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IS SEASONALITY A FACTOR FOR INTRODUCTION OF TEA FUTURES IN INDIA.

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ABSTRACT : *Tea and Coffee are the two most important and age old beverages throughout the world. India contributes significantly to the global production of tea but tea futures has not yet made its presence felt in the Indian commodity derivative market. However, a similar product - coffee, has a good place in the commodity market. A commodity needs to meet certain criteria for its inclusion in the derivative market and seasonality is one among those. This paper makes an attempt to investigate into the seasonality aspect of tea and examine whether the seasonality is a major factor that may influence the decision on inclusion of tea futures. On examining the seasonality pattern in tea in relation to coffee, we found that seasonality is not a major factor for the price variation either in tea or coffee and it may not be a major pulling factor to the introduction of 'tea futures.'*

Keywords : *Commodity derivatives, tea futures, coffee futures, seasonality, price volatility.*

Introduction

Commodity Derivatives Market plays a significant role in the economic development of a nation by enhancing the functions of price discovery and price risk management. Being an agro-based economy, commodity markets in India have a huge potential in the derivatives market. The merger of Forwards Market Commission with SEBI in 2015 has widened the scope of the commodity derivatives market in India. Various reforms have been initiated which aim towards the strengthening of the commodity derivatives market in India. The major focus of such initiatives by SEBI rested around (i) increasing the number of commodities for futures trade and (ii) strengthening the institutional structure and legal framework for futures trading. SEBI has clearly stressed on the inclusion of newer agricultural commodities in the Indian derivatives market. The inclusion of newer products will further facilitate the functioning of the derivatives market by enabling participation from a larger number of players and hence lead to better management of risks. Currently, there are five commodity exchanges operating in India where several agricultural commodities like rice, rubber, jeera (cumin) etc are traded but tea has not been included so far. India is one of the largest producers and consumers of black tea in the world with a substantial share of 23 per cent of the world tea production. It is also one of the leading exporters of tea and yet it has no place in the derivatives market so far. The Committee on Commodity Problems[1], in its report, stated that the presence of forward contracts with reputed buyers of bulk tea was already witnessed in the informal systems in the Indian market. Despite all the credentials, tea has no presence in the exchange traded derivatives market.

Many researchers namely Brorsen and Fofana,[2] Shim,[3] Zhang [4] and Qehaja [5] have investigated the feasibility of introduction of new commodities in the derivatives market which is mostly concentrated in countries other than India. But very little work is found on tea and it remains one such genre which has yet to be explored, especially in the Indian context. Bhattacharjee and Mahapatra[6] in their work have examined the feasibility of tea futures in India at the backdrop of another popular beverage - coffee which has a remarkable presence in the derivatives market, both at national and international level. They found a good demand for tea in the market along with adequate price volatility which are pre-requisites for the introduction of 'futures' in the derivative market. In another work, Bhattacharjee and Mahapatra[7] have studied the scope of homogeneity for introducing tea futures in the commodity market while relating it with coffee. They concluded that homogeneity is less likely to be a hurdle for tea futures as there lies scope of standardization. Bhattacharjee and Mahapatra[8] in a paper examined the extent of government interference on supply, distribution and pricing of tea for understanding the prospects of tea in the derivatives market. They observed that there is less scope of drawing undue attention in the form of government interference which makes it a suitable commodity for derivatives trading.

However, risk management is an important criterion for a commodity to be traded in the derivatives market. The need for managing price risk is vital for including

an agricultural commodity in the derivatives market. In this context, the presence of seasonality in agricultural commodity calls for risk management. Seasonality is an important characteristic in the Indian commodity sphere. Fluctuations in commodity prices during supply season and off season create discrepancies and price uncertainties. Derivatives market can conveniently even out such fluctuations and lead to price discovery.

Objective & Methodology

This study is an attempt to examine whether seasonality is a factor for introducing tea futures. As per SEBI guidelines, seasonality is a criterion to consider a commodity eligible for entry into the derivatives market which calls for risk management.[9] The objective of this paper is to examine whether seasonality has an effect on the introduction of tea futures in India.

