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Empirical Study of Price Volatility of Staple Foodgrains Commodities During Covid19 in India by GARCH Model using CPI

– Gurvinder Kaur*

Department of Commerce, Sri Guru Teg Bahadur Khalsa College, University of Delhi India

gurvinder_comm@sgtbkhalsa.du.ac.in *https://orcid.org/0000-0002-2693-152X*

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ABSTRACT

Purpose: India is an agriculture-dominated country having different weather conditions conducive to producing various types of foodgrain commodities. Despite good agriculture production as per Economic Survey 2020-21, in particular staple food grain commodities for every household, the imposition of lockdown from March 2020 onwards during the Covid 19 pandemic has changed the supply and demand dynamics, thus leading to the price volatility in staple foograin commodities as well as in concomitant services like health and transportation, etc. which was reflected in Consumer Price Index collected by ministry of MOSPI, Govt. of India.

Design/ Methodology/ Approach: This study investigates the price volatility of staple agricultural commodities for household and services, using consumer price index monthly time-series data (2012 as a base year) obtained from the Reserve Bank of India from Jan. 2019 to Dec. 2020, and analysis was carried out using econometric GARCH model followed by stationarity tests, heteroscedasticity test, autocorrelation test of time-series data for statistical significance.

Findings: The results have shown that some items exhibit significant price volatility than others for the said duration, and the same is further evident from the sum of α, β coefficients estimated using Econometric model analysis.

Paper Type: Empirical Research Paper

KEYWORDS Covid-19 | GARCH model | KPSS test | Eagle ARCH test | LJBQ test | CPI | Price volatility | Agriculture Commodities

****Corresponding Author** (Gurvinder)*

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Introduction

Grains and cereal are the staplefoodgrain commodities for every household and source of the nutrition-rich diet of every human being. India is aland having different weather conditions conducive to producing various types of agricultural grains. The majority of Indians are vegetarian and therefore grains and cereal, and their availability at affordable price plays a crucial role in their dietary system. About 72% of the total working population is engaged in agriculture activities and allied sector activities that account for approximately 17.8 percent of the country's Gross Value Added (GVA) for the year 2019-20 (at current prices). The agriculture sector came up with a robust growth rate of 3.4 percent during 2020-21 (first advance estimates). So, India has set a food grain production target of 298.3 million tonnes for the fiscal year 2020-21 against 291.95 million tonnes in 2019-20 and 285.20 million tonnes in 2018-19 (adopted as it is from Economic Survey 2020-21, Chapter 7). At the same time, to ensure the upward growth-orientated sustainability of the agriculture sector a success and then making availability of agriculture produce to every household at a reasonable price – an appropriate policy measures should be in place. For example, land development, irrigation and extension, promotion of agricultural infrastructure, mechanization and technological upgrading, crop diversification, storage, marketing and management, and appropriate pricing policies, etc. Out of these, the pricing of agriculture commodities has a pervading impact on society, government, and institutions. An imbalance and bottlenecks in the commodities market (availability and price) will be inevitable, arising either due to unforeseen financial cries or any influential global cause, if appropriate policy addressing mechanism were not in place. In this context, Covid 19 pandemic had thrown a devastating influence on many lives of human beings across the globe and we still haven't get rid of its horrendous drama. To contain the spread of pandemic across the second-most populous country in the world (1.35 billion), India has imposed stricter national lockdown from March 2020 onwards and in fact, this period coincided with the commencement of the harvesting season for the Rabi crops. Due to lockdown, several industries stopped their production, no movement of the farm machinery from one place to another place, and migration of the laborers to their native places created a shortage of the farm laborers – altogether created adversity for farming activities. Further, people were forced to stay home or were allowed to enjoy a very restricted movement also caused the shortage of workman strength in various service sectors, thus disrupting the demand and supply balance.

National lockdown periods have caused an imbalance in supply due to the reasons mentioned above and a few others as well, caused volatility in staple food grain prices and other related services was a major concern for every citizen. Price volatility creates an additional risk to poor consumers. Retailers and corporate houses might have found this period golden, thus hoarding the farmers' produce at a lower price and then manipulate the market at a later stage. In this process, poor farmers gain nothing but only big retailers and corporate houses. In other words, despite decent production of farm produce (as mentioned in the Annual Economic Survey 2020-21 report), imbalance in the supply chain caused volatility in the prices of staple commodities which is evident from the consumer price index (CPI). Supply chain disruptions caused by any kind of pandemic has several unique characteristics than the normal supply breakdown, because in this case the frontline workers are scared and concerned about their lives. The similar disruptions were seen in past during epidemic like SARS, Ebola, Swine flu in Africa countries which starts initially from small but scales very fast (Ivanov, 2020). In this context, the present study investigates the price volatility of the staple commodities, for the year 2020 concomitant with the Covid 19 pandemic in comparison to the year 2019, using year-on-year (Y-o-Y) CPI data obtained from the Reserve Bank of India from Jan. 2019 to Dec. 2020 and analyzed using widely adapted general econometric family of GARCH (1,1) model followed by several tests such as KPSS test for stationarity, Eagles ARCH test for heteroscedasticity,and L-Jung-Box Q-test for Autocorrelations to check the statistical significance of time-series data. This study particularly adds relevant knowledge to the existing database of price volatility of staple agriculture commodities in Indian during the global Covid 19 pandemic. The models used for analysis are in general econometric family models.

Literature Review

Raka Saxena *et. al.* studies the price transmission and volatility spillover effects in the 12 major wholesale onion markets in India based on the volume of onion arrivals, and weekly time series data on the prices at these markets from January 2005 to February 2017 (Saxena *et. al.* (2020)). They checked the stationarity of the onion price time-series data and used the VAR model to study the price linkages dependencies among the multiple time series processes. The spillover effects of volatility pattern among between markets was assessed by a univariate specification of the GARCH model followed by Baba–Engle–Kraft–Kroner (BEKK) (1,1) model (Engle and Kroner. (1995)) for individual series. They concluded that own-volatility shocks are generally larger than cross-volatility shocks.

