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Assessment of Co-Movement of Kinnow Prices among the Domestic Markets in Punjab

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Abstract

The study attempts to analyse the weekly co-movement of kinnow prices among the domestic markets in Punjab from 2005-06 to 2019-20. The data set covers peak period of market arrivals of kinnow that is from October to March of each year. To meet the objectives, instability was measured by CDVI which was in different weeks for all selected markets. According to seasonality index, farmers received more than the average price between 11th and 16th weeks of the year 2005-06 to 2019-20. Correlation analysis showed that markets moved together and were well integrated. The price series in the selected markets were stationary and unrestricted. Co-integration test indicated that kinnow prices in the selected markets had long run relationship with each other. Abohar market was found to be the key market which influenced the price of the other selected markets.

Keywords: Domestic market, Kinnow, Stationarity, Instability, Integration

JEL Classification: C21, C23, C32

Introduction

Fruits play an important role in the agricultural economy of India. India has a wide range of agro-climatic conditions, which allow the production of a variety of tropical and subtropical fruits. Fruits are rich source of vitamin and have high nutritional value. An increasing trend in population and changing consumer behaviour towards a more balanced diet has increased the demand for fruits. Among the major fruits of India, citrus fruits rank third in production after banana and mango and is cultivated over an area of near about 1003 thousand ha with a production of 12546 thousand metric tonnes. Maharashtra, Karnataka and Punjab are the leading citrus fruit producing states of the country. In Punjab, citrus occupies 57.28 thousand ha with annual production of 12.82 lakh metric tonnes. Among citrus, kinnow is popular crop in northern part of India. The total kinnow production in India was 5101 thousand tones, out of which 62 per cent was produced in Punjab during 2018-19. Kinnow fruit is mostly grown in Fazilka, Hoshiarpur, Bathinda and Sri Muktsar Sahib which accounts for more than 80 per cent of area under kinnow cultivation in Punjab (Anonymous, 2019).

In a market driven economy, the pricing mechanism is expected to transmit order and directions to determine the flow of marketing activities. Pricing signals guide production, consumption and marketing decisions over time, form and place (Kohls and Uhl, 1998). Identifying the causes of price differences in inter-regional or spatial markets has therefore become an important economic analytical tool to understand the markets. There are several impediments to the efficient functioning of the markets in developing economies like India. One way to throw some light on this issue is to analyse the market performance by studying market integration. Integrated markets are those where price signals are transferred from one to another, allowing physical arbitrage to adjust any disturbances in these markets; integrated market are thus a sign of efficiency. Spatial market integration refers to the co-movement of prices and/or flows between them. More, generally, it also refers to the smooth transmission of price signals and

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information across spatially separated markets. Market integration can also be defined as a measure of the extent to which demand and supply shocks in one location are transmitted to other locations (Negassa *et al*, 2003). However, temporal market integration refers to the arbitrage across period of time i.e. where the price signal are transmitted from previous year to next year within the same market (Goletti *et al* 1995).

If markets are not well integrated, this often indicates the presence of either government policies or infrastructural and institutional bottlenecks that interfere with the efficient flow of goods and prices between markets. With market reforms, market integration is expected to increase, reflecting a more rapid and effective transmission of price signals between markets.

Data Sources and Methodology

Kinnow generally arrives in the market from October to March every year. To analyse the co-movement of weekly prices, the secondary data of weekly kinnow prices of the various markets were collected from portal of Ministry of Agriculture and Farmers Welfare, Government of India. Four markets were chosen purposively on the basis of annual market arrivals of Punjab *viz*. Abohar, Hoshiarpur, Amritsar, and Ludhiana. Abohar and Hoshiarpur markets are considered as kinnow producing markets whereas Amritsar and Ludhiana markets are the two big consuming and distributing markets in the state. The data set covers peak period of kinnow arrivals i.e. October, November, December, January, February and March for years 2005-06 to 2019-20.

