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TESTING MARKET INTEGRATION OF LEADING CROPS IN BANGLADESH

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ABSTRACT

This is a study of functioning of selected commodity markets in terms of price relationship to each other. Spatial price integration has been assessed for crops viz. Aman (HYV), Boro (HYV), wheat, mustard and lentil in selected districts firstly, by one to one correlation matrix and secondly by the Augmented Dickey-Fuller co-integration test. District-wise market prices of the crops were collected from the Department of Agricultural Marketing (DAM) for the period of 1986-2005. Aman HYV markets were well integrated but the Boro HYV markets were not well integrated. Wheat markets were not all (48 percent) interdependent in price formations but peak prices season flour markets became largely integrated. Out of 21 paired markets, only 7 paired markets were integrated for unprocessed lentil and 10 paired markets were integrated after processing. Seventeen market pairs are significantly correlated during harvest season of mustard (whole). And all the correlation coefficients appeared significant for mustard oil. Markets were more inter-linked during the period of scarcity and more integrated for processed primary products. Level of market integration has improved than any time before the study period. Integrated markets in general imply policy formulation at macro level will be effective throughout all trading markets. But extent of market integration of the same commodity during harvest time and pre-harvest season and segmented any particular region has to be taken into consideration for fine tuning of agricultural policies attaining more success.

1. INTRODUCTION

The economy of Bangladesh is growing in the sense of increased production and marketing facilities. Efficiency should be attained not only in production activities but also in marketing of the produce as to ensure fair returns to the growers. Rice and wheat are major food crops which help men to survive providing protein and essential nutrients. Lentil is the main pulse crop which is the main source of plant protein. Mustard is the important oil crop. Mustard oil plays an important role as a fat substitute in our daily diet. Growth of production is not enough to sustain overall development unless markets for distribution of inputs and produce work efficiently and simultaneously.

The basic objective of the price policy is to safeguard the interests of producers and consumers. The producer's interest can best be safeguarded if he is paid appropriate price for his produce. He gets fair prices if markets are well integrated. Marketing margins of the middlemen in the value chains depend whether commodity markets are integrated or not. In well integrated markets (separated by space), middlemen's share of margin should be reasonable and consumers get produce at fair prices. So it is very important to understand

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whether commodity markets function efficiently. Markets function efficiently when these are integrated in price relationships. It is imperative to see whether infrastructural and technological development in communication system has improved the functioning of commodity markets.

In a competitive market with free flow of information, the price differences between any two regions (or markets) will be equal to or less than transfer costs between the two markets. Then `law of one price' should work in all markets and markets are said to be integrated. Spatially price differentials for a particular commodity arising from place differences would correspond closely to the costs incurred in providing the respective transportation facilities. In integrated markets, they will perform efficiently and there will be no scope for traders to make excessive profits by arbitrage.

If there are imperfections in the form of either oligopoly power among the sellers or unequal information among sellers, then it is expected that they will be able to reap abnormal profits and subsequently, wide intra-regional price differentials will exist in the market and in such imperfect market situation producers are deprived of their due share in consumers' paid prices.

In this study, efforts were made to test for market integration, where it is assumed, markets operate within a single pricing system for a homogeneous product. Prices vary only to the extent of transfer costs including costs of wastages in the transfer process. On the other hand, the non-competitive structure of the agricultural sector may also result in considerable price uncertainties and segregation of markets. For example, lack of market information will result in greater price uncertainties and subsequently, excessive price differences will occur among trading markets. In such a situation, markets would appear segmented or having very weak form of price inter-linkages.

Each agricultural commodity has a unique marketing system. Though rice is the dominant crop, the marketing system of other leading crops like wheat, lentil and mustard (for these crops- resource substitution for each other is possible) has also to be investigated to arrive at a broader scenario of functioning of marketing system in the crop sub-sector. If market segmentation is proved, there is broader scopes and need for government intervention policies. For any effective price policy formulation, the essential ingredient would be the results of price inter-linkages among the commodity trading markets.

Methodological developments for studying market integration are quite sparse. Revallian *(1986)* developed a general approach to modeling market integration that can estimate the extent to which local prices are influenced by prices elsewhere. He employed the model with rice prices in Bangladesh prior to and during the *1974* famine. His test of segmentation in rice markets rejected the hypothesis of segmented markets, but the test on short-run integration of markets was inconclusive.

Ahmed and Bernard *(1989)* used Revallian's model for testing integration of rice markets for the period *1981-85* for selected *19* district markets. They found under half of the markets *(9* out of 19) are highly integrated with the central market during dry season. In the dry season, about *36* percent of the markets are relatively weak in inter-market linkages. During

monsoon season about 74 percent of the markets are poorly integrated and only *26* percent remain highly integrated with the central market. This reveals as overall, rice markets (the largest commodity market) were not well integrated. There is dearth of studies which intensively investigated integration of rice markets (not with standing varieties) and not at all for any other leading field crops in Bangladesh. So, a thorough study on integration of crop markets using advanced test of market integration was long over-due. Whether farmers get fair prices depend on the extent of integration of the distributing markets. For this the specific objectives of the study are set as:

i) Whether markets for selected crops (representing major cereal and non-cereal crops) function under competitive market structures and for this -spatial price integration has to be tested for the selected crops. This will help to understand whether selected product markets operate under competitive conditions (if integrated) in the long run.

ii) Assess whether regional commodity markets are influenced by the central market prices.

iii) Suggest policy measures based on the analytical findings on the functioning of markets separated by space.

2. METHODOLOGY

The present study makes an extensive use of secondary data on price of major crops in Bangladesh over the period of *20* years. To understand developments in marketing system, a *20* year period is considered to be long enough.

The study covers the time period of *20* years from *1986-2005* (as the latest data available). *1986-1989* period was before full implementation of privatization policies. *1990* - 2005 period was after implementation of privatization policies. The later period fell in the structural adjustment reform period. Privatization of irrigation equipment and fertilizer distribution was introduced during this period. Besides, subsidies on fertilizer and other inputs were also largely withdrawn during this period. Further, output markets were liberalized and private sector was allowed to import food grains. That is, the economy essentially has thrived during this period based on functioning of markets.

