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Research Note

YIELD, PRICE AND INCOME INSTABILITY OF DIFFERENT CROPS IN JESSORE DISTRICT

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ABSTRACT

The paper examines the nature and degree of instability in yields, prices and gross returns of different crops in Jessore district. Considering the coefficient of variation around the trend (CV_t) of prices and gross returns, cereal crops were found to be relatively less risky compared to other crops. Price instability was higher than yield instability. The study emphasizes the need for price stabilization of agricultural commodities. Crop yield instability was also high. This necessitates intensive training of farmers and extension agents in matters of farm management and planning.

1. INTRODUCTION

A variety of risks and uncertainties adversely affects the optimization process of investment and production decisions in agriculture (Saxena *et al.* 1978) Among different types of risks and uncertainties yield, price, technological change and institutional factors are the most important. Yield variability is caused by weather fluctuations and diseases. The main factors responsible for price fluctuations are unstable national and international commodity prices and shifts in government policies. In such conditions, producers do not only aim to maximize income but also to reduce the risk. The measure of risk, affecting a producer, is the variability of income (Singh and Zilberman,1984).

In this paper attempt has been made to examine the nature and degree of instability in yields, prices and gross returns of different crops in Jessore District. Since these instabilities are not the same for all crops, the farmers must decide which combination of crops to choose in order to reduce his income instability. Such knowledge of stability will also be of help to the farmers in making suitable production and investment decisions and to the financing institutions in judging the repayment capacity and risk bearing ability of the farmers (Ganqwar *et. al.* 1971).

The paper has been organized in four sections. The next section briefly discusses the sources of data and the analytical procedures of the study. Some results pertaining to yield,

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price and gross return instability are discussed in section III. The conclusions and policy implications of the paper are presented in the final section.

II. DATA AND ANALYTICAL PROCEDURES

Sources of the Data

For the study, time series data of yields and prices of different crops for 17 years from 1973-74 to 1989-90 of Jessore district were used. Secondary yield data were collected from various published sources (BBS 1985, 1987, 1989 and 1993; and Hamid, 1991) while secondary price data were obtained from the office of District Marketing Officer, Department of Agricultural Marketing, Jessore. The gross return figures were obtained by multiplying the average yield per hectare with the prices of the respective crops.

Analytical Procedures

To examine the nature and degree of instability in yields, prices and gross returns of different crops in Jessore district, various measures such as coefficient of variation (CV_t) of yields/prices / gross returns, probability of failure (PF) of crop yields, distribution of below average yield obsevations, extent of deviation of actual crop yield from the mean and correlation matrices were worked out.

An index of instability was computed for examining the nature and degree of instability in crop production in Jessore district. The coefficient of variation (CV) of yields/prices/ gross returns was used as the measure of variability. However, simple coefficient of variation does not take note of the trend component inherent in the time-series data. As an alternative, coefficient of variation around the trend (CV_t) rather than coefficient of variation around the mean (CV) was suggested by Cuddy and Della (1978) as a better measure of variability. A linear trend, $Y = a + bt$, was fitted to the indices of yields/ prices/gross returns for the period from 1973-74 to 1989-90 and trend coefficient "b" was tested for significance. Whenever the trend coefficient was found significant, the index of instability was constructed as follows:

$$CV_t = (CV) \times \sqrt{1 - R^2}$$

$$\text{where, } CV = \frac{\text{Standard deviation}}{\text{Mean}} \times 100$$

In words, coefficient of variation around the mean was multiplied by the square root of the proportion of the variation which was unexplained by the trend equation, $Y = a + bt$.

Probability of failure (PF) of crop yields was used with a view to understanding the magnitude of instability associated with crop enterprises. Before computing the PF as a measure of instability, the crop yields were subjected to the test of normality and once the normal distribution of the yields was established, the yield falling 10 per cent below the normal (mean) yield was treated as a failure. The probability of obtaining such yields was treated as probability of failures and used as a measure of instability in crop yields.

Correlation Matrices

The farmers practice diversified farming not only to take advantage of the complementary relationship between enterprises, but also as a device to reduce uncertainty. For this analysis, time series data on yield and price of various farm enterprises are needed to calculate the corresponding income variances. In conjunction with other decision models, this can serve as an effective tool to the decision makers. Diversification to combat risk referred to combining those crops with negative or low positive correlation coefficients.