Following analytical tools were employed to analyse the data:

Instability Analysis

Instability index was used to examine the extent of variation and risk involved in prices. It was measured by Cuddy-Della Valle Index (Cuddy and Della Valle 1978; Anuja *et al.*, 2013). CDVI is a modification of CV which de-trends and shows the exact direction of the instability.

$$CDVI = CV\sqrt{1-r^2}$$

where, CV is the coefficient of variation in per cent, and r^2 = Coefficient of determination from a time trend regression adjusted to its degrees of freedom.

The ranges of CDVI: Low instability: 0-15, Medium instability: 15-30 and High instability: >30 (Sihmar, 2014).

Seasonality index

Seasonality was estimated from average weekly data on prices as daily data for several years were first converted into a weekly index using April as base month in every year. This partially removed the over-time trend in the data if there was any. Weekly averages over the years were taken, and then seasonality was estimated as follows;

$$S_i = \frac{(I_h - I_l)}{I_l} * 100$$

where, = Highest average monthly index value= Lowest average monthly index value

Stationarity test

Markets are considered to be integrated when long term equilibrium exits between them. However, price series need to be stationary to establish such relationship. In the absence of stationarity, the estimated relationship may be spurious without any significant meaning. Therefore, the first step in the time series analysis is to examine the stationarity of each individual time series selected. The Augmented Dickey-Fuller (ADF) unit root test (Dickey and Fuller, 1979) was considered to examine the stationarity. The test is conducted by augmenting the preceding three equations by adding the lagged values of the dependent variable. The ADF test here consists of estimating the following regression;

$$\Delta P_t = \alpha_0 + \delta_1 t + \beta_1 P_{t-1} + \sum_{j=0}^{q} \beta_1 \Delta P_{t-j} + \varepsilon_t$$

where, $\Delta P_t = P_t - P_{t-1}$, $\Delta P_{t-1} = P_{t-1} - P_{t-2}$, $\Delta P_{n-1} = P_{n-1} - P_{n-2}$ etc; P = the price in each market; α_0 = constant or drift; t = time trend variable; q = number of lag length selected based on Schwartz information criterion (SIC); pure white error term. The test for a unit root in the price series is carried out by testing the null hypothesis that β_1 (coefficient of P_{t-1}) is zero. The alternative hypothesis is thats β_1 less than 0. A non-rejection of the null hypothesis suggests that the time series under consideration is non-stationary.

Johansen's Co-integration method

Johansen and Juselius (1990) developed co-integration test to test the long-term relationship between the variables. It means even if two or more series are non-stationary, they are said to be co-integrated if there exists a stationary linear combination of them. After establishing that the price-series were stationary at the level or at same order of differences, the maximum likelihood (ML) method of co-integration was applied to check to test the number of co-integrating vectors. The null hypothesis of atmost 'r' co-integrating vectors against a general alternative hypothesis of 'r+1' co-integrating vectors is tested by trace statistics (Johansen 1989).

Trace statistic (λ - trace) = $-T\sum_{i=r+1}^{n}\ln(1-\lambda i)$

Maximum Eigen value statistic (λ -max) = $-T\ (1 - \lambda r + 1)$

λ_i are the estimated Eigen values obtained from the Π markets and T is the number of observations. The number of co-integrating vectors indicated by the tests is an important indicator of the extent of co-movement of prices. An increase in the number of co-integrating vectors implies an increase in the strength and stability of price linkages.

Vector Error Correction Model for short-term relationship

The co-integration analysis reflects the long-run movement of two or more series, although in the short-run they may drift apart. Once the series are found to be co-integrated, then the next step is to find out the short run relationship along with the speed of adjustment towards equilibrium using error correction model, represented by equations:

$$\Delta\, lnX_t = \alpha_0 + \sum \beta_{1i}\,\Delta lnY_{t-i} + \sum \beta_{2i}\,\Delta lnX_{t-i} + \gamma ECT_{t-1}$$

$$\Delta\, lnY_t = \beta_0 + \sum \alpha_{1i}\,\Delta lnX_{t-i} + \sum \alpha_{2i}\,\Delta lnY_{t-i} + \gamma ECT_{t-1}$$

Where, ECT_{t-1} is the lagged error correction term; X_t and Y_t are the variables under consideration transformed through natural logarithm; X_{t-i} and Y_{t-i} are the lagged values of variables X and Y. The parameter γ is the error correction coefficient that measures the response of the regressor in each period to departures from equilibrium. The negative and statistically significant values of γ depict the speed of adjustment in restoring equilibrium after disequilibria and if it is positive ad zero, the series diverges from equilibrium.