Selection of Prices

In the present study harvest and lean period one month price of selected crops (average of four weeks) have been taken for analysis. Off-season (lean period) price indicates the wholesale price in processed form prior to one month of harvest. For correlation and cointegration analyses, deflated rather than nominal prices were used to assess the relationship in terms of real price changes. This is imperative when using time series data spreading over a *20* year period, when inflationary price rises were substantial. Agricultural raw-materials prices (index) for the corresponding period were used as deflator. For a district market price, the respective divisional agricultural raw-materials prices index was used as the deflator, as the index is only available up to the divisional level.

Choice of markets

For Aman (HYV), seven leading district markets have been selected. These are Dhaka, Kishoregonj, Rangpur, Satkhira, Potuakhali, Moulvibazar and Feni. For Boro (HYV), Dhaka, Kishoregonj, Joypurhat, Jessore, Barisal, Comilla and Sunamgonj, and for wheat, Dhaka, Faridpur, Thakurgaon, Meherpur, Bhola, Chandpur and Hobigonj are selected. For each crop

a district is selected from each Division on the basis of highest growing area under the crop. Dhaka is selected as the central market. For mustard, Dhaka, Myminsingh, Rajshahi, Khulna, Barisal, Hobigong and Chittagong are taken. For lentil Dhaka, Mymensingh, Rajshahi, Khulna, Chandpur, Hobigonj and Chittagong are selected. All these are leading growing areas, for that matter, largest markets for the respective crops.

Analytical Techniques

Measures of the spatial integration of markets by correlation coefficient

The degree of correlation between prices in various markets is taken as an index of the extent to which the two markets are integrated. A higher degree of the correlation co-efficient indicates a greater degree of integration, at least in terms of the pricing of the product between the local market and central market, vice versa.

The correlation coefficient in the price of a commodity in any two markets is assumed unity under conditions of perfect spatial price integration. A correlation co-efficient of 0.81 or more is a high degree of inter market price relationship because, in such a case, 81 percent or more variation in the prices in one market is associated with that in another market, and that the remaining 19 percent variation may be assumed to stem from transportation, information lag and data bottleneck (Lele, cited in Acharya & Agarwal, 1994, p. 217). In this study we assumed `r' value of 0.70 for two markets as highly correlated in price changes as we have used deflated prices rather than nominal prices of crops and followed test of significance. Revallian (1986), Ahmed and Bernard (1989) all used nominal prices in their analysis.

The simple correlation coefficient for the prices in each pair of selected markets has been estimated.

There is often problem of spurious correlation between times series variables-when there is effect of inflationary growth (if it is price variable) or variables show same growth trends or for some other reason. So, advanced method of assessing market integration (by co-integration test) was also used in this study.

Market integration by cointegration test:

Empirical work based on time series data usually assumes that the under lying time series is stationary. In regressing a time series variable on another time series variable, one often obtains a very high R^2 (in excess of 0.9) even though there is no meaningful relationship between the two. This situation exemplifies the problem of nonsense regression. This problem arises if both the time series involved exhibit strong trends; the high R^2 observed is due to the presence of the trend, not to a true relationship between the two. This may also happen for the same reason when estimating `r' (paired correlation coefficient) between two price variables. That is why advanced technique like co-integration method has also to be tried in this study to arrive at conclusive decisions on integration of commodity markets.

Co-integration test, the methodology developed recently by Granger (1986) and Engle and Granger (1987) has been used to show whether selected agricultural product prices move in unison in the markets chosen for this study. If there are structural deficiencies in between

or among agricultural markets, then there will be non integrated price movements of homogenous products.

Broadly speaking, a stochastic process is said to be stationary if its mean and variance are constant over time and the value of covariance between two time periods depends only on the distance or gap or lag between the two periods at which the covariance is computed. To explain this statement, let Y_t be a stochastic time series with the properties:

Mean	:	$E(Y_t)= \mu$
Variance	:	$Var\ (Y_t)+ E(Y_t-\mu)^2 =\sigma^2$
Covariance	:	$\gamma_k=E[(Y_{t-\mu})(Y_{t+k}-\mu)]$

Where γ_k the covariance (or auto covariance) at lag k, is the covariance between the values of Y_t and Y_{t+k} that is, between two Y values k periods apart. If k=0, we obtain γ_0, which is simply the variance of Y ($=\sigma^2$); if k=1, γ_1 is the covariance between two adjacent value of Y.

The unit root test

Test of stationarity (or non-stationarity) is known as the unit root test. The easiest way to introduce this test is to consider the following model:

$$Y_t =Y_{t-1}+ U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

Where U_t is the stochastic error term that follows the classical assumptions, viz. it has zero mean, constant variance σ^2, and is non auto-correlated. Equation (1) is a first-order, or autoregressive process 1 e.g. AR (1) regression in that regress the value of Y at time t on its own value at time (t-1). If the coefficient of Y_{t-1} is in fact equal to 1, what is known as the unit root problem, i.e., a nonstationarity situation. Therefore, if run the regression:

$$Y_t =\rho Y_{t-1}+ U_t \qquad -1\leq \rho \geq 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

and actually if find $\rho = 1$, then the stochastic variable Y_t has a unit root. In (time series) econometrics, a time series that has a unit root is known as a random walk (time series). And a random walk is an example of a non-stationary time series.

For theoretical reasons, we manipulate equation (2) as follows: Subtract Y_{t-1} from both sides of (2) to obtain

$Y_t-Y_{t-1}=\rho Y_{t-1}- Y_{t-1}+ U_t$

$\Delta Y_t= (\rho-1)\ Y_{t-1}+ U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$

which can be alternatively written as?

$\Delta Y_t= \delta Y_{t-1}+ U_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$ **(4)**

Where $\delta = (\rho-1)$ and where Δ is the first-difference operator. Note that $\Delta Y_t= (Y_t -Y_{t-1})$. Therefore, instead of estimating (2), we estimate (3) and test the (null) hypothesis that $\delta = 0$. If $\delta = 0$, then $\rho = 1$, that is we have a unit root, meaning the time series under consideration is non-stationary. Before we proceed to estimate (4), it may be noted that if $\delta = 0$, (4) will become $\Delta Y_t= (Y_t-Y_{t-1}) = u_t \ldots\ldots(5)$

Since u_t is a white noise error term it is stationary which means that the first differences of a random walk time series (u_t) are a stationary time series because by assumption u_t is purely random. That is, by differencing a time series can be made stationary from the non-stationary position.