The seasonality of a commodity rests on its production and supply based on which the prices fluctuate during the varied seasons. The production of variety of tea with specific quality features stretched over a yearly period have been examined and compared with that of coffee in order to draw conclusions. Further, the prices of a particular month are compared to the prices over the entire year in order to measure the seasonality of prices. Here, seasonal index tool has been applied on monthly price data of both tea and coffee to gauge the seasonal pattern in prices. Seasonality is ascertained as 12 indices which are represented as the ratio of the prices of each individual month to the yearly average price. Financial year seasonal index and Moving average seasonal index are computed for analyzing the price seasonality. While the financial year seasonal index compares the monthly prices to the average prices over the same financial year and then averages this ratio over the various years; the moving-average seasonal index compares the prices of each month to the average over the 13-month period centered on that month. Both these methods tend to bring out similar results.

The current research work relies mostly on secondary data assembled from various reports and published journals. However, the primary sources also include interview/ conversation with few officials of the tea manufacturing concerns. The monthly WPI of tea and coffee is obtained from Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India (OEA, DIPP) for observing the seasonality in prices for seven years (i.e., 2012-13 to 2018-19).

Results & Discussion

The presence of seasonality in agricultural commodity calls for risk management which makes it suitable for derivatives trading. The production of many commodities is limited to a single crop year, while consumption occurs throughout the year. This results in recurring seasonal patterns of prices and production. The price of a commodity varies on the basis of its seasonality of production. The existence of seasonality in agricultural commodities is potentially explainable by the cyclic nature of production. Agricultural commodities must follow their own crop cycle which repeats the same seasonal pattern year after year.[10] Therefore, commodity

prices exhibit non-stationaries along the same seasonal lines. Seasonality is an important characteristic in the Indian commodity sphere. There arise discrepancies and price uncertainties due to fluctuations in commodity prices during supply season and off season. Derivatives market can conveniently even out such fluctuations and lead to price discovery. Therefore the seasonality aspect has been studied in terms of seasonality in production and seasonality in prices.

Seasonal Production of Tea

The production of tea requires a moderate climate of heat and rain. The cold weather is unsuitable for tea leaves as the leaves do not sprout in times of winter. There is no production of tea during Mid-December to the mid of March as there are no new leaves. The factories resort to renovation and repairs of the machinery and equipment in order to run for the entire upcoming year.

The seasonal production of tea is shown in Table 1. It is observed that the seasons are named according to the period of production around the year. The 1st Flush begins from Mid-March during which the tea leaves used for manufacturing consist of *two leaves and a bud* or *single leaf.* The same can be seen in the Rain Flush during May to end of August. The 2nd Flush which extends from end of April to May consists of two leaves and a bud only which is same to the Autumn Flush during September to mid of October. *Baanji* is a colloquial word used to describe single leaf which can be seen from end of March to mid of April and again from mid of October to mid-December.

Being a plantation crop like tea, coffee

Table 1: Tea Seasons - Features and Duration

Sl. No.	Seasons	Features	Duration
1.	1st Flush	Two leaves & Bud / Single Leaf	Mid-March
2.	Baanji	Single Leaf	End of March to Mid of April
3.	2nd Flush	Two leaves & Bud	End of April to May
4.	Rain Flush	Two leaves & Bud / Single Leaf	May to End of August
5.	Autumn Flush	Two leaves & Bud	September to Mid of October
6.	Baanji	Single Leaf	Mid-October to Mid of December

Source : Field study.

also inherits the seasonality feature. Two varieties of coffee are consumed worldwide at large - Arabica & Robusta - which are the most important from economic standpoint. Coffee in India is grown in different topographies, each varying in degrees of rainfall (ranging from 800 mm to 4,500 mm) and altitudes (ranging from 700 mm at Chikmaglur to 2,000 mm at Pulneys). These differences bring out variations to the flavor in Indian coffee. Arabica is harvested between the months of November to January and are generally grown on high altitudes (600 to 2,000 meters) in cool, moist-rich and sub-tropical weather conditions. They require soil rich in nutrients so that it enables the produces to adapt to the highest international coffee standards. Robusta plants are harvested during December to February and can be grown in the lower heights which can better endure the onslaught of unfriendly weather.[11]

In case of coffee, harvesting starts from November and continues till February and after that storage is required up to the next cycle, while in case of tea, the cycle of plucking and production takes place from Mid-March to Mid-December continuously. The seasonality gap in case of tea is 1.33 (12/9) which is lower to that of coffee having a seasonality gap of 3 (12/4). Thus, the seasonal supply/availability of coffee is for a shorter period when compared to tea. Therefore, coffee has higher risks of market disruptions due to its shorter cropping season. Tea has sufficiently high price volatility over coffee to warrant hedging.[12] However, it may not be high enough to make survival difficult for those that do not hedge when compared to coffee. So industry participation might not be automatic. Therefore, taking the quality aspect into account, the annual supply season of tea is found to vary over the six seasons as mentioned in Table 1. This explains the unavailability of one variety during the other time periods. Consequently, a greater seasonality with regard to the quality variation in tea may necessitate the need to even out the fluctuation in prices that may arise due to the limited supply in off-season period. This characteristic of seasonality supports the claim for derivatives trading of tea in the Indian market.