Three types of crop instabilities are considered in this study.

a) Instability in crop yields which arises from uncertainties in weather conditions, diseases, insects and pests, resources availability and technological change.

b) Instability in product prices resulting from wide fluctuations in prices of outputs which affect the net income of the farmers. These variations may be seasonal, cyclical, secular or random in nature.

c) Instability in gross returns per hectare arising from the interaction of product/yield per hectare and output prices. Instability in gross returns is the primary interest of the farmers as well as the financing agencies.

III. ANALYSIS OF THE RESULTS

Instability of Crop Yields

The yields of practically all crops grown in Jessore district have been varying as a result of weather conditions, technological changes and increased use of inputs. However, this fluctuation has not been uniform among all the crops. Therefore, instability in crop yields has been calculated crop-wise, in order to make the study more meaningful to the actual users.

Table 1 presents the instability in crop yields for different crops grown in Jessore district. It is seen from Table 1 that the coefficients of variation of yield of potato (MV), *aus* (MV), turmeric and lentil were quite high indicating a high degree of instability. Among the grain, aus (MV) had the highest yield instability and transplanted *aman* (MV) had the lowest yield instability. In case of jute, yield instability was low, ranking seventh in the descending order of the value of the coefficient of variation. Among the vegetables, *mukhikachu* had the highest yield instability and cucumber had the lowest yield instability. An examination of Table 1 reveals that vegetables were less risky crops in respect of yield instability.

Among all the crops, potato was found to be the most risky crop in terms of yield instability. According to the opinions of the farmers, potato cultivation was risky due to the frequent attack of pests and diseases. It is interesting to note that potato, predominantly an irrigated crop of the district, had a CV_t of around 22 per cent which was much higher than *aus* (MV) and lentil which were rainfed thereby implying that the cultivation of an irrigated crop in the study district was also risky.

Table 1. Ranking of Crops Based on Coefficient of Variation (CV_t) in Yields, Prices, Gross Returns and Probability of Failure (PF) (1973-74 to 1989-90).

CV_t of yields	Crops	CV_t of prices	Crops	CV_t of gross returns	Crops	PF*	Crops
21.50	Potato (MV)	56.24	Garlic	35.15	Jute	0.37	Potato (MV)
14.56	*Aus* (MV)	52.16	Cabbage	34.59	Turmeric	0.31	Turmeric
14.12	Turmeric	48.24	Cauliflower	32.25	Bean	0.26	Lentil
13.31	Lentil	40.60	Turmeric	28.38	Chickpea	0.18	T.*Aman* (LV)
9.33	*T. Aman* (LV)	38.77	Jute	24.77	Brinjal (Rabi)	0.17	Aus (MV)
9.15	*T.Aman* (MV)	37.94	Green chillies	22.86	Brinjal (Summer)	0.15	Bean
7.88	Jute	36.10	Onion	21.90	Lentil	0.13	Jute
7.12	*Mukhikachu*	33.77	Tomato	21.87	Potato (MV)	0.11	*T. Aman* (MV)
7.00	Bean	32.86	Dry chillies	20.89	Wheat (MV)	-	-
6.00	Linseed	32.26	Indian spinach	20.09	Mustard	-	-
5.93	Radish	30.02	Ribbed gourd	19.25	Aus (MV)	-	-
5.74	Brinjal (summer)	27.98	Potato (MV)	14.15	Boro (MV)	-	-
4.75	Spinach	27.77	Bean	12.69	T. Aman	(LV)	-
4.63	Cucumber	12.65	Ginger	-	-	-	-
-	-	27.07	Pulwal	-	-	-	-
-	-	26.50	Chickpea	-	-	-	-
-	-	24.96	Brinjal	-	-	-	-
-	-	22.31	*Khesari*	-	-	-	-
-	-	16.43	Lentil	-	-	-	-
-	-	15.11	Mustard	-	-	-	-
-	-	13.97	*Aus* (MV)	-	-	-	-
-	-	11.53	*T. Aman* (LV)	-	-	-	-
-	-	10.04	Boro (MV)	-	-	-	-
-	-	8.58	Wheat (MV)	-	-	-	-

Continued to next page

* Normality of yields enables mean yield to be the normal yield, yields less than 10 per cent below the normal yield are treated as failures.