Now if a time series is differenced once and the differenced series is stationary, the original (random walk) series is **integrated of order 1,** denoted by I (1), Similarly, if the original series has to be differenced twice (i.e., take first difference of the first difference) before it becomes stationary, the original series is **integrated of order 2, or** I (2). In general, if a time series has to be differenced "d" times, it is integrated of order d or I (d).

Under the null hypothesis that $\delta = 0$ ($\rho = 1$), the conventionally computed statistics is known as the τ (tau) statistics whose critical values have been tabulated by Dickey and Fuller(1979) on the basis of Monte Carlo simulations. In the literature the tau statistic or test is known as the Dickey-Fuller (DF) test in honour of its discoverers. Interestingly, if the null hypothesis $\delta = 0$ ($\rho = 1$), is rejected (i.e., the time series is stationary), the usual (student's) t test can be used.

For theoretical and practical reasons the Dickey-Fuller test is applied to regressions run in the following forms:

$$\Delta Y_t = \delta Y_{t-1} + U_t \quad \text{.....(6)}$$

$$\Delta Y_t = \beta_1 + \delta Y_{t-1} + U_t \quad \text{.....(7)}$$

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + U_t \quad \text{.....(8)}$$

Where t is the time trend variable. In each case the null hypothesis is that $\delta = 0$, that is there is a unit root and the time series is non-stationary. The alternative hypothesis is that δ is less than zero; that is the time series is stationary. If the null hypothesis is rejected it means that Y_t is a stationary time series with zero mean in the case of (6) that Y_t is stationary with a nonzero mean $[=\beta_1/(1-\rho)]$ in the case of (7) and that Y_t is a stationary around a deterministic trend in (8).

If the computed absolute value of the tau statistics ($|\tau|$) exceeds the Dickey Fuller(1979) critical tau values we reject the hypothesis that $\delta = 0$, in which case the time series is stationary. On the other hand if the computed ($|\tau|$) does not exceeds the critical tau value we do not reject the hypothesis in which case the time series is non stationary.

In conducting the DF test as in (6) (7) or (8) it was assumed that the error term u_t was uncorrelated. But if u_t are correlated (more likely for time series data), Dickey and Fuller(1979) have developed a test, known as the Augmented Dickey-Fuller (ADF) test. This test is conducted by "augmenting" the preceding equations by adding the lagged values of the dependent variable ΔY_t, the ADF test then consists of as following:

If the error term u_t is auto correlated one modifies (8) as follows:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \alpha_1 \sum_{t=1}^{m} \Delta Y_{t-1} + \varepsilon_1 \quad \text{..... (9)}$$

Where ε_t is a pure white noise error term and where $\Delta Y_{t-1}=(Y_{t-1}-Y_{t-2})$, $\Delta Y_{t-2}=(Y_{t-2}-Y_{t-3})$ etc. that is one uses lagged difference terms. The number of lagged difference terms to include is often determined empirically the idea being to include enough terms so that the error term in (9) is serially independent. The null hypothesis is still that $\delta = 0$, or $\rho=1$ that is a unit root exists in Y (i.e., Y is nonstationary) (Gujarati, 1994, pp. 814-825).

Once the non-stationarity status of the variables is determined the next step is to test for the presence of co-integrating (long-run equilibrium) relationship between the variables.

To test the univariate price series for stationarity the Augmented Dickey-Fuller (ADF) test has been applied which tests the null hypothesis of non-stationarity against alternative of stationarity. The standard equation of the ADF test is:

$$\Delta Y_t=\beta_0+ \beta_1 Y_{t-1}+ \sum_{k=1}^{N} \delta_K \Delta Y_{t-k}+\eta_1 \qquad (10)$$

$\Delta Y_t = Y_t - Y_{t-1}$ and η_t is the residual term as defined earlier. The test statistic is simply the t-statistic however under the null hypothesis it is not distributed as student-t distribution but the ratio can be compared with critical values tabulated in Davidson and Mackinnon (1993). In estimating equation (11) the null hypothesis is H_0 : Y_t is I (1) which is rejected in favour of I (0) if β_1 is found to be negative and statistically significant. The above test can also be carried out for the first difference of the variables. That is we estimate the following regression equation:

$$\Delta^2 Y_t=\theta_0+ \theta_1 \Delta Y_{t-1}+ \sum_{k=1}^{N} \emptyset_K \Delta^2 Y_{t-k}+\mu_t \qquad (11)$$

Where the null hypothesis is H_0 : Y_t is I (2) which is rejected in favour of I (1) if θ_1 is found to be negative and statistically significant. In general a series Y_t is said to be integrated of order d if the series achieves stationary after differencing 'd' times denoted Yt~I(d). Consequently, if Y_t is stationary after differencing once then we may denote Y_t~I (1) and ΔY_t ~ I(0). However, in most applied work the procedure is terminated after the first or second differences (Behura and Pradhan, 1998 pp. 344-350, and Baharumshah and Habibullah, 1994, pp. 205-215). In our test procedure, in some cases we had to undergo for second differencing.

3. RESULTS AND DISCUSSION

3.1 Measures of the Spatial Integration of Markets

To start from a simple beginning, simple correlation co-efficient as a measure of market integration is used in this study even though this method has been criticised for some limitations by a few authors (Blyn, 1973 p. 56; Harris, 1979 p. 202). Common factors like inflation, seasonality, some price setting by public agencies, non-stationary of time series may generate high correlation co-efficients among market prices though the underlying conditions may not be congenial to an integrated market. In a high inflationary situation like Bangladesh, use of nominal price to use in estimation of correlation coefficients (pair wise) would be misleading as the force of inflation increases over the years for which, estimated coefficients may tend to show high degree of association between pair of prices of two markets. So, to have a useful and reliable estimate, product prices have been deflated.

Correlation co-efficient can serve only as an indicator of integration between the price movements of two markets, assuming uniformity in market structure and conduct of both the markets.