Asha Bisht *et. al.* investigated the volatility in prices of major pulses (chickpea, pigeon pea, black gram, green gram, and lentil) in India using the GARCH model, and price explosion was estimated using the sum of the coefficients obtained from models' analysis (Bisht Asha and Kumar Anil (2019)). Their research finding implies that the shocks in the price system are permanent in the case of pulses and do not reverse to the mean over time, and high volatility largely occurs due to supply shortage, monopolistic behavior of traders, increase in profit margins, information gap and weak infrastructure. It is worth mentioning here some of his earlier agriculture produce-related studies estimating price volatilities in India using the GARCH model (Anuja*et. al*. (2013); Bisht, A. and Kumar, A. (2018); Bhardwaj *et. al*. (2014)).

Gil-Alana examined the price volatility shock by estimating the sum of the coefficients α, β for seven agricultural commodities: rice, wheat, maize, bajra, jowar, black gram, and arhar by bifurcating the study duration into two periods (Gil-Alana and Tripathy (2014)). Their finding shows evidence of mean reversion with the effect of the shocks disappearing in the long run for time-series data including agriculture commodities like rice, wheat, maize, bajra, and jowar, whereas permanent nature of shocks found for the time-series data including black gram and arhar. The end conclusion was – the effect of the shocks will persist forever in case of a negative shock.

Manogna and Mishra investigated empirically the price discovery and volatility spillover in Indian agriculture spot and nine commodities (soybean seed, coriander, turmeric, castor seed, guar seed and chana, cotton seed, rape mustard seed, and jeera) futures markets using Granger causality, vector error correction model (VECM) and exponential generalized autoregressive conditional heteroskedasticity (EGARCH) model (Manognaand Mishra (2020)). They concluded that there exist mutual spillover effects on futures and spot markets, and futures market is more efficient in price discovery of agricultural commodities in India.

Amrouk*et. al.* investigated the price dynamics between staple food and cash crop futures prices and their interaction over time using the multivariate Copula-DCC-GARCH model for the developing countries. To identifythe direction of the volatility spillover, a rolling-sample volatility index was used for staple-cash commodity pairs. They concluded that the quantum of interaction varies significantly over the sample time(Amrouk*et. al.* (202)).

Tule et al. examined the role of agricultural commodity prices in predicting the inflation behavior in Nigeria and found that agricultural commodities predict inflation better than the random walk model - a benchmark model often used for forecasting inflation. (Tule *et. al.* 2019)).

Debashish Maitra studied the presence of a break in volatility is tested by cumulative sum of squares (CUSUM test), followed by generalized autoregressive conditional heteroskedasticity and EGARCH models, and found that seasonality on volatility plays a significant role and cannot be omitted (Maitra (2018)).

Sinha *et.al.* investigated empirically the transmission of price signals and volatility spillover effects between the spot and futures market of black pepper using the VEC-BEKK and Dynamic Conditional Correlation (DCC) model on the price data for the duration of 1st January 2010 - 20th May 2013 collected from NCDEX, India. They concluded that the futures market is the main transmitter of volatility into the spot market resulting in higher persistency in the volatility of the black pepper spot market. (Sinha *et. al.* (2017))

Brümmer*et. al.* studied food price volatility using combination of the GARCH model and a VAR model for volatility drivers and spillover effects by taking into account the data for the oilseeds and vegetable oils markets, and concluded that the volatility drivers are market specific (Brümmer*et. al.* (2015)).In this regard, further, S. Ganneval carried out an empirical study to analyze the impact of volatility on market linkages for homogenous commodities like rapeseed, corn, feed barley, and protein pea French markets over 2006–2013 using Threshold Vector Error Correction Models (TVECM) with two regimes (Ganneval (2015)).

An empirical study using ARIMA and GARCH family of econometric tools was carried out by Janak Raj and Sarat Dhal on the data collected from the RBI, India and a comparison was made for the wholesale inflation rate based on two indicators, i.e., the month-over-month inflation rate and the year-on-year. They derived a conclusion from the model analysis that the standard year-on-year inflation rate could be more meaningful rather than the monthly inflation rate. (Janak and Sarat (2008)).

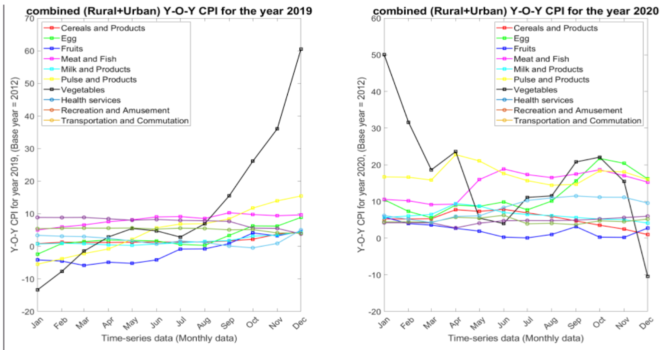
Tomar and Kesharwani (2020) studied the volatility spillover and the connectedness for Indian financial markets using Primary Index, Mid Cap Index, and Small Cap Index; and concluded that 58% of the volatility spillover is from within the model that heavily relies on the size alone. They found that Mid Cap was the largest dispenser of spillover.

