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STUDY OF PRICE VOLATILITY OF SOYBEAN IN MAJOR MARKETS OF MAHARASHTRA STATE

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ABSTRACT

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Soybean is the leading oilseed produced globally. It paly significant role in total oilseed production of India. Maharashtra is the second largest producer of soybean after Madhya Pradesh in India. The present study aimed to study the price volatility of soybean among the major soybean markets of Maharashtra. For study purpose the data related to monthly modal prices of soybean were collected from major markets viz. Latur, Khamgaon (Buldhana), Nagpur and Higanghat (Wardha) for the period January, 2002 to December, 2018. There were persistent fluctuations over a period of time in the major markets and it was maximum in Nagpur market.

KEY WORLDS: ***Markets, Price volatility, Modal prices***

JEL Key words: C49, E30, E37

1. INTRODUCTION

Soybean (*Glycine max* L.) is known as 'golden bean' and grown all over world for dual purpose that is oil seed as well as pulse crop. The crop also has a prominent place as the world's most important seed legume, which contributes 25 per cent to the global vegetable oil production, about two thirds of the world's protein concentrate for livestock feeding and is a valuable ingredient in formulated feeds for poultry and fish. About 85 per cent of the world's soybean is processed annually into soybean meal and oil. The major soybean producing nations are the United States, Brazil and Argentina. The three countries dominate global production, accounting for 80 per cent of the world's soybean supply. Global production of soybean has grown at a CAGR of 4.1 per cent from 282.749 million metric tons in 2013-14 to 346.919 million metric tons in 2017-18.

Production of soybean in India is dominated by Madhya Pradesh and Maharashtra states which contribute to 89 per cent of the total soybean production in the country. Rajasthan, Telangana, Karnataka, Chhattisgarh and Gujarat states contribute the remaining 11 per cent of production. Maharashtra state the potential of becoming the leader in soybean. It is a kharif crop, cultivated in month of June to July and harvested by September to November. This paper examines volatility of prices of soybean in major market of Maharashtra.

2. MATERIALS AND METHODS

The secondary data on monthly modal prices (Rs/qtl) were collected for the period from January, 2002 to December, 2018 from the records maintained by the market committees of Latur, Khamgaon (Buldhana), Nagpur and Higanghat

(Wardha), the major soybean markets in the Maharashtra.

2.1 ARCH model

Autoregressive Conditional Heteroscedasticity models are specially designed to model and forecast conditional variances. The variance of the dependent variable is modeled as a function of past values of the dependent variable and independent or exogenous variables. ARCH and GARCH (Generalized ARCH) models are widely used in various branches of econometrics, especially in financial time series analysis.

2.2 GARCH model

Before fitting the GARCH model, autoregressive integrated moving average (ARIMA) filtration was done to identify the best fit ARCH term and then GARCH model was fitted (Bollerslev, 1986). The representation of the GARCH (p, q) is given as:

$$Y_{it} = a_0 + b_1 Y_{i,t-1} + b_2 Y_{i,t-2} + \varepsilon_{i,t} ; \quad t = 1,2\ldots\ldots\ldots,T$$

$$\Sigma_{it}^2 = \text{Constant} + \alpha_i \varepsilon_{i,t}^2 + \beta_i \sigma_{i\,t-1}^2$$

Where, Y_{it} is the price index in time 't' of commodity 'i'. $\sigma_{i,t}^2$ denotes the variance of e_t conditional upon information up to period t-1. The fitted values of $\sigma_{i,t}^2$ give the measure of uncertainty of Y_{it}. The sum of $a_i + b_i$ gives the degree of persistence of volatility in the series.

3. RESULTS AND DISCUSSION

In order to assess the presence of volatility in soybean prices in major markets of Maharashtra, ARCH-GARCH analysis was carried out for the price series of selected markets viz Latur, Khamgaon, Nagpur and Higanghat.The sum of Alpha and Beta indicated ARCH and GARCH affect for the given markets (Table-1). The value close to one indicates persistence of volatility in the prices of soybean in selected markets.

The volatility of prices was more influenced by acreage adjustments driven by the lagged price, production variation in the different states, distribution of rainfall, prices of the competing crops, export demand, prices of the competing crops *etc.* When all or some of these factors operate, soybean prices exhibited volatility. Under these conditions, if farmers are given the right market advisory, they can take advantage of the same for the additional net returns.