Aman HYV market

The harvest time wholesale price of Aman (HYV) paddy markets appeared all highly linked, i.e. the co-efficient values are more than 0.78. The range of integration is from 0.78 to 0.99. All the markets were significantly highly integrated. However, off-season prices of HYV Aman (Table 2) appeared more integrated (all the markets) with relatively higher magnitudes of coefficients. From Tables 1 and 2 it is observed that Aman (HYV) paddy prices are more integrated than harvest price of Boro (HYV) paddy.

Table 1. One to one correlation co efficients of deflated harvest prices of Aman (HYV) paddy in selected markets (1986-2005).

	Dhaka	K.gonj	Rangpur	Satkhira	Potuakhali	M.bazar	Feni
Dhaka	1	0.98**	0.78**	0.89**	0.88**	0.83**	0.82**
K.gonj		1	0.83**	0.90**	0.88**	0.89**	0.87**
Rangpur			1	0.90**	0.89**	0.93**	0.92**
Satkhira				1	0.99**	0.89**	0.90**
Potuakhali					1	0.86**	0.87**
M.bazar						1	0.98**
Feni							1

**Correlation is significant at 1 percent level (a 2-tailed test) . The software used for estimation has been SPSS

Notes: K.gonj = Kishoregonj, M.bazar = Moulvibazar

Table 2. One to one correlation co-efficients of deflated prices of Aman (HYV) rice during off-season prices season in selected markets (1986-2005).

	Dhaka	K.gonj	Rangpur	Satkhira	Potuakhali	M.bazar	Feni
Dhaka		0.97**	0.93**	0.94**	0.94**	0.91**	0.93**
K.gonj		1	0.95**	0.92**	0.92**	0.92**	0.89**
Rangpur			1	0.89**	0.90**	0.90**	0.88**
Satkhira				1	0.99**	0.92**	0.92**
Potuakhali					1	0.92**	0.95**
M.bazar						1	0.92**
Feni							I

**Correlation is significant at 1 percent level (a 2-tailed test)

Notes: K.gonj = Kishoregonj, M.bazar = Moulvibazar

The off season (pre-harvest period) wholesale prices of Aman (HYV) rice markets were also highly linked. The co efficient values are between 0.88-0.99. All the rice markets were highly integrated both in harvest and in peak prices seasons. Markets were more integrated (18 pairs show 90 percent or more associations during off season than harvest season where

only 8 pairs show more than 90 percent or more association) than production season. Markets were highly interdependent in terms of price changes for Aman HYV during both production and off-season.

Boro (HYV) market

The paired correlation co-efficients for the harvest period prices of Boro (HYV) paddy during 1986-2005 are presented in Table 3. The immediate observation that emerges from the correlation co-efficients is that, Boro (HYV) paddy markets were not well integrated (out of 21 paired markets, 11 i.e. 52%) were not integrated. Only 48% paired markets were integrated. Ten paired co-efficients are above 0.73 and significant at 1 percent level, meaning all leading rice markets were well integrated in terms of price movement.

Table 3. One to one correlation co efficients of deflated harvest prices of Boro (HYV) paddy in selected markets (1986-2005).

	Dhaka	K.gonj	Joypurhat	. Jessore	Barisal	Comilla	S.gonj
Dhaka	1	0.86**	0.64**	0.49*	0.54*	0.74**	0.30
K.gonj		1	0.64**	0.78**	0.79**	0.89**	0.53*
Joypurhat			1	0.34	0.32	0.60**	-0.11
Jessore				1	0.98**	0.79**	0.73**
Barisal					1	0.80**	0.73**
Comilla						1	0.63**
S.gonj							1

**Correlation is significant at the 1 percent level (a 2-tailed test)
*Correlation is significant at the 5 percent level (a 2-tailed test) Notes:
K.gonj = Kishoregonj, S.gonj = Sunamgonj

Table 4. One to one correlation co-efficients of deflated off-season prices of Boro (HYV) rice in selected markets (1986-2005).

	Dhaka	K.gonj	Joypurhat	Jessore	Barisal	Comilla	S.gonj
Dhaka	1	0.62**	0.78**	0.82**	0.88**	0.89**	0.55*
K.gonj		1	0.54*	0.79**	0.59**	0.59**	0.84**
Joypurhat			1	0.89**	0.88**	0.85**	0.74**
Jessore				1	0.93**	0.86**	0.89**
Barisal					1	0.90**	0.73**
Comilla						1	0.72**
S.gonj							

**Correlation is significant at 1 percent level (a 2-tailed test)
*Correlation is significant at 5 percent level (a 2-tailed test) Notes:
K.gonj = Kishoregonj, S.gonj = Sunamgonj

During pre-harvest time, Boro HYV rice markets were more integrated than harvest time paddy markets. According to our cutting point of 0.71 (r-value), 16 markets (76 percent markets) were highly and significantly integrated. Boro HYVs are less storable than other HYVs and followed by Aman HYV harvest and that might create to an extent market

segregation for the Boro HYV paddy during harvest season wherein farmers' stores are filled in with Aman harvests.

Wheat market

From Table 5, it could be seen that the paired correlation co-efficients of harvest time prices of wheat were high for 11 pairs of markets (61 percent). The results imply that wheat markets were not all (39 percent) interdependent in price formations but peak prices season flour price (after processing) became largely integrated. All markets during pre-harvest season were significantly correlated.

Table 5. One to one correlation co-efficients of deflated harvest time prices of wheat (whole) in selected markets (1986-2005).

	Dhaka	Faridpur	T.gaon	Meherpur	Bhola	C.dpur
Dhaka	1	0.92**	0.80**	0.93**	0.65**	0.74**
Faridpur		1	0.84**	0.96**	0.80**	0.67**
T.gaon			1	0.76**	0.86**	0.40
Meherpur				1	0.70**	0.74**
Bhola					1	0.23
C.dpur						1

**Correlation is significant at 1 percent level (a 2-tailed test) Notes:
C.dpur = Chadpur, T.gaon = Thakurgaon

Table 6. One to one correlation co-efficients of deflated harvest prices of wheat (flour) during peak prices season in selected markets (1986-2005).