Seasonality and Price Changes

Generally, supplies are low at the beginning of the harvest season, so prices are high. At the end of the season, prices normally tend to be higher again as the supply diminishes. Such fluctuations arising due to seasonality of the commodities give rise to uncertainties in the market. The presence of derivatives products can easily help bring price stability by facilitating price discovery and hedging. Analysis of the price fluctuations with regard to seasonality gives a better understanding of the need for a derivatives market.

The seasonality of prices can be measured by comparing the prices in a given month to the prices over the whole year. The financial year seasonal index compares the price in each month to the average over the same financial year and then averages this ratio over multiple years. The moving-average seasonal index is similar except that it compares the

price in each month to the average over the 13-month period centered on that month. In practice, the two methods tend to give fairly similar results.

The monthly WPI of tea is considered for observing the seasonality in prices for a period of seven years ranging from 2012-13 to 2018-19. The Seasonal Index of tea and coffee based on Financial year and Moving average method are presented in Table 2.

Table 2: Seasonal Index of WPI of Tea & Coffee

Months	Seasonal Index			
	Tea		Coffee	
	Financial Year	*Moving Average*	*Financial Year*	*Moving Average*
April	1.03	1.05	1.00	1.00
May	1.04	1.04	0.99	0.99
June	1.03	1.03	1.00	1.00
July	1.01	1.02	1.00	1.00
August	0.99	0.99	1.02	1.00
September	1.00	1.00	1.02	1.01
October	1.00	1.00	1.02	1.02
November	1.00	0.99	1.00	1.00
December	1.00	1.00	1.00	1.00
January	0.99	0.98	0.99	0.99
February	0.96	0.95	0.99	0.99
March	0.95	0.94	1.00	0.99

Source: *Computed on the basis of data sourced from Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, https://www.eaindustry.nic.in/*

Note: *Data of the monthly WPI of Tea and Coffee are given in Table 3 and Table 4 respectively.*

Table 3: Monthly Wholesale Price Indices of Tea : India

Year	Monthly Wholesale Price Index of Tea (Base Year = 2011-12)											
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
2012-13	120.7	134.7	136.0	128.0	132.0	132.5	130.8	130.5	136.7	133.7	130.4	141.3
2013-14	148.5	140.0	140.9	139.9	135.7	137.4	131.5	124.8	120.4	120.7	117.5	112.7
2014-15	127.4	132.2	129.6	126.5	115.8	115.3	116.4	112.1	113.3	112.7	107	103.2
2015-16	115.4	118.6	117.2	119.9	117.5	116.1	118.6	122.5	126.0	129.9	128.6	120.8
2016-17	141.2	141.2	145.9	141.9	137.4	140.7	140.5	142.2	14.28	139.8	134.4	133.0
2017-18	147.0	140.1	136.5	130.4	126.7	124.5	130.4	130.8	128.8	127.5	123.6	119.7
2018-19	140.6	137.1	136.6	138.3	141.7	147.9	145.1	148.6	149.3	139.2	132.9	133.3

Table 4 : Monthly Wholesale Price Indices of Coffee : India

Year	Monthly Wholesale Price Index of Coffee											
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
2012-13	92.6	93.6	95.8	97.6	107.1	109.2	100.9	98.1	97.0	90.5	91.5	90.0
2013-14	91.5	89.9	88.3	88.3	88.3	90.6	88.1	83.7	84.4	84.9	84.9	97.1
2014-15	107.8	107.8	111.0	112.4	114.2	115.5	118.1	116.1	112.4	111.9	108.9	108.4
2015-16	110.5	109.5	109.9	109.9	108.3	107.8	107.8	105.4	104.0	102.8	102.8	100.4
2016-17	95.9	93.1	94.8	94.6	96.2	97.2	102.1	104.6	102.7	103.9	104.3	104.0
2017-18	103.7	102.5	102.3	99.3	99.1	98.8	96.1	95.2	95.5	97.0	96.1	93.3
2018-19	92.0	89.9	90.8	91.7	92.6	92.6	94.1	95.6	97.3	97.3	97.3	97.3