Another index of instability in yields was the probability of failure (PF). As a measure of instability, PF further supported the results of the coefficient of variation analysis (Table 1). The PF of different crops ranged from 0.11 (T. *aman*-MV) to 0.37 (potato). More or less the same pattern of instability was noticed among the crops, the ranking being almost the same. The time series data on rainfall and crop yields (major crops) indicated that the below normal rainfall was not necessarily followed by below normal crop yields. The findings of the study

of Nadakarni and Ghosh *(1978)* revealed that rainfall alone was not responsible for crop yield instability.

The instability and consequential risk in agriculture in terms of yield instability were found in the studey area. Yields over the years did not show any consistant pattern or sequence. Sequential occurrence of below average yields of two or more years enhances yield instability. The time incidence of instability can be obtained by observing the sequence of years with below average yields. Table 2 reveals the distribution of contiguous below average yield observations. It is noted that frequency of five and above contiguous below average yields were not uncommon. In addition, frequency of five and above contiguous below average yields were higher than other categories.

Further information on yield instability may be found by examining the deviation of actual yields from mean yields of different crops. Table 3 indicates the extent to which actual yields deviated from mean yields during the period of 17 years. The severity of yield instability was indicated by the fact that in *75-85* per cent of the observations (in the case of different crops), the actual yields deviated from mean yields by upto 30 per cent.

Correlation Matrices Among Crop Yields

Correlation matrices among yields of various crops of Jessore district were analysed. The degree of association between crop yields signified the relative behaviour of crop yields of different crops grown over time. Diversification to combat risk referred to combining those crops with negative or low positive correlations among the products. Table 4 reveals the annual yield correlations coefficients for various crops in Jessore district. All these crops reacted differently to variations in weather and environmental conditions. It can be seen from table 4 that there is scope for diversification as simple correlation coefficients among some of the crops were not only low but also negative. Risk averse operator farmers might like to combine those crops which had negative or low positive correlation coefficients.

Instability in Product Prices

Instability in product prices undoubtedly exert an important influence on farmers planning decisions. In this study, year to year fluctuations in prices were treated as instability relevant for planning decisions by individual farmers.

In case of product prices, the coefficients of variation ranged from a minimum of about *9* per cent for wheat (MV) to a maximum of *56* per cent.for garlic. It is evident from Table 1 that the price instability of all the food crops was less, indicating the significance of the institutional intervention in marketing of these crops. Jute ranked fifth in price instability. The price instability of vegetables was higher than that of pulses and oilseeds. This means that vegetables were more risky crops than pulses and oilseeds. One possible reason for high instability in prices of vegetables was their bulky nature. Vegetables required larger storage

Table 2. Distribution of Below Average Yield Observations, Jessore District, Bangladesh.

Sl No	Crops	Total number of yield observ-ations	Number of above average yield observa-tions	Number of below average yield observ-ations	Frequency of contiguous below average yield observations					
					No contig-uous below average yield obseva-tions	One contiguous below average yield observ-ations	Two contig-uous below average yield observ-ations	Three contig-uous below average yield observ-ations	Four contig-uous below average yield observa-tions	Five and above contig-uous below average yield observ-ations
1	2	3	4	5	6	7	8	9	10	11
1.	*Aus* (LV)	17	7	10	-	-	-	4	-	6
2.	*Aus* (MV)	17	7	10	2	-	-	-	-	8
3.	T.*Aman* (LV)	17	8	9	-	2	-	-	-	7
4.	*Aman* (BC)	17	4	13	1	2	-	-	-	10
5.	*T. Aman* (MV)	17	9	8	-	-	-	8	-	-
6.	Boro (LV)	17	6	11	1	2	-	-	-	8
7.	Boro (NV)	17	8	9	5	-	-	4	-	-
8.	Wheat (NV)	17	8	9	1	2	-	-	-	6
9.	Jute	17	7	10	-	2	3	-	5	-
10.	Potato	17	7	10	-	2	-	-	-	8
11.	Mustard	17	9	8	1	2	-	-	5	-
12.	Lentil	17	9	8	-	-	-	8	-	-
13.	Chickpea	17	8	9	4	-	-	-	5	-
14.	Linseed	17	10	7	-	-	3	4	-	-
15.	Brinjal (Rabi)	17	5	12	-	2	3	-	-	7
16.	Cucumber	17	9	8	2	-	-	-	-	6
17.	Sweetgourd (*Kharif*)	17	7	10	1	2	-	-	-	7
18.	Turmeric	17	4	13	-	-	-	-	-	13
19.	Bean	17	8	9	-	2	-	-	-	7
20.	Radish	17	8	9	-	2	-	-	-	7
21.	Bittergourd	17	7	10	-	4	-	-	-	6
22.	Spinach	17	6	11	-	-	6	-	5	-
23.	Brinjal (Summer)	17	7	10	-	-	-	4	-	6
24.	*Danta*	17	9	8	1	-	-	-	-	7
25.	*Mukhikachu*	17	8	9	-	-	-	-	-	9

Table 3. Extent of Deviation of Actual Crop Yield from the Mean, Jessore, Bangladesh.