Database and Methodology

India is a major producer and consumer of agricultural foodgrains in the world, coupled with two reasons, e.g., vast fertile agricultural land with different weather conditions conducive to grow a variety of crops and the second largest populous country in the world. Out of 1.35 billion population of India, nearly 700 million people are dependent directly or indirectly on agriculture derived livelihood (Hindustan Times. (April 23, 2020)).The literature on the prices volatility of staple food and CPI (inflation) during current pandemic is very limited. This study is motivated by the food security concerns where findings will addknowledge to the existing literature. To quantify the volatility in price, we have collected monthly time-series combined CPI data (base year = 2012), from the Reserve Bank of India for the period of January 2019 to December 2020. The term 'combined' here always refers to Rural + Urban, until and unless stated otherwise. Why Y-o-Y CPI data, instead of monthly CPI data, because of monthly inflation is calculated Y-o-Y basis, whereas yearly inflation is based on average of months". Thus Y-o-Y CPI data will capture the real purchasing power of consumers' income and their welfare during COVID 19 following RBI's standard estimation methodology (page no. 12 of the report). For econometric model-based data analysis, CPI data was divided into two groups, i.e., for the whole year 2019 and 2020. Because the year 2019 was COVID-19 pandemic free and the year 2020 can be regarded as COVID-19 year (from March 2020 onwards until now). Further, we have considered all seven staple household commodities (Cereals & Products, Eggs, Fruits, Meat and Fish, Milk and milk products, Pulses and vegetables) and three other highly affected services sectors (Health, Recreation, and amusement, Transport, and communication). Then a quantitative analysis for price volatility is carried out by estimating the coefficient α from ARCA(1) model and β from GARCH (1) using generalized auto regressive conditional heteroskedasticity GARCH (1,1) model developed by Bollerslev (Bollerslev,1986), followed by various tests for statistical significance of time-series input data. For example, Kwiatkowski–Phillips–Schmidt–Shintest (KPSS) for the stationarity of time-series (Kwiatkowski *et. al.*, 1991), Eagles ARCH test (Eagle, 1982) for heteroscedasticity and L-Jung-Box Q-test (Ljung and Box, 1978) for Auto correlations and their estimated values are listed in the table 1. All these three tests for which $p - values$ are less than the $significance\ level$, the data are statistically significant and carries meaningful information. Those tests for which $p - values$ are greater than the $significance\ level$, the data are statistically insignificant and were highlighted in bold in table 1.

Result and Discussion

Figure 1 shows price volatility in (a) all seven staple household commodities (Cereals & Products, Eggs, Fruits, Meat and Fish, Milk and milk products, Pulses and vegetables), and (b) highly affected services sectors (health, recreation and amusement, transport and communication).



(a) (b)

Figure 1. Combined (rural and urban) year-on-year consumer price index data for (a) the year 2019, and (b) for 2020.

As it is evident from figure 1 (a) that commodity 'vegetable' shows the highest price volatility from July onwards, followed by Pulse and Products (in decreasing sequence) for the year 2019 whilst all other commodities exhibit fairly constant prices. However, the very same trend is not visible for the year 2020 when COVID 19 pandemic was in place and subsequent national lockdown that gripped the entire country. From January 2020 until March 2020, the price volatility is fairly zero as shown in Fig. 1(b), and henceforth household commodities like 'vegetable, Pulse and Products, Meat and Fish, Egg and 'health service' have shown prominent volatilities (in decreasing order).In order to test the statistical significance of the time-series data, before applying GARCH (1 1) model to capture the pedagogic causality of price volatility, various econometric test were conducted, and their numerical values are listed in the Table 1 as below. In a few cases, p-values are greater than significance value thus making those dataset insignificant listed bold.

Table 1: Various tests for the statisticalsignificance of time-series data; like KPSS test for stationarity, Eagles ARCH test for heteroscedasticity, and L-Jung-Box Q-test for Autocorrelations

		Year 2019				Year 2020			
Items	**Name of tests**	***p-value***	***Test statistics***	***Critical value***	***Signif. Level***	***p-value***	***Test statistics***	***Critical value***	***Signif. Level***
Cereals and Products	*KPSS*	0.0100	0.2472	0.1460	0.05	0.0237	0.1794	0.146	0.05
	Eagles	0.0022	9.402	3.8415	0.05	0.0091	6.8118	3.8415	0.05
	LJBQ	0.0169	23.1455	19.6751	0.05	0.0115	24.299	19.6751	0.05
Egg	*KPSS*	0.0215	0.1855	0.1460	0.05	**0.1**	**0.1131**	**0.146**	**0.05**
	Eagles	0.0038	8.3541	3.8415	0.05	0.0106	6.538	3.8415	0.05
	LJBQ	5.94E-04	32.6741	19.6751	0.05	0.0026	28.6672	19.6751	0.05
Fruits	*KPSS*	0.0462	0.1505	0.146	0.05	0.045	0.152	0.146	0.05
	Eagles	**0.0554**	**3.6692**	**3.8415**	**0.05**	0.0191	5.4965	3.8415	0.05
	LJBQ	3.97E-06	45.4926	19.6751	0.05	**0.2151**	**14.3333**	**19.6751**	**0.05**
Meat and Fish	*KPSS*	**0.0318**	**0.1678**	**0.146**	**0.05**	0.0932	0.1227	0.146	0.05
	Eagles	0.0041	8.238	3.8415	0.05	0.0106	6.5395	3.8415	0.05
	LJBQ	7.72E-05	38.0336	19.6751	0.05	0.0088	25.1037	19.6751	0.05
Milk and Products	*KPSS*	0.0232	0.1808	0.146	0.05	0.0687	0.1359	0.146	0.05
	Eagles	0.0015	10.0689	3.8415	0.05	0.0396	4.2335	3.8415	0.05
	LJBQ	8.58E-04	31.6805	19.6751	0.05	0.0456	19.9808	19.6751	0.05
Pulse and Products	*KPSS*	0.1	0.058	0.146	0.05	**0.1**	**0.0752**	**0.146**	**0.05**
	Eagles	0.0013	10.3106	3.8415	0.05	**0.2533**	**1.3052**	**3.8415**	**0.05**
	LJBQ	1.55E-07	53.3444	19.6751	0.05	**0.5341**	**9.9589**	**19.6751**	**0.05**
Vegetables	*KPSS*	0.0451	0.1519	0.146	0.05	**0.1**	**0.1168**	**0.146**	**0.05**
	Eagles	0.0011	10.5837	3.8415	0.05	0.0028	8.9384	3.8415	0.05
	LJBQ	1.29E-04	36.7069	19.6751	0.05	0.0034	27.8574	19.6751	0.05
Health	*KPSS*	0.0315	0.1682	0.146	0.05	**0.1**	**0.0973**	**0.146**	**0.05**
	Eagles	0.0023	9.2628	3.8415	0.05	0.0092	6.7809	3.8415	0.05
	LJBQ	6.41E-04	32.4701	19.6751	0.05	0.0064	26.0222	19.6751	0.05
Recreation and Amusement	*KPSS*	0.0337	0.1656	0.146	0.05	**0.1**	**0.0895**	**0.146**	**0.05**
	Eagles	0.0088	6.8639	3.8415	0.05	**0.4357**	**0.6075**	**3.8415**	**0.05**
	LJBQ	0.0457	19.9708	19.6751	0.05	**0.2156**	14.324	19.6751	0.05
Transport and communication	*KPSS*	**0.0812**	**0.1292**	**0.146**	**0.05**	0.1	0.1116	0.146	0.05
	Eagles	**0.5503**	**0.3568**	**3.8415**	**0.05**	0.0028	8.9384	3.8415	0.05
	LJBQ	**0.2186**	**14.2666**	**19.6751**	**0.05**	3.89E-06	45.545	19.6751	0.05