***Source :** Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, https://www.eaindustry.nic.in/*

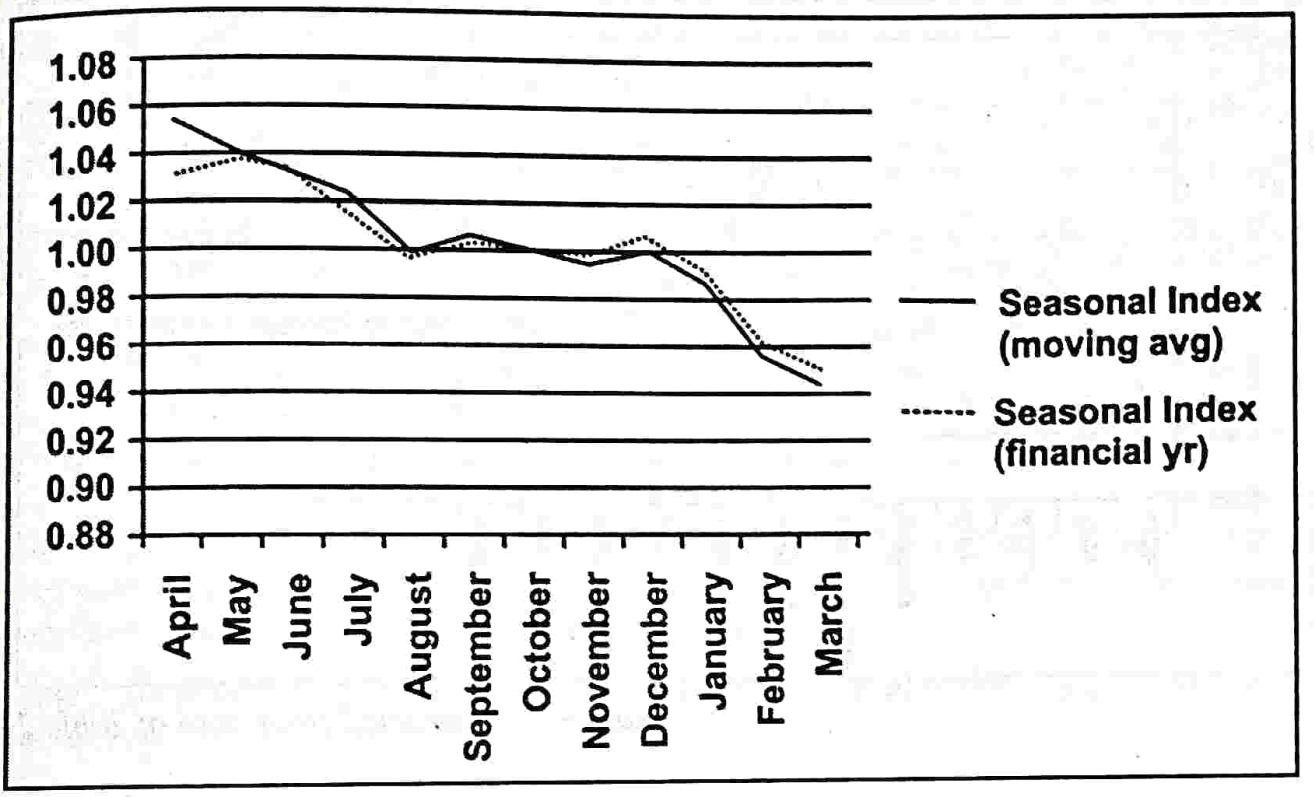
The graphical presentation of the seasonality in tea prices for a period of seven years ranging from 2012-13 to 2018-19 is shown in Figure 1 whereby both the seasonal indexes are plotted. As can be observed, both the methods produce almost similar results. The prices are at the peak in April and gradually keep declining till August. Prices

then become consistent till December and then drop to their bottom point in March. This suggests that prices fall during the off season as there is no production of tea during December to March. And with the arrival of harvest time, the prices of tea picks up again.

since in the off season the prices are not high owing to scarce production.

Despite the absence of adequate seasonality, several agricultural products may be traded in the derivatives market depending upon various other factors leading to need for risk management. In this context, the seasonality of tea is compared with another commodity - coffee which has a close resemblance with tea on many aspects and is already traded in the derivatives market.