3.1 Volatility of soybean prices in selected markets

The analysis revealed some unprecedented volatility in soybean prices. From the results (Table) it is inferred that there was high volatility in Nagpur and Higanghat markets for soybean prices as the sum of Alpha and Beta values were 0.99 next followed by Latur market ($\alpha+\beta = 0.92$) and Khamgaon market ($\alpha+\beta = 0.88$) during the period from January, 2002 to December, 2018. These values were very close to one, indicating that the volatility shocks were quite persistent in these markets.

Table. 1 Results of ARCH-GARCH analysis

Particulars	Latur	Khamgaon	Nagpur	Hinganghat
Alpha (α)	0.96	0.94	0.95	0.98
Beta (β)	-0.04	-0.06	0.04	0.01
$\alpha + \beta$	0.92	0.88	0.99	0.99

3.2. Variations in Prices of chillies over time

Price movements of soybean in major markets of Maharashtra are presented in Table-2 (See annexure)

3.2.1 Latur market

Soybean prices in Latur market for the period from January, 2002 to December, 2018 have indicated wide variations with the prices ranging from Rs.4,600 in September, 2012 to Rs.1,007 in October, 2002. An all time high price of Rs. 4,600 was reached in September, 2012.

3.2.2 Khamgaon market

Soybean prices in Khamgaon market for the period from January, 2002 to December, 2018 have indicated wide variations with the prices ranging from Rs.4,375 in July 2012 to Rs.1,035 in October, 2005. An all time high price of Rs. 4,375 was reached in July, 2012.

3.2.3 Nagpur market

Soybean prices in Nagpur market for the period from January, 2002 to December, 2018 have indicated wide variations with the prices ranging from Rs.4,400 in July, 2012 to Rs.1,100 in October, 2004. An all time high price of Rs. 4,400 was reached in July, 2012.

3.2.4 Higanghat market

Soybean prices in Higanghat market for the period from January, 2002 to December, 2018 have indicated wide variations with the prices ranging from Rs.4,000 in May, 2014 to Rs.1,035 in October, 2001. An all time high price of Rs. 4,000 was reached in May, 2012

4. CONCLUSIONS

The sum of Alpha and Beta indicated ARCH and GARCH affect for the given markets. The value close to 1indicates the persistence of shocks or volatility in the market. Therefore it could be inferred that, soybean prices in all the markets had persistent fluctuations over a period of time and it was maximum in Nagpur market.

5. REFERENCES

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ANNEXURE

Table 2. Price Movement of Soybean in Major Markets of Maharashtra (2002 to 2018)