Sl No	Crops	Number of observations with extent of deviation of actual crop yield from the mean										
		Upto 10 percent		11 to 20 percent		21 to 30 percent		Above 30 percent		Total		
		(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(T)
1.	*Aus* (LV)	4	7	1	3	2	-	-	-	7	10	17
2.	*Aus* (MV)	2	3	2	2	2	3	3	2	7	10	17
3.	T. *Aman* (LV)	4	5	3	4	1	-	-	-	8	9	17
4.	*Aman* (BC)	1	7	1	3	-	2	2	1	4	13	17
5.	T. *Aman* (MV)	6	4	3	3	-	1	-	-	9	8	17
6.	*Boro* (LV)	2	5	1	4	1	2	2	-	6	11	17
7.	*Boro* (MV)	5	7	3	1	-	1	-	-	8	9	17
8.	Wheat (MV)	3	3	3	3	-	1	2	2	8	9	17
9.	Jute	4	9	2	-	1	1	-	-	7	10	17
10.	Potato (MV)	-	-	1	6	3	3	3	1	7	10	17
11.	Mustard	8	5	-	2	1	1	1	-	9	8	17
12.	Lentil	4	6	5	-	-	1	-	1	9	8	17
13.	Chickpea	4	6	2	1	1	-	1	2	8	9	17
14.	Linseed	9	5	1	2	-	-	-	-	10	7	17
15.	Brinjal (Rabi)	4	12	-	-	-	-	1	-	5	12	17
16.	Cucumber	9	8	-	-	-	-	-	-	9	8	17
17.	Sweetgourd (*Kharif*)	3	4	1	6	2	-	1	-	7	10	17
18.	Turmeric	-	5	-	8	1	-	3	-	4	13	17
19.	Bean	4	2	1	6	2	1	1	-	8	9	17
20.	Radish	4	5	2	4	2	-	-	-	8	9	17
21.	Bittergourd	5	9	2	1	-	-	-	-	7	10	17
22.	Spinch	4	11	2	-	-	-	-	-	6	11	17
23.	Brinjal (Summer)	1	6	4	2	2	2	-	-	7	10	17
24.	*Danta*	8	6	1	2	-	-	-	-	9	8	17
25.	*Mukhikachu*	2	2	6	7	-	-	-	-	8	9	17

(+) Deviation in positive direction.
(-) Deviation in negative direction.
(T) Total of the positive and negative observatons.

Table 4. Simple Correlation Matrix of Detrended Yields of Different Crops in Jessore District (1973-74 to 1989-90).