Granger causality test

In order to know the direction of causation between the markets, Granger causality test was employed (Granger, 1969). When co-integration relationship is present for two variables, a Granger causality test can be used to analyze the direction of this co-movement relationship. Granger causality tests come in pairs, testing weather variable X_t Granger-causes variable Y_t and vice versa. All permutations are possible *viz.*, univariate Granger causality from X_t to Y_t or from Y_t to X_t, bivariate causality or absence of causality. The Granger causality test estimates the following unrestricted equation:

$$lnX_t = \sum_{i=1}^{m}\alpha_i\, lnX_{t-i} + \sum_{j=1}^{m}\beta_j ln\, Y_{t-j} + \varepsilon_{1t}$$

$$lnY_t = \sum_{i=1}^{m}\alpha_i\, lnY_{t-i} + \sum_{j=1}^{m}\beta_j ln\, X_{t-j} + \varepsilon_{2t}$$

Where, X and Y are two different market prices series; ln stands for price series in logarithm form; t is the time trend variable. The subscript stands for the number of lags of both variables in the system. The null hypothesis in both equations is a test that lnX_t does not Granger cause lnY_t. In each case, a rejection of the null hypothesis will imply that there is Granger causality between the variables (Gujarati, 2010).

Impulse Response Function

An impulse-response function can also be used to obtain additional information about the dynamic interrelationships among prices. This concept has been used to analyse the impact of price shocks and the way in which shocks were transmitted among market prices. It is based on the foundation that the economy's dynamic behaviour can be well explained by random impulses generated over time by a constant linear structure. The impulse response function traces the effect of one standard deviation or one unit shock to one of the variables on current and future values of all the endogenous variables in a system over various time horizons (Rahman and Shahbaz, 2013). Generalized impulse response function (GIRF), originally developed by Koop *et al*. (1996) and suggested by Pesaran and Shin (1998) was used. The GIRF of an arbitrary current shock and history given in Equation for n = 0, 1, 2…..

$$GIRF\ Y\,(h,\delta,w_{t-1}) = E[Y_t + h \mid w_{t-1}]$$

Variance Decomposition

To identify the price triggers in major influencing markets, variance decomposition technique was applied. It separates the variation in an endogenous variable into the shocks to the variables in VAR and provides information about the relative importance of each random variable in affecting the variables in the VAR. It provides information about the relative importance of each random innovation i.e. price change in one market in affecting the variables in the vector auto-regression i.e. price changes in other markets.

Impulse responses trace out the moving average of the system, i.e. they describe how responds to a shock in; variance decomposition measures the contribution of to the variability of; the historical decomposition describes the contribution of shock to the deviations of from its baseline forecasted path (Canova, 2011).

Results and Discussion

Seasonality and instability analysis

Instability and seasonality of the kinnow prices in the selected markets has been presented in Table 1. The Maximum value of CDVI was observed in different weeks for all selected markets i.e. 9th week for Abohar, 47th week for Amritsar, 16th week for Hoshiarpur and 43rd week for Ludhiana market.