Markets	Years / Months	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Latur	Jan	985	1290	1495	1210	1160	1390	2050	2170	2210	2275	2360	3145	3565	3340	3700	2780	3200
	Feb	1000	1390	1510	1225	1170	1415	2080	2260	2180	2320	2400	3100	3740	3340	3770	2750	3790
	Mar	1040	1400	1610	1300	1160	1530	2100	2280	1970	2200	2620	3570	4040	3345	3780	2750	3660
	Apr	1125	1500	1760	1300	1275	1630	2170	2490	1960	2340	3150	4010	4200	3550	4100	2850	3680
	May	1316	1550	1855	1210	1321	1580	2190	2620	1890	2330	3280	3825	4450	3875	3990	2750	3670
	Jun	1325	1500	1600	1230	1295	1565	2610	2410	1870	2280	3405	3790	4330	3500	3910	2690	3400
	Jul	1275	1350	1750	1250	1300	1690	2800	2220	1930	2300	4450	3700	4120	3560	3700	2850	3500
	Aug	1250	1190	1800	1190	1310	1580	2570	2370	2050	2390	4501	3260	4070	3300	3530	2980	3475
	Sep	1175	1220	1600	1175	1305	2410	2580	2050	1940	2399	4600	3480	3500	3300	3450	2900	3530
	Oct	1007	1050	1160	1100	1180	1450	1720	2100	2000	2010	2900	3310	3100	3900	2700	2800	3250
	Nov	1293	1250	1180	1060	1350	1760	1700	2320	2021	2050	3110	3655	3330	3700	2750	2555	3400
	Dec	1300	1450	1270	1050	1330	1830	1750	2325	2050	2200	3180	3655	3250	3650	2850	2890	3300
Khamgaon	Jan	978	1300	1427	1172	1089	1295	1909	2008	2104	2110	2310	3140	3250	3075	3715	2725	3050
	Feb	1002	1395	1414	1095	1107	1318	1995	2213	2058	2250	2395	3005	3550	3062	3550	2705	3337
	Mar	1010	1400	1577	1222	1118	1304	2110	2057	1850	2155	2660	3192	3775	3040	3550	2650	3425
	Apr	1086	1490	1702	1166	1130	1545	2025	2323	1820	2200	2870	3860	3825	3112	3955	2725	3400
	May	1173	1535	1975	1117	1253	1473	2145	2414	1791	2257	3170	3800	4252	3650	3775	2607	3375
	Jun	1371	1425	1850	1173	1152	1475	2536	2396	1725	2145	3150	3662	3925	3187	3650	2612	2985
	Jul	1360	1235	1735	1222	1185	1630	2732	2086	1945	2212	4375	3505	3950	3500	3350	2725	3375
	Aug	1451	1115	1512	1161	1252	1550	2475	2262	1919	2337	4200	3325	3562	3162	3312	2775	3212
	Sep	1200	1150	1450	1120	1105	1375	2630	1917	1852	2300	3975	3281	3207	3120	3100	2785	2975
	Oct	1160	1046	1122	1035	1095	1472	1615	1951	1937	1930	2842	3200	3120	3712	2590	2075	3000
	Nov	1293	1194	1150	1050	1220	1625	1477	2173	1967	1990	3047	3395	3112	3640	2730	2425	3200
	Dec	1260	1148	1171	1050	1178	1637	1682	2250	1987	2195	3185	3490	3050	3355	2710	2675	3162
Nagpur	Jan	978	1300	1440	1223	1126	1375	2020	2100	2143	2142	2340	3195	3090	3044	3520	2776	3049
	Feb	1002	1395	1500	1220	1120	1350	2050	2202	2116	2325	2340	3045	3324	3100	3449	2709	3581
	Mar	1010	1400	1675	1212	1145	1450	2212	2208	1951	2215	2575	3392	3575	3070	3462	2675	3555
	Apr	1086	1475	1700	1250	1170	1500	2150	2490	1940	2297	3017	3812	3600	3275	3845	2771	3605
	May	1173	1501	1700	1183	1300	1550	2300	2560	1872	2335	3150	3825	4000	3515	3719	2775	3462
	Jun	1371	1428	1450	1220	1240	1500	2410	2430	1803	2255	3214	3760	3735	3375	3690	2650	3150
	Jul	1360	1331	1845	1190	1250	1650	2700	2139	1900	2285	4400	3565	3675	3523	3450	2750	3606
	Aug	1451	1170	1800	1191	1300	1475	2500	2176	2075	2350	4200	3155	3695	3125	3488	2823	3325
	Sep	1200	1267	1470	1160	1200	1535	2380	1910	1892	2344	3550	3190	2850	3187	3200	2905	3181
	Oct	1160	1130	1100	1100	1150	1500	1650	1926	2028	2007	2811	3285	2885	3666	2900	2662	2888
	Nov	1293	1200	1150	1080	1260	1700	1480	2292	2038	2040	2995	3310	3110	3572	2749	2600	3289
	Dec	1260	1311	1255	1081	1300	1750	1700	2361	1933	2140	3051	3300	3070	3394	2800	2809	3243
Higanghat	Jan	1005	1290	1484	1250	1104	1391	2034	2093	2224	2213	2358	3153	3350	3095	3300	2600	3000
	Feb	1002	1350	1510	1205	1110	1395	2018	2207	2195	2289	2407	3148	3256	3100	3250	2650	3400
	Mar	1035	1382	1580	1251	1124	1360	2150	2220	1970	2118	2575	3372	3555	3069	3275	2575	3300
	Apr	1120	1520	1378	1250	1160	1430	2160	2533	1985	2331	2268	3450	3738	3220	3500	2600	3300
	May	1185	1515	1462	1210	1125	1530	2292	2535	1857	2171	3275	3807	4000	3430	3400	2500	3300
	Jun	1345	1447	1535	1234	1266	1440	2412	2437	1877	2200	3323	3676	3900	3227	3375	2600	2800
	Jul	1350	1340	1750	1245	1260	1440	2590	2198	1950	2223	3450	3656	3850	3449	3300	2550	3300
	Aug	1420	1150	1800	1203	1288	1460	2585	2242	2066	2276	3530	3329	3675	3150	3175	2600	3100
	Sep	1330	1200	1585	1190	1248	1430	2135	2006	1949	2346	3365	3250	3250	3100	3000	2775	3000
	Oct	1035	1121	1144	1061	1177	1550	1725	2056	2127	2070	3000	3004	3100	3271	3000	2600	2900
	Nov	1280	1215	1270	1104	1180	1755	1528	2380	2008	2002	3117	3350	2960	3200	3119	2500	3100
	Dec	1270	1358	1285	1008	1195	1820	1733	2400	1982	2198	3209	3318	3077	3500	2775	2700	3000