We have used the univariate GARCH (1,1) model of the Econometric Modeler toolbox and estimated the various parameters as listed in the following Table 2 for all seven commodities and three services sectors for the year 2019. As it is evident that the sum of the coefficients α+β either quite close to or is equal to 1 for most of the items, following numerical value of coefficients based study by ***Gil-Alana***, thus indicating that the volatility is persistent despite the difference in time.

Table 2: GARCH (1,1) model statistics for the year 2019

Commodities	Models	Values	Sum of α+β	Standard Error	T-statistics	p-Value
Cereals and Products	GARCH {1} = β	0.024	1.00	3.244	0.007	0.994
	ARCH {1} = α	0.976		2.105	0.465	0.643
Egg	GARCH {1} = β	2e-12	0.945	1.169	1.7096e-12	1.00
	ARCH {1} = α	0.945		1.166	0.810	0.418
Fruits	GARCH {1} = β	0.978	0.978	6.366	0.154	0.878
	ARCH {1} = α	2e-12		0.95718	2.0895e-12	1.00
Meat and Fish	GARCH {1} = β	2e-12	0.768	26.209	7.631e-14	1.00
	ARCH {1} = α	0.768		26.321	0.029	0.977
Milk and Products	GARCH {1} = β	2e-12	1.00	2.270	8.812e-13	1.00
	ARCH {1} = α	1.00		1.759	0.569	0.570
Pulse and Products	GARCH {1} = β	2e-12	1.00	1.465	1.3654e-12	1.00
	ARCH {1} = α	1.00		2.469	0.405	0.685
Vegetables	GARCH {1} = β	0	1.00	0.70	0.00	1.00
	ARCH {1} = α	1.00		0.77	1.30	0.19
Health	GARCH {1} = β	0.03	0.92	50.09	0.00	1.00
	ARCH {1} = α	0.89		48.16	0.02	0.99
Recreation and Amusement	GARCH {1} = β	0.07	0.97	76.38	0.00	1.00
	ARCH {1} = α	0.90		74.37	0.01	0.99
Transport and Communication	GARCH {1} = β	0.00	0.32	6.58	0.00	1.00
	ARCH {1} = α	0.32		3.14	0.10	0.92

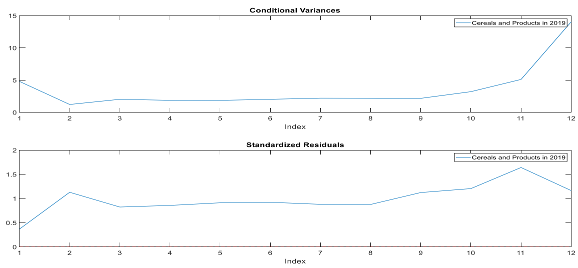
But the sum of the coefficients α+β is relatively smaller for most of the items in year 2020, thus indicating high volatility as is evident from values listed in Table 3.

Conditional Variance and Standardized Residuals

Further conditional Variance and standardized residuals have been estimated for all the staple foograin commodities and servicesin the year 2019 and year 2020 as shown in the following Figure 2 and Figure 3 (with commodity names inset in each graph).Here we have considered only two years Y-o-Y CPI monthly data in order to capture the influence of current pandemic. The values of conditional covariance and standardized residuals are spread along 12 months on horizontal line in the following graphs, might not appealing look wise but significant otherwise.