Table 1. Instability and seasonality of Kinnow prices in the selected markets

Week	Abohar			Hoshiarpur			Amritsar			Ludhiana		
	CV	CDVI	SI	CV	CDVI	SI	CV	CDVI	SI	CV	CDVI	SI
1	26.08	22.68	0.89	25.11	20.39	0.87	31.71	21.22	0.83	16.44	6.28	0.84
2	26.78	22.78	0.84	30.96	17.06	0.88	30.36	22.88	0.89	21.07	10.97	0.84
3	26.13	24.29	0.88	30.87	28.29	0.90	28.91	22.14	0.89	23.63	16.88	0.86
4	30.69	28.45	0.87	37.37	29.88	0.90	23.04	16.93	0.93	25.49	18.85	0.87
5	30.77	28.58	0.87	30.72	23.61	0.88	31.71	21.44	0.92	21.38	14.83	0.84
6	34.70	34.54	0.90	36.84	32.01	0.90	29.59	25.81	0.90	27.79	20.01	0.86
7	27.08	26.06	0.93	38.84	32.03	0.93	28.77	24.94	0.91	26.66	21.36	0.86
8	34.69	34.27	0.95	33.19	26.44	0.88	35.00	32.91	1.08	31.25	26.63	0.91
9	35.83	35.83	0.96	37.83	35.50	1.02	32.12	31.28	1.12	24.42	18.11	0.88
10	34.93	29.30	0.98	40.40	40.02	1.11	35.43	32.61	1.13	36.67	34.60	0.97
11	31.70	27.69	1.08	38.46	38.45	1.13	27.27	23.98	1.12	38.97	38.48	1.04
12	31.39	25.82	1.10	41.45	41.37	1.24	26.71	25.96	1.31	33.58	33.42	1.11
13	33.46	16.43	1.29	33.76	30.91	1.40	27.98	27.93	1.30	45.79	45.69	1.26
14	25.86	20.69	1.55	32.23	29.66	1.55	31.56	29.61	1.54	46.41	45.62	1.31
15	21.45	14.31	1.54	34.85	31.84	1.64	31.06	28.45	1.56	45.84	42.62	1.45
16	24.43	15.65	1.46	46.98	46.97	1.47	27.83	27.62	1.22	40.37	31.05	1.49
42	36.48	29.49	0.96	45.45	35.39	0.93	38.84	37.76	0.81	52.04	45.55	1.25
43	40.91	32.56	0.86	47.24	31.08	0.87	25.25	25.24	0.82	54.47	46.39	1.23
44	29.49	20.07	0.82	42.99	28.47	0.87	19.78	19.30	0.78	51.96	36.21	1.10
45	27.51	26.08	0.92	39.91	33.01	0.81	31.46	21.62	0.90	61.98	45.84	0.92
46	28.36	27.76	0.90	38.12	19.68	0.85	28.98	17.43	0.85	27.15	14.43	0.86
47	19.44	16.26	0.93	42.17	24.10	0.82	38.35	38.35	0.75	25.85	18.42	0.85
48	21.04	20.53	0.93	36.87	16.30	0.76	35.72	26.98	0.96	20.15	9.53	0.92
49	27.04	23.29	0.92	37.84	16.45	0.80	23.94	22.51	0.88	22.36	9.86	0.90
50	24.92	17.85	0.90	26.49	11.83	0.88	14.87	13.48	0.88	21.84	9.63	0.89
51	19.55	13.53	0.90	24.96	9.72	0.89	14.67	14.65	0.88	20.42	8.44	0.84
52	20.45	16.09	0.89	24.02	13.55	0.85	29.61	27.87	0.85	19.49	9.71	0.84

Note: CV-Coefficient of Variation (%), CDVI- Cuddy-Della Valle index and SI-Seasonality Index

Table 2. Correlation coefficients of weekly kinnow prices between selected markets

Markets	Abohar	Hoshiarpur	Amritsar	Ludhiana
Abohar	1.000			
Hoshiarpur	0.551*	1.000		
Amritsar	0.456*	0.507*	1.000	
Ludhiana	0.429*	0.657*	0.373*	1.000

*Note: *indicates significance at 5% level of significance*

Minimum value of CDVI was in 51st week for Abohar and Hosiharpur, 50th week for Amritsar and 1st week for Ludhiana. Between 11th to 16th weeks, seasonality index was greater than one for all the markets which indicates that farmer's received more than the average price during the period (2005-06 to 2019-20).

Correlation analysis

The results pertaining to correlation analysis of weekly prices of kinnow in the selected markets has been presented in Table 2. The correlation coefficients between the markets were significant and ranged from 0.373 to 0.657. This showed that kinnow prices in these markets moved together and were well integrated meaning the price differential in these markets was not more than transportation cost, implying they were efficient markets.