	Dhaka	Faridpur	T.gaon	Meherpur	Bhola	C.dpur
Dhaka	1	0.95**	0.7G**	0.89**	0.74**	0.83**
Faridpur		1	0.84**	0.90**	0.80**	0.89**
T.gaon			1	0.78**	0.84**	0.82**
Meherpur				1	0.85**	0.77**
Bhola					1	0.84**
C.dpur						1

**Correlation is significant at 1 percent level (a 2-tailed test)
Notes: C.dpur = Chandpur, T.gaon = Thakurgaon

The correlation co-efficieints of off-season wholesale prices of wheat (flour) are above 0.74. The values are significant at 1 percent level. Flour markets (atta) at wholesale levels were more competitive and many more market actors were there than whole wheat markets at production seasons.

Lentil market

Analysis of correlation co-efficients of harvest prices of lentil has been carried out in relation to the 21 paired markets and results are presented in Table 7. For lentil, only 33 % markets (pair-wise out of 21) were significantly highly integrated and the rest (67%) were

not during harvest season. During the slack season, the situation improves a little and 48% paired markets got integrated

Table 7. **One to one correlation co efficients of deflated lentil (whole/unprocessed) prices in selected markets (1986-2005).**

	Dhaka	Mymsingh	Rajshahi	Khulna	C.dpur	H.gonj	Ctg.
Dhaka	1	0.71**	-0.12	0.20	0.72**	0.88**	0.60**
Mymsingh		1	0.30	0.35	0.77**	0.70**	0.45*
Rajshahi			1	0.15	0.08	O.OG	-0.09
Khulna				1	0.62**	0.22	0.69**
C.dpur					1	0.77**	0.80**
H.gonj						1	0.58*
Ctg.							1

**Correlation is significant at 1 percent level (a 2-tailed test)
*Correlation is significant at 5 percent level (a 2-tailed test)
Notes: C.dpur = Chandpur, H.gonj = Hobigonj, Ctg. = Chittagong

The country is deficit in meeting her lentil demand. So, local markets are also being influenced by import quantity and prices. Different markets are there at different levels of distribution process. So, local markets with domestic products may not be much integrated as import markets which also influence price formation. As the markets were (monthly) segmented, price policy if any, for lentil improvement should be considered regionally for the effectiveness of such policies. Efforts need to be taken for market development throughout the country.

The paired correlation co-efficients of pre-harvest prices of lentil (processed) are presented in Table 8. It could be observed from the table that the correlation co-efficients are significant in 10 pairs (48 percent) of markets out of 21 market pairs. Numbers of integrated markets were more than harvest season markets. Between regional markets, the level of integration is the lowest and insignificant when compared pairing with Dhaka.

Table 8. One to one correlation co-efficients of deflated pre-harvest prices of lentil (1986-2005).

	Dhaka	Mymsingh	Rajshahi	Khulna	C.dpur	H.gonj	Ctg.
Dhaka	1	0.95**	0.85**	0.49*	0.75**	0.86**	0.62**
Mymsingh		1	0.85**	0.37	0.60**	0.77**	0.56*
Ra'shahi			1	0.20	0.46	0.70**	0.38
Khulna				1	0.69**	0.52*	0.61**
					1	0.89**	0.89**
H. - on'						1	0.79**
Ctg.							1

**Correlation is significant at 1 percent level (a 2-tailed test) Notes: C.dpur = Chandpur, H.gong = Hobigong , Ctg.= Chittagong

The country is deficit in lentil and had to import largely and the growing districts are not also blessed with surpluses. So, local production partly meet local demands and supply is erratic depending on the import arrivals. As a result, arbitrage may not be so effective to make the markets instantaneously to be in equilibrium in supply demand with all other deficit markets.

Mustard market

The correlation co-efficients of mustard (seed) prices between the various selected production districts are presented in Tables 9 to 10. From the table, it could be seen that, the correlation co-efficients between the markets (81 percent paired markets) were highly significant and these indicate that the markets were significantly correlated for mustard in respect of their price changes.

Table 9. One to one correlation co-efficients of deflated mustard (whole) prices in selected markets during harvest season (1986-2005).

	Dhaka	Mym.	Rajshahi	Khulna	Barisal	Hgonj	Ctg.
Dhaka	1	0.86**	0.62**	0.82**	0.89**	0.73**	0.73**
Mym.		1	0.86**	0.90**	0.71**	0.87**	0.91**
Rajshahi			1	0.86**	0.57**	0.8G**	0.90**
Khulna				1	0.8G**	0.86**	0.91**
Barisal					1	0.66**	0.68**
Hgonj						1	0.97**
Ctg.							1

**Correlation is significant at 1 percent level (a 2-tailed test)
Notes: Hgonj = Hobigonj, Ctg. = Chittagong, Mym. = Mymensingh

Markets for mustard were well formed and the traders' wide spread use of cell phone technology, easy transportation facility have made the markets competitive and highly interlinked for mustard.

Table 10. One to one correlation co-efficients of deflated pre-harvest prices of mustard (oil) (1986-2005).

	Dhaka	Mym	Rajshahi	Khulna	Barisal	H.gonj	Ctg.
Dhaka	1	0.99**	0.89**	0.94**	0.91**	0.89**	093**
Mym		1	0.84**	0.93**	0.92**	0.87**	0.88**
Rajshahi			1	0.92**	0.86**	0.78**	0.95**
Khulna				1	0.98**	0.81**	0.92**
Barisal					1	0.77**	0.85**
H.gonj						1	0.90**
Ctg.							1

**Correlation is significant at 1 percent level (a 2-tailed test) Notes: H.gonj = Hobigonj, Ctg.= Chittagong, Mym.= Mymensingh

All the correlation co-efficients show high magnitudes of correlation among them and linked significantly to Dhaka market. Good communication among them and easy transportation facility has made the markets more competitive even for the processed product (oil) of mustard.

A lower correlation will reflect bottlenecks arising from lack of market information, lack of perfect mobility of the product due to natural barrier like the river Yamuna, institutional rigidity, and lack of product homogeneity or development of a syndicated market force. Certainly, all these ale not barriers now-a-days with well developed highways connecting the selected districts undertaken for the study with concomitant revolution in cell-phone technology in the country.

3.2 Measuring Market Integration by Cointegration Test

To test the univariate price series for stationarity, the Augmented Dickey-Fuller(1979) test (ADF test) have been carried out. Initially, test has been performed on price series in levels, which implied testing a null hypothesis of non-stationarity against alternative of stationarity. The null hypothesis is Ho: P, is I(1) i.e., non-stationary which is rejected in favour of I(0) if the coefficients of the lagged price variable is found negative and statistically significant (stationary series). Dhaka market is considered as central market. So all the market prices are tested whether co-integrated or not with Dhaka market

Aman (HYV) market

Table 11. Unit root tests for Aman (HYV) price series.