Table 3: GARCH (1,1) model statistics for the year 2020

Commodities	Models	Values	Sum of α+β	Standard Error	T-statistics	p-Value
Cereals and Products	GARCH {1} = β	0.00	0.87	6.97	0.00	1.00
	ARCH {1} = α	0.87		4.86	0.18	0.86
Egg	GARCH {1} = β	0.00	0.84	3.86	0.00	1.00
	ARCH {1} = α	0.84		2.44	0.34	0.73
Fruits	GARCH {1} = β	0.93	0.93	1.33	0.70	0.49
	ARCH {1} = α	0.00		0.31	0.00	1.00
Meat and Fish	GARCH {1} = β	0.00	0.68	8.22	0.00	1.00
	ARCH {1} = α	0.68		5.52	0.12	0.90
Milk and Products	GARCH {1} = β	0.00	0.93	12.88	0.00	1.00
	ARCH {1} = α	0.93		12.83	0.07	0.94
Pulse and Products	GARCH {1} = β	1.00	1.00	72.71	0.01	0.99
	ARCH {1} = α	0.00		5.62	0.00	1.00
Vegetables	GARCH {1} = β	0.93	0.93	1.38	0.68	0.50
	ARCH {1} = α	0.00		0.30	0.00	1.00
Health	GARCH {1} = β	0.05	0.70	23.77	0.00	1.00
	ARCH {1} = α	0.65		10.14	0.06	0.95
Recreation and Amusement	GARCH {1} = β	1.00	1.00	135.00	0.01	0.99