Augmented Dickey-Fuller test (ADF)

As correlation analysis provides only rough estimates on price movements, the integration of markets was further analysed using advanced econometric techniques. To avoid spurious results there was a need to check whether the variables were stationary or not. The ADF based unit root test procedure was applied to check whether the price series was stationary at their level, followed by their differences. The results presented in Table 3 indicated that these series were non-stationary at their level. Similarly, by taking the first difference, price series become stationary as t-statistic value for all the markets were significant.

Further to establish the long-run equilibrium relation among the price series, it was necessary to co-integrate them. Co-integration among the variables in turn requires checking the order of integration among the variables and variables cannot be integrated in the presence of unit root. And the result indicated that the series was free from consequences of unit root which means we can proceed with co-integration.

Johansen co-integration test

Johansen co-integration test was used to analyse the integration among selected markets and the estimated results has been presented in Table 4. Unrestricted co-integration rank test (Eigen value and trace statistic) indicated the presence of at least four co-integrating equations at 5% level of significance. This indicated that kinnow prices in the selected market were having long run equilibrium and also implies strength and stability of price linkages between selected markets.

Vector Error Correction Model

Vector Error Correction Model (VECM) was employed to know the speed of adjustments among the markets for long run equilibrium among the selected markets. As all the selected markets were integrated in the long run, it becomes important to study the short

Table 3. Results of the ADF test

Markets	At first difference		
	t statistic	p value	Stationarity
Abohar	-5.920	0.000	Stationary
Hoshiarpur	-5.100	0.000	Stationary
Amritsar	-6.724	0.000	Stationary
Ludhiana	-4.263	0.001	Stationary

Table 4. Johansen co-integration test of wholesale price variation- four regional kinnow markets

Null hypothesis	Eigen Value	Trace Statistic	p value
None *	0.162	140.035	0.000
At most 1 *	0.134	88.360	0.000
At most 2 *	0.091	46.342	0.000
At most 3 *	0.060	18.298	0.000

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

run and long run equilibrium among the markets. The number of lags in the VECM was taken to be two as the Akaike Information Criterion (AIC) was lowest at this order (2) in the system for all the selected markets i.e., Abohar, Amritsar, Hoshiarpur and Ludhiana.

The error correction term indicates the speed of adjustment among the variable before converging to equilibrium in the dynamic model. The negative and statistically significant values of error correction term in all selected markets depict the speed of adjustment in restoring equilibrium after disequilibrium.

Equations of Vector Error Correction Model (VECM) of the selected markets

$\Delta ln\ Abohar_t = -0.047ECT_{t-1} + 0.252\Delta\ ln\ Amritsar_{t-1} + 0.186\Delta lnAmritsar_{t-2}$

$\Delta\ ln\ Hoshiarpur_t = -0.043ECT_{t-1} - 0.279\Delta ln\ Hoshiarpur_{t-1}\ 0.158\Delta\ ln\ Hoshiarpur_{t-2} + 0.251\Delta Abohar_{t-2} + 0.169\Delta\ ln\ Amritsar_{t-1} + 0.284\Delta\ ln\ Amritsar_{t-2}$

$\Delta\ ln\ Amritsar_t = -0.262ECT_{t-1} + 0.254\ \Delta\ Abohar_{t-1} + 0.115\ \Delta\ ln\ Hoshiarpur_{t-2}$

$\Delta\ ln\ Ludhiana_t = -\ 0.118ECT_{t-1} - 0.156\ \Delta\ ln\ Ludhiana_{t-1} + 0.154\Delta\ ln\ Hoshiarpur_{t-1}$

It has been observed that when Abohar and Hoshiarpur markets were considered to be dependent on the other markets, the speed of adjustment was very low (approximately 4%). This was probably due to the presence of unidirectional relationships of the market and its characteristic as producing market. However, when Amritsar and Ludhiana markets were considered to be dependent, the speed of adjustment was high (26% and 12%) which means the chances of correction of any disequilibriumwere high in these markets.The prices of all the kinnow markets were influenced by their own weekly lags for long run equilibrium.

Granger Causality test

The result of casual relationship between the prices series was approached through Granger Causality technique presented in Table 5 and Figure 1.

