96
20	2024	100.85	69.62	249.31	53.17
21	2025	90.06	105.34	286.07	43.61

The cyclical indices presented in Table 4 indicate year-to-year fluctuations in onion arrivals across the selected markets. Higher cyclical indices were observed during 2021, 2022 and 2023, suggesting comparatively greater arrivals in these years. In case of Pune market recorded relatively higher arrivals during 2005 to 2009. On the other hand, lower arrivals were noticed in 2011, 2014 and 2015, reflecting comparatively lower market supplies during those years.

Market Co-integration

The Johansen co-integration test was used to examine whether the prices of Ahilyanagar, Lasalgaon, Nagpur and Pune markets moved together in the long run. The results confirmed the existence of a long-run equilibrium relationship among the selected onion markets. This indicates that the markets are co-integrated.

Table 5: Result of multiple co-integration analysis of onion prices for the selected markets

Hypothesized No of CE (s)	Eigen value	Trace statistic	0.05 Critical value	Prob **	No. of Co-integrating Equation CE (s)
None*	0.2501	170.06	47.8561	0.00	4
At most 1*	0.2154	98.077	29.7970	0.00	
At most 2*	0.1229	37.429	15.4947	0.00	
At most 3*	0.0183	4.629	3.8414	0.0314	

(Note: * denotes rejection of the hypothesis at the 0.05 level)

Conclusion

The seasonal pattern of onion prices indicated that prices remained comparatively higher during the lean supply months in the selected markets, while lower prices were observed during the peak arrival period. Cyclical fluctuations were evident in the onion price series of the selected markets, with higher prices recorded during 2007, 2009, 2010, 2013 and 2015, whereas lower prices were observed during 2006, 2008, 2012, 2016, 2018, 2022 and 2023. The arrival pattern showed a distinct peak period from January to March, when onion arrivals were maximum in the selected markets, while arrivals declined considerably during the lean period from September to November, resulting in noticeable price fluctuations. Cyclical movements were also observed in market arrivals, indicating periodic changes in the quantity of onion supplied to the selected markets over the study period. The Johansen Co-integration Test confirmed the existence of a long-run equilibrium relationship among the onion prices of Ahilyanagar, Lasalgaon, Nagpur and Pune markets, indicating that these markets are co-integrated.

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