	ARCH {1} = α	0.00		5.00	0.00	1.00
Transport and Communication	GARCH {1} = β	0.00	0.85	6.14	0.00	1.00
	ARCH {1} = α	0.85		5.20	0.16	0.87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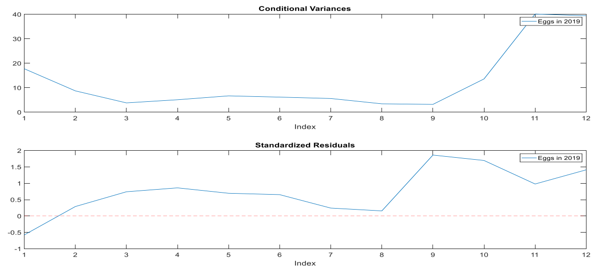
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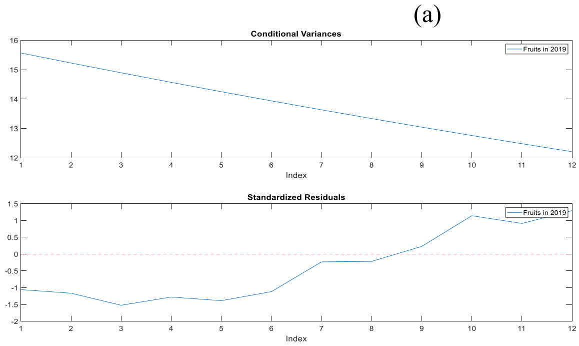
(a) (b)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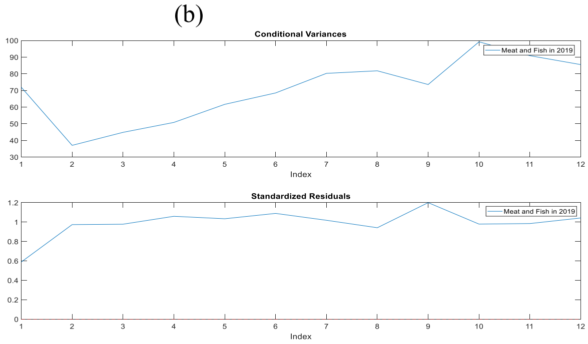
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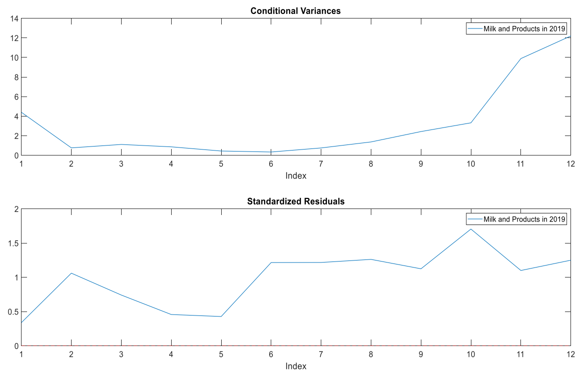
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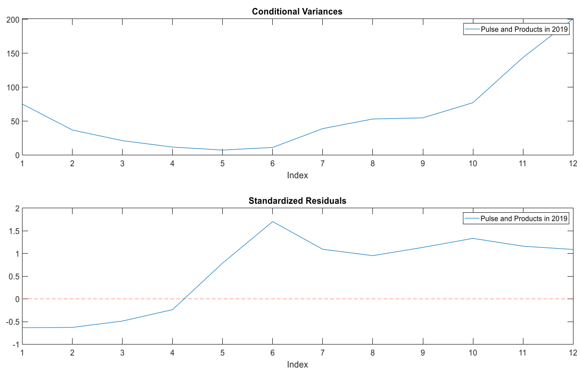
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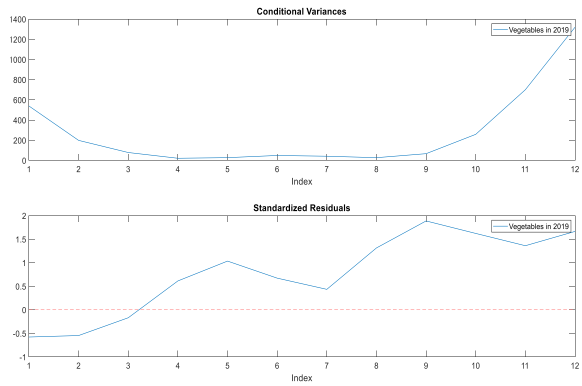
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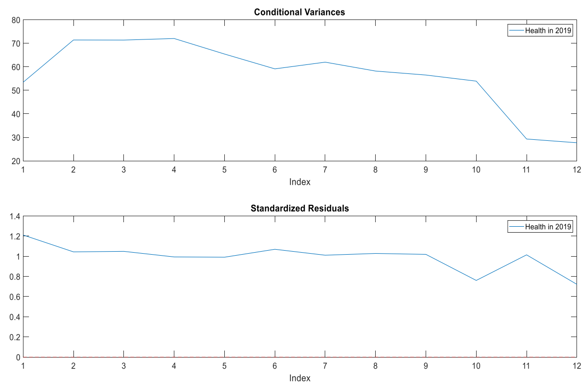
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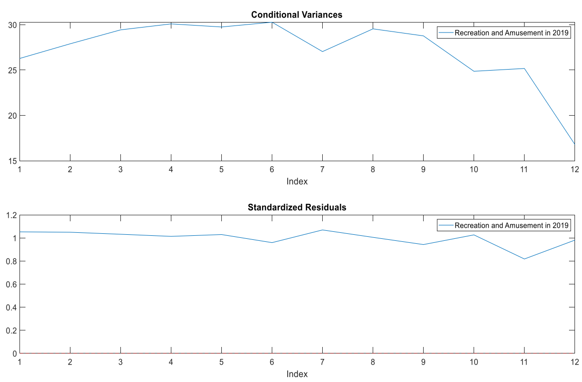