Among the selected kinnow markets, the price of Abohar market showed bidirectional causality transmission with price of Amritsar market. Abohar market also influenced the prices of Hoshiarpur and Ludhiana markets which shows the unidirectional relationship between them. The prices of Hoshiarpur and Amritsar markets unidirectionally influenced Ludhiana market prices. Among these, Abohar market has been found to be a key market which influenced the crop price in all other selected markets.

Impulse Response Function

From the Granger Causality test, Abohar market was identified as the key market. So, further response of other markets to change in Abohar market prices was interpreted with the help of Impulse Response Function and Variance Decomposition. Figure 2 showed the results of Impulse Response Function. Impulse Response Function describe how much and to what extent a standard deviation shock in one of the market affects prices in all integrated markets over a period of 10 weeks. When standard deviation shock was given to Abohar market, an immediate and a high response was noticed in all other markets. Amritsar market reached peak at second week, Hoshiarpur reached peak at third week after declining for first two weeks and Ludhiana market reached peak at fifth week. After attaining peaks in their respected weeks, they all started declining. The response kept declining but remained positive for other markets except Amritsar market where itkept declining and reached negative. This shows that if a shock is arising in Abohar market it gets transmitted to all other markets with a higher response in the approaching weeks.

Variance Decomposition

The variance decomposition indicates the amount of information each variable contributes to

Table 5. Results of Granger causality test of selected kinnow markets

Null Hypothesis:	Obs	F-Statistic	Prob.
AMT does not Granger Cause ABH	295	3.139	0.045
ABH does not Granger Cause AMT		4.200	0.016
HOS does not Granger Cause ABH	295	1.537	0.217
ABH does not Granger Cause HOS		2.479	0.086
LUD does not Granger Cause ABH	295	0.058	0.943
ABH does not Granger Cause LUD		9.765	0.000
HOS does not Granger Cause AMT	295	1.419	0.244
AMT does not Granger Cause HOS		2.214	0.111
LUD does not Granger Cause AMT	295	1.239	0.291
AMT does not Granger Cause LUD		16.325	0.000
LUD does not Granger Cause HOS	295	0.526	0.592
HOS does not Granger Cause LUD		22.888	0.000

Note: ABH-Abohar, AMT-Amritsar, HOS-Hoshiarpur and LUD-Ludhiana

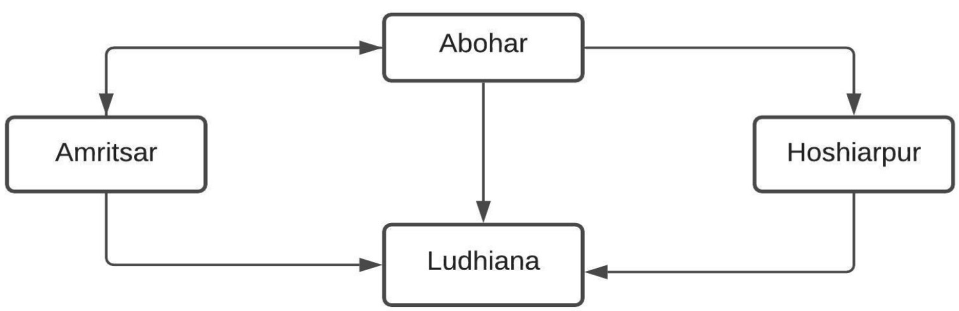

Figure 1. Relationship between the selected markets

the other variables that is how much of the forecast error variance of each variable can be explained by exogenous shocks to the other variables. Table 6 indicated that in short run 100 percent of forecast error variance in Abohar was explained by the variable itself which means other variables in model do not have any strong influence in the market. The other markets have strong exogenous impact i.e. they will not influence Abohar at all in short run. Even in the second period, influences from the other markets were low meaning these variables exhibit strong exogeneity and has weak influence in other markets in future. In the long run 92.93 percent of forecast error variance of Abohar market was explained by market itself. So, Abohar was showing strong influence right from the short to long run period. Although, the influence in other markets was also rising but remained weak overall.