Sl. No.	Crops	Aus (LV)	Aus(MV)	T. Aman (LV)	Aman (Bc)	T. Aman (MV)	Boro (LV)	Boro (MV)	Wheat (MV)	Jute	Potato (MV)	Mustard	Lentil	Chickpea	Linseed	Brinjal (Rabi)	Cucumber	S. gourd (Kharif)	Turmeric	Bean	Radish	B. gourd	Spinack	Brinjal (Sum.)	Dhata	Mukhikachu
1.	Aus (LV)	1.00	0.34	0.41	-0.23	0.46*	0.18	0.26	-0.49*	0.49*	-0.78**	0.47*	0.13	0.33	0.18	0.14	0.32	-0.40	0.73**	0.40	0.12	-0.30	0.19	0.12	0.74**	0.82**
2.	Aus (MV)		1.00	-0.13	-0.31	0.02	0.23	0.32	-0.28	0.30	-0.24	0.34	0.10	0.19	0.23	-0.03	0.19	-0.17	0.44	0.18	0.06	0.02	0.01	-0.07	0.28	0.39
3.	T. Aman (LV)			1.00	0.30	0.57**	0.42	0.32	0.29	0.29	-0.43	0.43	0.31	0.40	0.38	-0.12	-0.15	-0.25	0.52*	0.45*	-0.50*	-0.30	0.13	0.20	0.69**	0.15
4.	Aman (Bc)				1.00	0.51*	0.07	0.23	0.52*	-0.46*	0.06	0.18	0.40	0.27	0.38	0.13	-0.27	-0.21	-0.41	-0.19	-0.50*	-0.64**	0.20	-0.02	-0.01	-0.35
5.	T. Aman (MV)					1.00	-0.11	0.12	0.05	0.09	-0.68**	0.48*	0.25	0.36	0.42	0.25	0.09	-0.26	0.27	0.21	-0.26	-0.65**	0.44	0.16	0.58**	0.47*
6.	Boro (LV)						1.00	0.55**	0.08	0.09	0.15	0.04	0.32	0.46*	0.07	-0.24	-0.56**	-0.04	0.45*	0.18	-0.32	-0.06	-0.45*	-0.32	0.12	-0.20
7.	Boro (MV)							1.00	0.21	0.17	-0.06	0.65**	0.75**	0.75**	0.61**	-0.22	0.05	-0.25	0.42	0.22	0.01	0.04	0.28	-0.13	0.44	-0.14
8.	Wheat (MV)								1.00	-0.34	0.29	0.01	0.16	-0.01	0.45*	-0.04	-0.07	-0.20	-0.30	-0.26	-0.45*	-0.13	0.19	0.16	-0.13	-0.54*
9.	Jute									1.00	-0.33	0.26	0.04	0.13	0.02	0.07	0.06	-0.04	0.52*	0.20	0.44	0.32	-0.13	0.12	0.58**	0.35
10.	Potato (MV)										1.00	-0.46*	0.11	-0.05	-0.11	-0.28	-0.38	0.44	-0.60**	-0.50	-0.05	0.46*	-0.45*	-0.01	-0.79**	-0.80**
11.	Mustard											1.00	0.71**	0.64**	0.79**	-0.37	0.41	-0.25	0.49*	0.60**	-0.10	-0.04	0.63**	0.41	0.75**	0.31
12.	Lentil												1.00	0.83**	0.74**	-0.53*	0.01	0.05	0.14	0.27	-0.18	0.06	0.25	0.25	0.32	-0.18
13.	Chickpea													1.00	0.59**	-0.24	-0.06	0.02	0.44	0.29	-0.21	0.04	0.25	0.13	0.46*	-0.02
14.	Linseed														1.00	-0.26	0.34	-0.20	0.22	0.19	-0.35	-0.13	0.54*	0.57**	0.43	0.04
15.	Brinial (Rabi)															1.00	0.20	-0.22	0.09	-0.40	0.27	-0.30	0.01	-0.28	-0.03	0.36
16.	Cucumber																1.00	-0.50*	0.10	0.09	0.31	0.09	0.62**	0.45*	0.28	0.51*
17.	Sweetgourd (Kharif)																	1.00	-0.11	0.05	-0.01	0.44	-0.23	-0.08	-0.38	-0.35
18.	Turmeric																		1.00	0.64**	-0.02	0.05	0.14	0.01	0.74**	0.55**
19.	Bean																			1.00	-0.21	0.08	0.18	0.08	0.65**	0.38
20.	Radish																				1.00	0.43	0.02	-0.23	-0.08	0.15
21.	Bittergourd																					1.00	-0.06	0.15	-0.16	-0.34
22.	Spinach																						1.00	0.34	0.41	0.16
23.	Brinjal (Summer)																							1.00	0.18	0.18
24.	Danta																								1.00	0.55**
25.	Mukhikacher																									1.00

** Significant at 1 per cent probability.

* Significant at 5 per cent probability.

space resulting in higher cost of storage. Another possible reason might be high transport cost of vegetables as these were perishable crops and required quicker transportation. Their yearly supply fluctuations, therefore, were not easily smoothened out. So, there was need for price stabilization of vegetables. But, it is to be noted that low correlation (Table 5) between the prices of different crops made such price stabilization not a difficult task.

The price instability of garlic was found to be around 56 per cent which was higher when compared to yield instability of MV potato (about 22 per cent). The results of the study reveal that price instability was higher than yield instability. Similar results were found by Mruthyunjaya and Sirohi (1979), Bhowmick (1982) and Shahabuddin (1983). In contrast to these, Gajanana (1990) observed that yield instability was higher than price instability.