	Aman (IIYV) **paddy price (haryest season)**		
Markets	ADF test at level I(1)	ADF test at first difference I(2)	ADF test at second difference I(3)
Dhaka	-0-66	-2.08	-3-47***
Kishoregonj	-0.35	-3.17**	-
Rangpur	-2.71	-2.79*	-4.35***
Satkhira	-1.59	-3.10**	-
Potuakhali	-1.49	-3.51***	-
Moulvibazar	-2.21	-3.15**	-
Feni	-2.23	-7.52***	-
	Aman (HYV) rice price (pre-harvest)		
Markets	ADF test at level I(1)	ADF test at first difference I(2)	ADF test at second difference I(3)
Dhaka	-1.43	-2.38	-4.40***
Kishoregonj	-0.07	-2.10	-3.22**
Rangpur	-1.67	-2.11	-3.25**
Satkhira	-1.93	-2.64	-4.26***
Potuakhali	-1.07	-3-74***	-
Moulvibazar	-1.53	-3.41**	-
Feni	-1.53	-3.41**	-

Dickey-Fuller (1979) critical values (ti values):
-2.57 at 10% level, -2.86 at 5% level &-3.43 for 1% level of significance
*** Significant at 1 % level ** Significant at 5 % level * Significant at 10 % level

Empirical results of the unit root test (ADF test) for the hypothesis that Aman (HYV) prices for Kishoregonj, Rangpur, Satkhira, Potuakhali, Moulvbazar and Feni were each individually integrated of order one, the set of regression was run once more after differencing all the terms. The second differencing was done for data series. The tau (i) statistics were compared with Dickey-Fuller critical t(ti) values. The results for the first-difference of the variables show that the prices were stationary i.e. contain unit roots for all markets at different levels of significance. In some cases the null hypotheses Y, - I(2) is rejected implying that those series do not require second differencing to achieve stationarity. For some series second differencing was necessary to make the series stationary (ADF test at second difference).

Engle-Granger tests of residual equation confirm the stationarity of the residual series. The ADF results of unit root equation indicate that the Aman (HYV) paddy price series were of I(2). While Engle Granger (EG) results of residual equation indicate that the residual series were I (0).

Table 12. Cointegration test results for market pairs of Aman (HYV) between 19862005.

According to Engle-Granger test (1987), Aman (HYV) paddy prices during harvest time between Dhaka and other six regional markets each were co-integrated (Table 12) at second difference excepting Dhaka-Moulvibazar meaning during harvest time- Dhaka central market had strong price relationship with other markets except Moulvibazar. Moulvibazar was segregated from Dhaka in terms of having independent price making forces during Aman (HYV) harvest season.

In preharvest time, all the markets were co-integrated with Dhaka (at 1%, 5% or 10% level) excepting again Moulvibazar region. Any price support policy for Aman

Aman (HYV) paddy price series

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Kishoregonj	-2.60	-3.36*
Dhaka-Rangpur	-1.31	-3.38*
Dhaka-Satkhira	-2.34	-5.81***
Dhaka-Potuakhali	-1.64	-5.22***
Dhaka-Moulvibazar	0.90	-2.61
Dhaka-Feni	-2.21	-3.68***

Aroan (HYV) rice price series

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Kishoregonj	-3.20*	
Dhaka-Rangpur	-2.32	7.83***
Dhaka-Satkhira	-1.38	6.84***
Dhaka-Potuakhali	-3.39*	-
Dhaka-Moulvibazar	-2.24	-2.61
Dhaka-Feni	-2.66**	-3.68**

Davidson-Mackinnon (1993) asymptotic critical values are
-3.13 at 10 %, -3.41 at 5 % &- 3.96 at 1% level of significance
*** Significant at 1%r level ** Significant at 5 % level * Significant at 10 % level

(HYN") crop should be separately designed for Moulvibazar region to make it effective (regional planning is required).

Boro (HTrti) market

The results of Unit root test for Boro (HYV) wholesale prices are presented in Table 13. The null hypothesis of non-stationarity cannot be rejected for Barisal, Comilla and Sunamgonj markets at level in harvest time paddy prices. From the results of first difference we can say Boro (HYV) price series were non-stationary at level.

Table 13. Unit root tests for Boro (HYV) price series.

Markets	**Boro (HYV) paddy price**	
	ADF test at level I(1)	ADF test at first difference I(2)
Dhaka	-0.44	-3.08**
Kishoregonj	-0.55	-3.20**
Joypurhat	-1.22	-5.21***
Jessore	-1.61	-6.37***
Barisal	-1.19	-2,94**
Comilla	-1.36	-2.74*
Sunamgonj	-2.23	-2.77*
Markets	**Boro (HYV) rice price**	
	ADF test at level I(1)	ADF test at first difference I(2)
Dhaka	-2.54	-3.21**
Kishoregonj	-2.65	-3.04**
Joypurhat	-0.01	-2.59*
Jessore	-0.62	-3.13**
Barisal	-2.75	-2.9G**
Comilla	-0.90	-3.34**
Sunamgonj	-1.54	-4.16***

Dickly - Fuller (1979) critical values (π values) are:
-2.57 at 10 %, -2.86 at 5 % &- 3.43 at 1% level of significance
*** Significant at 1%r level ** Significant at 5 % level * Significant at 10 % level

As the Engle-Granger co-integration test reveals, Boro (HYV) paddy markets were not integrated with Dhaka during harvest season. Boro paddy for trading may not be directly connected to Dhaka or pass through Dhaka during harvest season (Table 14).

According to Engle-Granger test, Kishoregonj, Jessore, Comilla markets for Boro (HYV) rice prices were integrated with Dhaka market at 5% level. And Joypurhat, Barisal, Sunamgonj markets rice prices were not integrated with Dhaka prices. These markets were segregated with Dhaka in terms of price relationship (Table 14).

So, policy of price fixing for procurement of Boro (HYV) paddy during harvest season should be at different levels according to the prices of regional markets. Central policy making with single price may prove disastrous economically when markets appeared segregated.