Conclusion and Policy Implications

The prices of agricultural commodities fluctuate in accordance with their supply and demand situation which, in turn is characterised by seasonality of production and marketing. Citrus occupies a place of importance in the fruit wealth and economy of the India. It has been found that maximum value of CDVI was in different weeks for all selected markets. Between 11th to 16th weeks of years 2005-06 to 2019-20, seasonality index was greater than one for all the markets which indicates that price duty during this period was more than the average price during overall. Correlation analysis showed that markets moved together and were well integrated. The price series in the selected markets were stationary and unrestricted co-integration test indicated that kinnow prices in the selected markets had long run relationship. The speed of adjustment

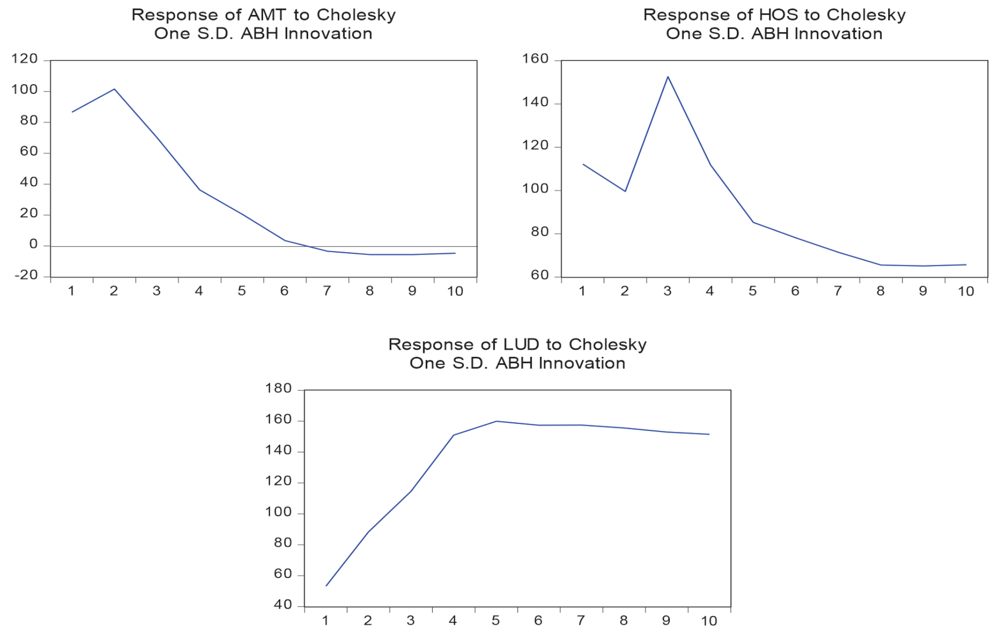

Figure 2. Response of other markets to change in prices of Abohar market

Table 6. Variance decomposition of kinnow prices in Abohar market

Period	S.E.	Abohar	Hoshiarpur	Amritsar	Ludhiana
1	264.98	100.00	0.00	0.00	0.00
2	360.59	98.64	0.31	0.97	0.09
3	428.99	96.96	0.22	1.78	1.04
4	477.69	96.50	0.19	1.44	1.87
5	516.85	95.90	0.16	1.29	2.65
6	550.52	95.18	0.15	1.36	3.31
7	580.56	94.47	0.15	1.54	3.84
8	608.30	93.85	0.15	1.74	4.26
9	634.76	93.34	0.15	1.92	4.59
10	660.19	92.93	0.15	2.07	4.85

was low in Abohar and Hoshiarpur markets and high in Amritsar and Ludhiana markets. Granger causality revealed that Abohar market was the key market which influenced the price of the other selected markets. When standard deviation shock was given to Abohar market, an immediate and a high response was noticed in all other markets. After attaining peaks in their respected weeks, they all started declining and Amritsar market reached negative. The variance decomposition revealed that Abohar was showing strong influence right from the short run to long run period into the future. Although, the influence in other markets was also rising but remained weak overall.

In concluding suggestions, authors suggests that for controlling variation in selected markets, the prices and arrivals of key market (Abohar) could be monitored on a regular basis. The price signals in Abohar were quickly transmitted to other markets and vice versa, therefore, the network of markets should be well designed to control the price fluctuations. There should be accurate transmission of price signals in the market which will improve the marketing performance hence help in integrating markets between different regions.

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