Instability in Gross Returns

Ultimately, the farmers are interested in net return and its instability between alternative crops. The variation in net return is closely related to instability in gross return due to the relative stability of costs in the short period. Moreover, due to the non-availabity of time series data regarding costs for individual crops, we have used gross return for computing crop income instability.

The gross return instability of different crops grown in Jessore is given in Table 1. In the case of gross return, the coefficients of variation ranged from a minimum of about 13 per cent for transplanted aman (LV) to a maximum of 35 per cent for jute. It is observed from Table 1 that vegetables were a bit risky as compared to other crops. The non-cereal crops were again found risky as compared to cereal crops. This leaves some scope for stabilizing the farm returns by incorporating these relatively stable crops in farm plans.

Simple correlation matrix of detrended gross returns is presented in Table 6. It can be seen from the table that there is scope for diversification as simple correlation coefficients among majority of the crops were not only low but also negative.

IV. CONCLUSIONS AND IMPLICATIONS

The analysis of the present study concludes that agriculture in Jessore district was highly unstable and risky, characterized by fluctuations in farm income resulting from instability in both yield and price. It is observed that price instability was higher than yield instability. Considering the CV_t of prices and gross returns, cereal crops were found to be relatively less risky compared to others crops.

The study indicates a high degree of instability in farming. This needs immediate attention by the policy makers, administrators and researchers. Crop price variability was found to be higher than yield variability. Thus, there is need for price stabilization of agricultural commodities. The price instability of all the food crops (rice and wheat) were less compared to other crops, indicating the significance of the institutional intervention in

Table 5. Simple Correlation Matrix of Detrended Prices of Different Crops in Jessore District (1973-74 to 1989-90).

SL No.	Crops	Aus (MV)	T. Aman (LV)	Boro (MV)	Wheat (MV)	Jute	Potato(MV)	Lentil	Chickpea	Khesari	Mustard	Onion	Garlic	Dry Chillies	Green Chillies	Ginger	Turmeric	Brinjal	Bean	Tomato	Cabbage	Cauli flower	Indian Spinach	Ribbed Gourd	Pulwal
1.	Aus (MV)	1.00	0.27	0.22	0.17	0.10	0.07	-0.09	-0.37	-0.02	0.18	-0.02	-0.09	0.34	0.26	0.21	0.04	0.32	0.01	-0.06	0.37	-0.32	-0.01	-0.16	0.21
2.	T. Aman (LV)		1.00	0.61**	-0.10	0.41	0.07	0.09	0.37	0.05	0.59**	0.22	-0.33	0.31	0.03	0.01	0.37	0.14	0.17	0.33	0.26	-0.25	0.33	0.13	-0.03
3.	Boro (MV)			1.00	0.32	0.43	0.13	0.06	0.18	-0.01	0.49*	0.57**	-0.20	0.41	0.31	0.15	0.19	0.25	0.08	0.29	0.20	-0.24	0.16	0.23	-0.07
4.	Wheat (MV)				1.00	0.08	0.03	-0.02	-0.10	-0.07	0.08	0.41	0.61**	0.55**	0.58**	0.51*	-0.23	0.16	0.33	0.06	-0.09	0.13	-0.08	-0.12	0.23
5.	Jute					1.00	-0.18	-0.36	-0.01	-0.44	0.33	-0.02	-0.55**	0.54*	0.27	-0.54*	0.83**	0.17	0.06	0.44	0.30	-0.26	0.69**	0.26	-0.00
6.	Potato (MV)						1.00	0.84**	0.34	0.59**	0.59**	0.69**	0.06	0.12	0.26	0.29	-0.04	0.81**	0.46*	0.51*	0.51*	0.47*	-0.11	0.67**	0.81**
7.	Lentil							1.00	0.67**	0.58**	0.47*	0.66**	0.13	0.08	0.23	0.33	0.24	0.66**	0.53*	0.38	0.29	0.64**	-0.29	0.69**	0.61**
8.	Chickpea								1.00	0.36	0.46*	0.32	-0.04	0.21	0.27	0.01	0.02	0.32	0.50*	0.26	0.01	0.61**	-0.10	0.64**	0.09
9.	Khesari									1.00	0.56**	0.22	0.31	-0.03	0.23	0.13	-0.09	0.31	0.28	-0.04	0.13	0.56**	-0.35	0.19	0.33
10.	Mustard										1.00	0.43	-0.05	0.61**	0.59**	0.01	0.43	0.61**	0.39	0.38	0.24	0.33	-0.11	0.54*	0.42
11.	Onion											1.00	0.11	0.21	-0.23	0.46*	-0.18	0.57**	0.38	0.61**	0.38	-0.17	-0.06	0.49*	0.51*
12.	Garlic												1.00	0.14	0.36	0.57**	-0.53*	-0.05	0.33	-0.28	-0.51*	0.45*	-0.35	-0.30	0.28
13.	Dry Chillies													1.00	0.89**	0.13	0.32	0.54**	0.49*	0.14	-0.01	0.27	0.14	0.36	0.31
14.	Green Chillies														1.00	0.17	0.15	0.57**	0.50*	0.02	-0.13	0.52*	-0.08	0.40	0.36
15.	Ginger															1.00	0.81**	0.19	0.11	-0.22	-0.18	0.03	-0.62**	-0.12	0.31
16.	Turmeric																1.00	0.17	0.15	0.48*	0.36	-0.04	0.81**	0.29	0.03
17.	Brinjal																	1.00	0.65**	0.46*	0.53*	0.48*	0.08	0.79**	0.82**
18.	Bean																		1.00	0.45**	0.27	0.73**	0.32	0.52*	0.69**
19.	Tomato																			1.00	0.67**	0.10	0.64**	0.54*	0.51*
20.	Cabbage																				1.00	-0.11	0.39	0.35	0.42
21.	Cauli flower																					1.00	-0.11	0.56**	0.51*
22.	Indian Spinach																						1.00	0.15	0.15
23.	Ribbed Gourd																							1.00	0.52*
24.	Pulwal																								1.00