Table 14. Cointegration test results for market pairs of Boro (HYV) between 1986-2005.

Boro (HYV) paddy price series

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Kishoregonj	-3.03	-1.95
Dhaka-Joypurhat	-2.18	-2.28
Dhaka-Jessore	-2.66	-2.01
Dhaka-Barisal	-2.51	-1.99
Dhaka-Comilla	-2.72	-1.89
Dhaka-Sunamgonj	-2.36	-1.98

Boro (HYV) rice price series

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Kishoregonj	-3.21**	-
Dhaka-Joypurhat	-2.20	-2.73
Dhaka-Jessore	-3.36**	-
Dhaka-Barisal	-2.73	-2.66
Dhaka-Comilla	-3.70**	-
Dhaka-Sunamgonj	. -2.40	-2.64

Davidson-Mackinnon (1993) asymptotic critical values are
-3.13 at 10 %, -3.41 at 5 % &- 3.96 at 1% level of significance
*** Significant at 1% level * * Significant at 5 % level * Significant at 10 % level

Wheat market

The results of ADF tests for wheat markets are presented in Table 15. The results indicate that all prices were non-stationary in level but stationary in their first or second difference.

Wheat markets during harvest period were integrated with Dhaka markets at different levels of significance (this corroborates the results of correlation test on wheat) wheat flour markets (pre-harvest time) were also integrated with Dhaka markets in terms of price behaviour. Wheat markets were well integrated (Table 16). Central price policy making will be effective in case of wheat commodity. Wheat as a commodity is more homogenous than paddy/ rice (not having so many varieties and seasons of production).

Table 15. Unit root tests for Wheat price series.

Markets	Wheat (whole) price		
	ADF test at level I(1)	ADF test at first difference I (2)	ADF test at second difference I (3)
Dhaka	-0.47	-2.62	-5.60***
Faridpur	-1.24	-2.83*	-
Thakurgaon	-0.81	-2.52	-4.51***
Meherpur	-1.14	-3.10**	-
Bhola	-2.32	-3.32**	-
Chandpur	-1.60	-2.67*	-

Markets	Wheat (flour) price		
	ADF test at level I(1)	ADF test at first difference I (2)	ADF test at second difference I (3)
Dhaka	-1.46	-2.97**	-
Faridpur	-2.82	-3.38***	-
Thakurgaon	-1.86	-2.36	4.51***
Meherpur	-1.60	-3.56***	-
Bhola	-2.35	-3.76***	-
Chandpur	-1.71	-2.04	3.33**

Dickey-Fuller Critical values (i values)
-2.57 at 10 % level, -2.86 at 5 % level & -3.43 for 1% level of significance
*** Significant at 1% level ** Significant at 5 % level * Significant at 10 % level

Table 16. Cointegration test results for market pairs of wheat between 1986-2005. Wheat (whole) price series.

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Faridpur	-3.21 *	-3.55**
Dhaka-Thakurgaon	-4.06***	-
Dhaka-Meherpur	-3.68**	-
Dhaka-Bhola	-1.32	-3.75**
Dhaka-Chandpur	-2.13	-3.73**

Wheat (flour) price series

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Faridpur	-3.98**	-
Dhaka-Thakurgaon	-1.22	-3.14*
Dhaka-Meherpur	-3.65**	-
Dhaka-Bhola	-1.89	-4.36***
Dhaka-Chandpur	-3.79**	-

Davidson-Mackinnon asymptotic critical values (1993) are
-3.13 at 10 %, -3.41 at 5 % &- 3.96 at 1% level of significance
*** Significant at 1 % level * * Significant at 5 % level * Significant at 10 % level

Lentil Market

Lentil price series were also non-stationary at level which were turned stationary after first or second differencing (Table 17) and then Engle-Granger cointegration test was conducted for assessing long-run price equilibrium situation. Co-integration test on lentil prices reveals that the lentil markets were integrated with Dhaka markets during harvest time, except Dhaka-Rajshahi market pair. Dhaka-Rajshahi prices remain non-responsive during harvest time. Rajshahi lentil may serve own or other regions during the harvest time.

The results reveal that-during pre-harvest time, lentil prices at Chandpur remain non-responsive to Dhaka prices -though all other markets were well integrated with Dhaka during pre-harvest time (Table 18). At the time Chandpur market may be served by supply or demand from Chittagong market.

Table 17. Unit root tests for lentil price series.

Markets	**Lentil (unprocessed) price**		
	ADF test at level I (1)	ADF test at first difference I (2)	ADF test at second difference I (3)
Dhaka	-0.99	-4.34***	-
Mymensingh	-1.70	-2.23	-4.31***
Rajshahi	-2.09	3.23**	-
Khulna	-1.82	-3.69***	-
Chandpur	-1.35	-2.39	3.45***
Hobigonj	-2.17	-3.34**	-
Chittagong	-1.75	-2.19	3.53***
Markets	**Lentil (processed) price**		
	ADF test at level I(1)	ADF test at first difference I(2)	ADF test at second difference I(3)
Dhaka	-1.85	-3.10**	-
Mymensingh	-1.24	-2.70	-3.00**
Rajshahi	-1.31	-3.35**	-
Khulna	-2.37	-2.11	-3.80***
Chandpur	-2.56	-3.69***	-
Hobigonj	-1.53	-4.35***	-
Chittagong	-2.50	-3.02**	-

Dickey-Fuller Critical values (ti values)
-2.57 at 10 % level, -2.86 at 5% level &-3.43 for 1% level of significance
*** Significant at 1% level ** Significant at 5 % level * Significant at 10 % level

Table 18. Cointegration test results for market pairs of lentil between 1986-2005. Lentil (unprocessed) price

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Mymensingh	-0.78	-3.40*
Dhaka-Rajshahi	-0.03	-3.00
Dhaka-Khulna	-1.20	-3.91**
Dhaka-Chandpur	-0.76	-3.83**
Dhaka-Hobigonj	-2.47	-3.88**
Dhaka-Chittagong	-1.32	-3.51 *

Lentil (processed) price

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Mymensingh	-2.64	4.41***
Dhaka-Raj shahi	-3.15	-5.35***
Dhaka-Khulna	-2.13	-3.30*
Dhaka-Chandpur	-1.91	-2.71
Dhaka-Hobigonj	-2.85	-3.34*
Dhaka-Chittagong	3.17	-3.78**

Davidson-Mackinnon (1993) asymptotic critical values are
-3.13 at 10 %, -3.41 at 5 % &- 3.96 at 1% level of significance
*** Significant at 1% level * * Significant at 5 % level * Significant at 10 % level

Mustard market

Mustard prices at both harvest and pre-harvest periods were non-stationary (Table 19). These non-stationary series were all turned stationary at first differencing during harvest time and with first differencing also at pre-harvest time excepting Mymensingh, which required second differencing to make the series stationary.