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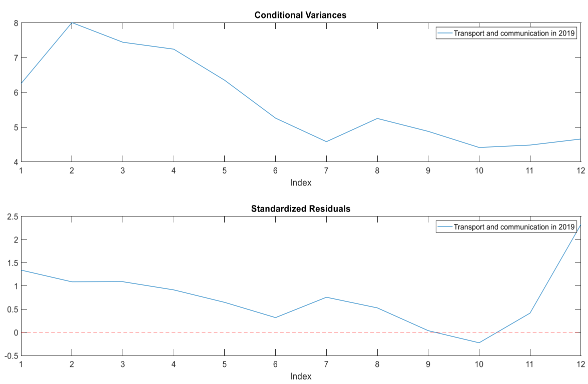
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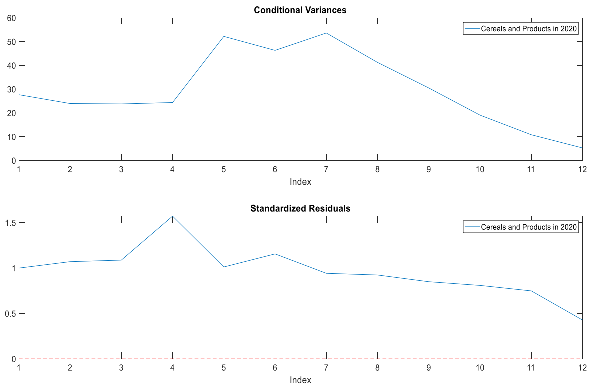
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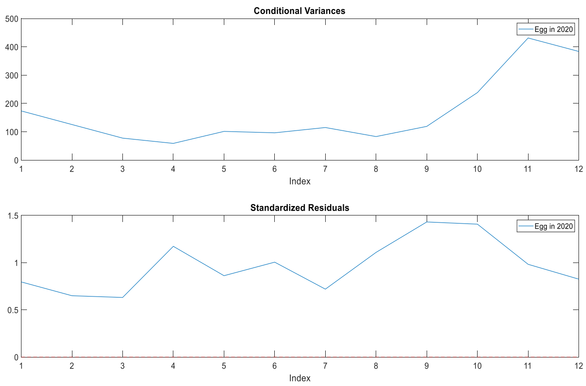
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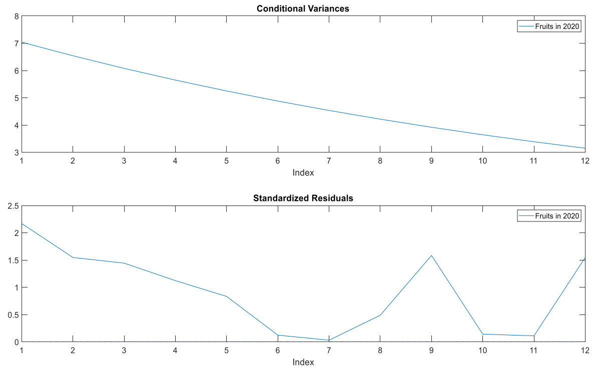
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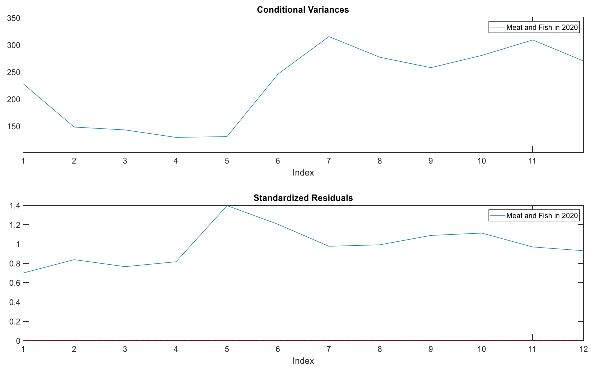
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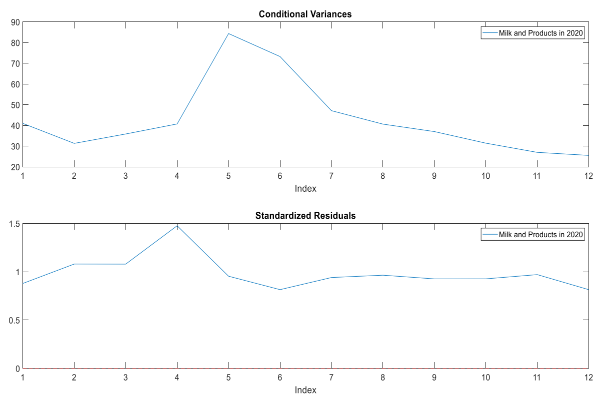
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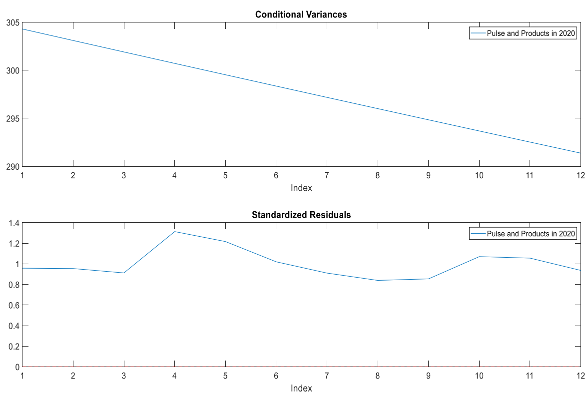
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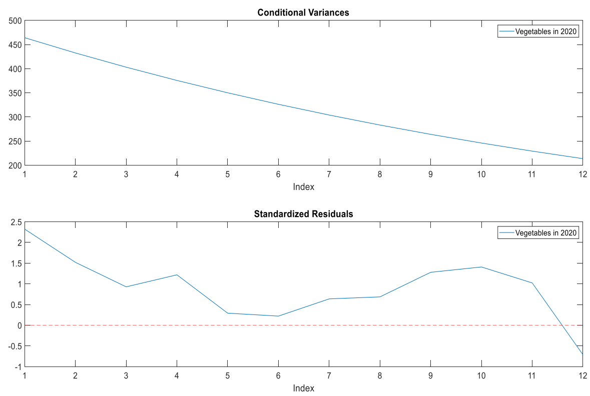
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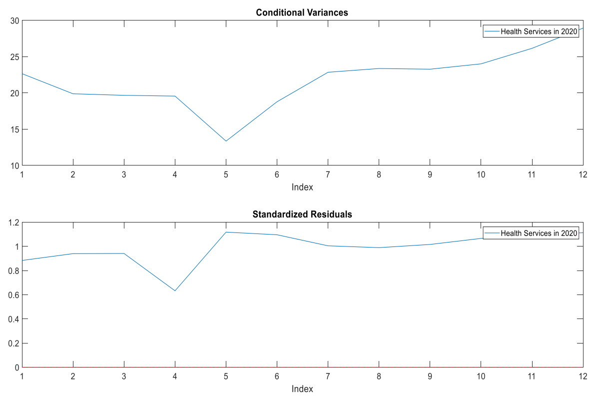
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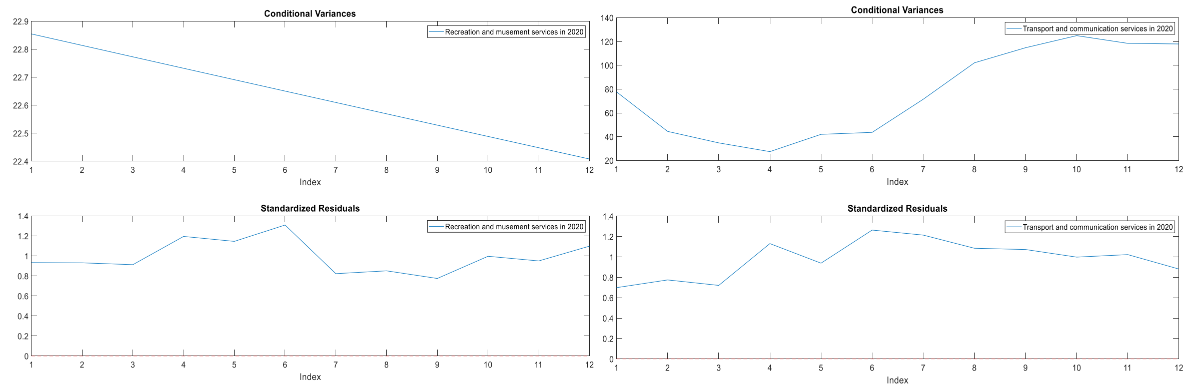