** Significant at 1 per cent probability.

* Significant at 5 per cent probability.

Table 6. Simple Correlation Matrix of Detrended Gross Returns of Different Crops in Jessore District (1973-74 to 1989-90).

SL. No.	Crops	Aus (MV)	T. Aman (LV)	Boro (MV)	Wheat (MV)	Jute	Potato (MV)	Mustard	Lentil	Chickpea	Brinjal (Rabi)	Brinjal (Sum.)	Turmeric	Bean
1.	Aus(MV)	1.00	-0.28	0.18	0.01	-0.04	0.09	-0.12	-0.14	-0.36	0.14	-0.09	-0.29	-0.14
2.	T. Aman (LV)		1.00	0.41	0.25	0.42	0.34	0.71**	0.41	0.64**	0.44	0.51*	0.52	0.59**
3.	Boro (MV)			1.00	0.33	0.42	0.24	0.44	0.25	0.28	0.36	0.3	0.34	0.35
4.	Wheat (MV)				1.00	0.47*	0.27	-0.05	-0.29	-0.29	-0.04	0.04	0.31	-0.08
5.	Jute					1.00	-0.05	0.54*	0.01	0.17	0.38	0.52*	0.80**	0.25
6.	Potato (MV)						1.00	0.35	0.38	0.09	0.45*	0.56**	0.12	0.25
7	Mustard							1.00	0.68**	0.74**	0.67**	0.81**	0.76**	0.71**
8	Lentil								1.00	0.77**	0.64**	0.61**	0.33	0.45**
9	Chickpea									1.00	0.40	0.43	0.45*	0.84**
10.	Brinjal (Rabi)										1.00	0.87**	0.41	0.64**
11	Brinjal (Sum.)											1.00	0.59**	0.63**
12	Turmeric												1.00	0.38
13	Bean													1.00

** Significance at 1 per cent per cent probability.
* Significance at 5 per cent probability

marketing of food crops. It appears that the procurement policy pursued by the Government of Bangladesh would help stabilize rice price to a great extent but it involves considerable amount of social cost. In order to reduce the social cost, farmers organization should grow for building up storage facility in colleraboration with banks. Recent experiment on *SHOGORIP* (*shassha godam rean parkhalpa*) is an encouraging experiment in this aspect. Crop yield instability was also high. This necessitates intensive training of farmers and extension agents in matters of farm management and planning.

Further, the results of this study serve as a guide line to financing agencies and also to agencies involve in crop insurance, by showing the extent of yield, price and income instabilities in different crops of Jessore district.

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