Co-integration test reveals (Table 20) the mustard (both whole and processed) market pairs were integrated excepting Dhaka- Chittagong during harvest season. But during preharvest season mustard oil markets were highly integrated. Prices move in unison in all the markets together. In general all the markets were integrated (more so in off- season) except Boro (HYV) harvest season markets.

Table 19. Unit root tests for mustard price series.

Markets	**Mustard (whole) price**	
	ADF test at level I(1)	ADF test at first difference I(2)
Dhaka	-0.02	-2.81**
Mymensingh	-0.66	-3.81***
Raj shahi	-2.09	-3.35**
Khulna	-0.56	-3.23**
Barisal	-1.43	-3.73***
Hobigonj	-0.71	-2.79.*
Chittagong	-2.12	-3.22**

Markets	Mustard (oil) price		
	ADF test at level I (1)	ADF test at first difference I (2)	ADF test at second difference I (3)
Dhaka	-1.58	-3.77***	-
Mymensingh	-1.73	-2.25	-3.20**
Rajshahi	-0.45	-3.61***	-
Khulna	-0.40	-3.81***	-
Barisal	-0.96	-5.14***	-
Hobigonj	-0.25	-3.01**	-
Chittagong	-1.38	-3.68***	-

Dickey-Fuller (1979) critical values (τ values)
-2.57 at 10 % level, -2.86 at 5 % level & -3.43 for 1% level of significance
*** Significant at 1 % level ** Significant at 5 % level * Significant at 10 % level

Table 20. Cointegration test results for market pairs of mustard between 1986-2005.

Mustard (whole) price

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Mymensingh	-0.03	-3.64**
Dhaka-Rajshahi	-0.61	-3.21*
Dhaka-Khulna	-3.89	-3.68**
Dhaka- Barisal	-1.75	-3.59**
Dhaka-Hobigonj	-2.17	-3.18*
Dhaka-Chittagong	-2.09	-2.84

Mustard (oil) price

Market pairs	Engle-Granger test at first difference	Engle-Granger test at second difference
Dhaka-Mymensingh	-2.54	-4.41***
Dhaka-Rajshahi	-2.63	-4.44***
Dhaka-Khulna	-0.73	-4.41***
Dhaka- Barisal	-1.34	-4.05***
Dhaka-Hobigonj	0.65	-4.30***
Dhaka-Chittagong	1.54	-4.07***

Davidson-Mackinnon (1993) asymptotic critical values are
-3.13 at 10 %, -3.41 at 5 % &- 3.96 at 1% level of significance
*** Significant at 1 % level * * Significant at 5 % level * Significant at 10 % level

4. CONCLUSIONS AND POLICY IMPLICATIONS

Aman HYV markets were highly interdependent in terms of price changes during both production and off-season except Dhaka-Moulvibazar for Aman HYV paddy/ rices. Any price support policy for Aman HYV crop should be separately designed for Moulvibazar region to make it effective.

During harvest season, fifty-two percent of Boro HYV markets were not integrated. That is prices were determined with regional demand supply forces. But,-during pre-harvest (slack season) most of the paired markets got integrated. As of co-integration test, Dhaka prices did not influence regional markets during harvest season, but had strong inter-linkages (50% markets) with regional markets during slack season of supply.

Sixty-one percent of paired wheat markets were strongly integrated during harvest season as of paired correlation test. All the markets for processed wheat were highly integrated. Cointegration test reveals that Dhaka price had strong relationship with regional markets both for whole wheat and wheat flour (atta).

Lentil markets were segregated to each other largely both in production and lean season of supply as revealed by the paired correlation test. But co-integration test revealed that the Dhaka lentil price had strong price relationship with other 5 regional markets except Rajshahi (in production season) and Chandpur in slack supply season.

Mustard and mustard oil markets were highly integrated. Only Dhaka-Chittagong markets showed little price relationship during production season as indicated by the co-integration test.

If price series are found non-stationary then- results of co-integration tests are more convincing for acceptance rather then using correlation coefficients. Therefore, it is suggested that the results of co-integration test received in this study should guide the recommendations on the level of price relationship between/among markets. Every product has a unique marketing system and thus shows unique price relationship between spatially separated markets. Price policy prescriptions should follow each marketing situation taking cognizance of market integration level among regions. The present study revealed that the level of prices integration/ association has improved over the years. Commodity markets were largely integrated but interestingly, Boro HYV paddy in the surpluses regions showed not so well integrated. For this commodity, if any procurement price is declared to support farmer prices, that should be decided on the basis of regional markets. A single price would not benefit all farmers equally.

An important finding of the study is (both seasonal and off-seasonal markets) that Dhaka market is significantly integrated to regional markets of each commodity (exception Boro HYV). Dhaka proved to be a very influencing central market for the commodities studied.

Dhaka serves as central depot of distribution of many agricultural commodities. In general, there is absence of segmentation of markets of the selected commodities with Dhaka market which implies that price analysis and formulation of policies at the aggregate level is valid and will be pertinent for policy implementation. Of course, regional markets shall also have to be developed establishing more wholesale markets at district / upazila headquarters having concomitant development of roads/ highways between them helping more markets to be integrated (as not all markets are highly integrated yet).

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There is variation to the extent of integration between production season and off-season, and primary products and processed primary products. Off-season markets were more

integrated than production season. To reduce this gap, policies for the development of storage facility by the private sector has to be encouraged and cost of storage shall have to be reduced (e.g. by lowering electricity charges). Value addition activities by processing shall have to be encouraged, also. Policies should be designed for commodity development keeping eye on variation in market linkages between harvesting season and lean period season. Different
policy prescriptions are worth depending on the seasonality of supply.

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