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Figure 3. Conditional variance and standardized residuals of Y-o-Y CPI for commodities and services in year 2020

Conclusion

From the comparison of Y-o-Y CPI values of seven household staplefoodgrains and three service sectors during COVID19, it is evident that CPI and hence inflation were found significantly volatile from March 2020 onwards. Statistical significance of time-series data was checked using KPSS test for stationarity, Eagles ARCH test for heteroscedasticity,and L-Jung-Box Q-test for autocorrelations. Only in a very few cases, the data was found insignificant. High volatility largely occurs due to supply shortage, monopolistic behavior of traders, increase in profit margins, information gap and weak infrastructure etc. during pandemic. Further quantitative analysis by estimating the coefficients □ , □ using the GARCH (1,1) model of the Econometric Modeler tool family, confirms the nature and persistency of volatility in the year 2020 as compared to year 2019.

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Annexure 1

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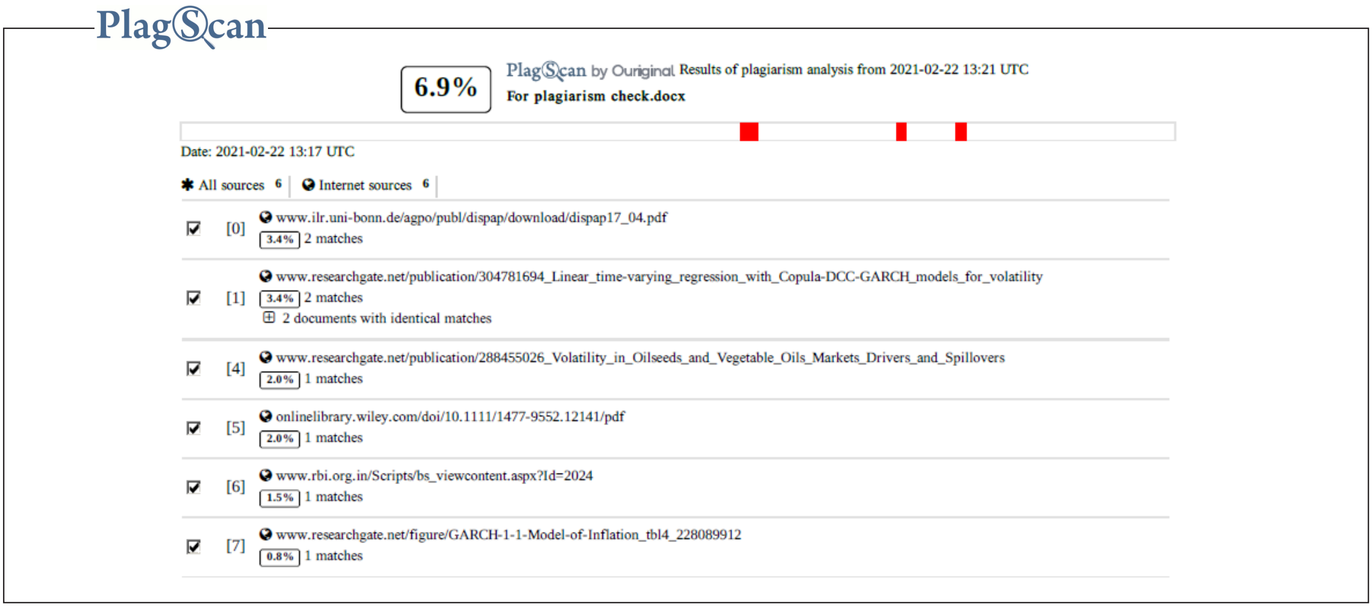

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Reviewer Memorandum

Internal Assessor Statement: The above article is an excellent overall view on how covid-19 impacted the price volatility on staple food grains commodities in India. India is one of the largest producers as well as exporters of some major food commodities, and is often criticized for its protectionist measures to curb transmission of price shocks from international markets. There is no gainsaying the fact that in addition to its impact on public health, COVID-19 and the lockdown that was undertaken beginning in March 2020 in an attempt to contain its spread have had a major economic impact that has affected all sectors of the economy. The agricultural sector and agricultural markets are no exception. Unlike many other countries, the agricultural sector in India accounts for 60% of all rural employment and is thus the single largest source of livelihoods.

External Critic (National): Notwithstanding the fact that food comes under the ambit of essential commodities that in principle are exempt from movement restrictions, India's food markets have been significantly impacted by the spread of the novel coronavirus (and COVID-19 disease). The impact has manifested itself in the form of demand as well as supply shocks. The employment and income shocks that translated into an across-the-board demand compression have been further exacerbated by the closure of hotels, restaurants, and institutions. Also, consumers' buying behaviour has changed, with greater online transactions and home-delivery services displacing in-person purchases and restaurant meals. Produce growers and distributors are being forced to shift supplies from food service outlets to retail channels. On the supply side, all across the value chain, there are labour and logistical constraints. All these factors have implications for the quantities of goods that arrive at the wholesale markets that feed retail outlets, and the prices at which trade occurs.There is no gainsaying the fact that in addition to its impact on public health, COVID-19 and the lockdown that was undertaken beginning in March 2020 in an attempt to contain its spread have had a major economic impact that has affected all sectors of the economy. The agricultural sector and agricultural markets are no exception. Unlike many other countries, the agricultural sector in India accounts for 60% of all rural employment and is thus the single largest source of livelihoods.

Outer Reviewer's (Global) Observation: The empirical evidence on the impact of the pandemic on food and agricultural markets is still emerging. For instance, Mahajan and Tomar (2020) find that there was a drop of 10% in the online availability of various foods (with no impact on retail prices) in the immediate aftermath of the first lockdown. There was also a drop of nearly 20% in market arrivals of vegetables and fruits in a few cities between March and April. They attribute these largely to supply-chain disruptions. Narayanan and Saha (2020), analysing retail and wholesale prices through the end of April, find that for many commodities, including pulses and edible oils, among others, prices witnessed a sharp spike immediately after the lockdown. They find that movement restrictions acted to limit arbitrage possibilities across cities and contributed to increased spread in prices.

Editorial Excerpt

The article has 6.9% of plagiarism which is the accepted percentage as per the norms and standards of the journal for the publication. As per the editorial board's observations and blind reviewers' remarks the paper had some minor revisions which were communicated on a timely basis to the author (Gurvinder) and accordingly all the corrections had been incorporated as and when directed and required to do so. The comments related to this manuscript are noticeably related to the theme "**Price Volatility of Staple Foodgrains**" both subject-wise and research-wise. A huge change in demand and supply dynamics in food grain commodities was observed during Covid-19 pandemic. This research inspects the price volatility of staple agricultural commodities for household and services, using consumer price index monthly time-series data. CPI and inflation were found significantly volatile whereas only in a very few cases, the data was found insignificant. The study further concluded that high volatility largely occurs due to supply shortage, monopolistic behavior of traders, increase in profit margins, information gap and weak infrastructure etc. during pandemic. Overall, the paper promises to provide a strong base for the further studies in the area. After comprehensive reviews and editorial board's remarks the manuscript has been categorised and decided to publish under "**Empirical Research Paper**" category.

Citation

Gurvinder Kaur
"Empirical Study of Price Volatility of Staple Foodgrains Commodities During Covid19 in India by GARCH Model using CPI"
Volume-13, Issue-1, Jan-Mar 2021. (www.gjeis.com)

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Conflict of Interest: Author of a Paper had no conflict neither financially nor academically.

Acknowledgement

The acknowledgment section is an essential part of all academic research papers. It provides appropriate recognition to all contributors for their hard work and effort taken while writing a paper. The data presented and analyzed in this paper by (Gurvinder) were collected first handily and wherever it has been taken the proper acknowledgment and endorsement depicts. The author is highly indebted to others who had facilitated in accomplishing the research. Last but not least endorse all reviewers and editors of GJEIS in publishing in a present issue.

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