Figure 1: Seasonality and Tea Prices



Source: Constructed from data of Table 2

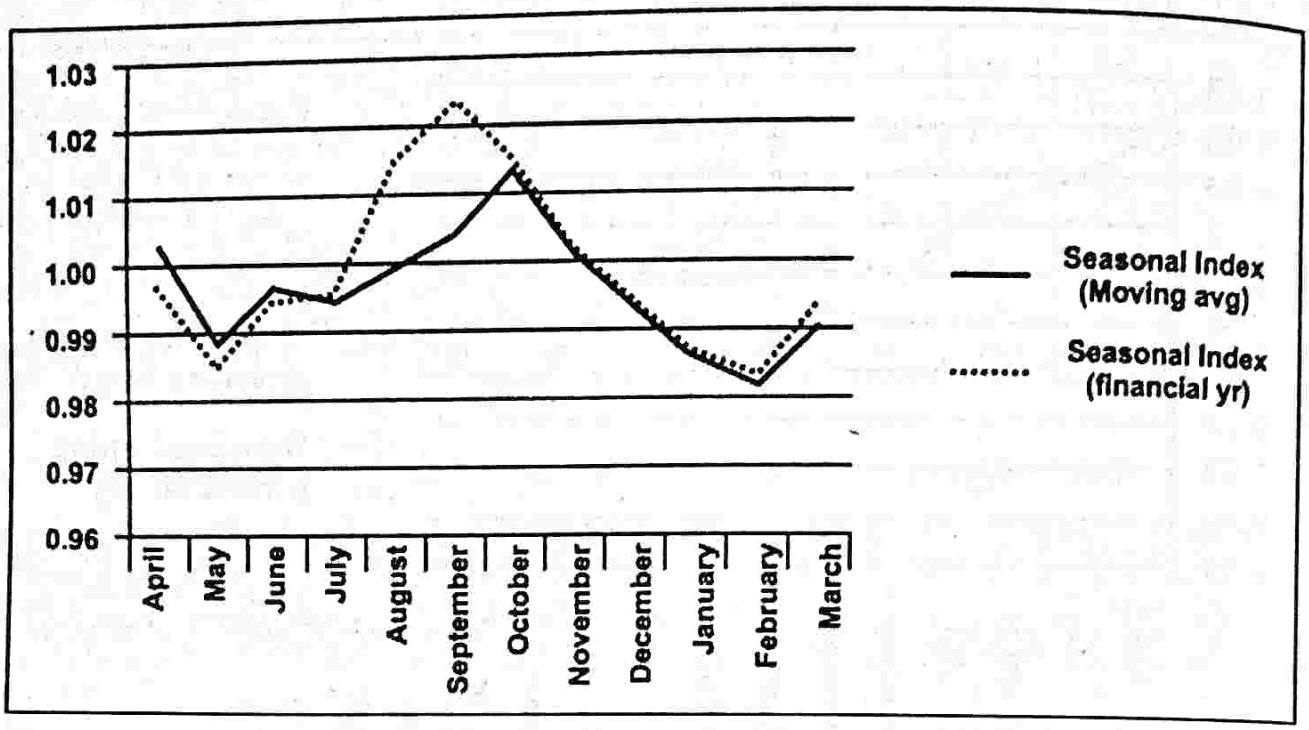
The moving-average index in April is 1.05, which means that prices in April are usually 5% greater than the annual average. On the contrary, the moving-average index in March is 0.94, which indicates that prices in March are 6% lower than the annual average. In simple words, the prices in the peak month are 12% higher than in the lowest month (1.05/0.94 = 1.12). This reflects that prices are comparatively higher at the start of the season i.e., in April but during off season tea prices decline further. Such fluctuation is only partially characterized by seasonality in tea

Figure 2 plots the two seasonal indexes of coffee prices. This indicates that there is no abrupt changes in prices in short run period. Coffee prices fall and then gradually rise in the first half of the financial year and reach its peak in September. Prices then fall

to their lowest point in February and then start climbing again. This suggests that coffee prices are at a high during the off season when there is no production during March to October while they are lower than in the lowest month (1.02/0.99 = 1.03).This reflects the seasonality in coffee prices which fluctuates during supply and off season.

Moreover, Figure 3 shows the original

Figure 2 : Seasonality and Coffee Prices



Source : Constructed from data of Table 2

during the supply season. Thus, coffee prices show fluctuations in line with the supply and off season which paves the way for easy participation for hedging whereas in case of tea, seasonality does not seem to be adequate for active industry participation.

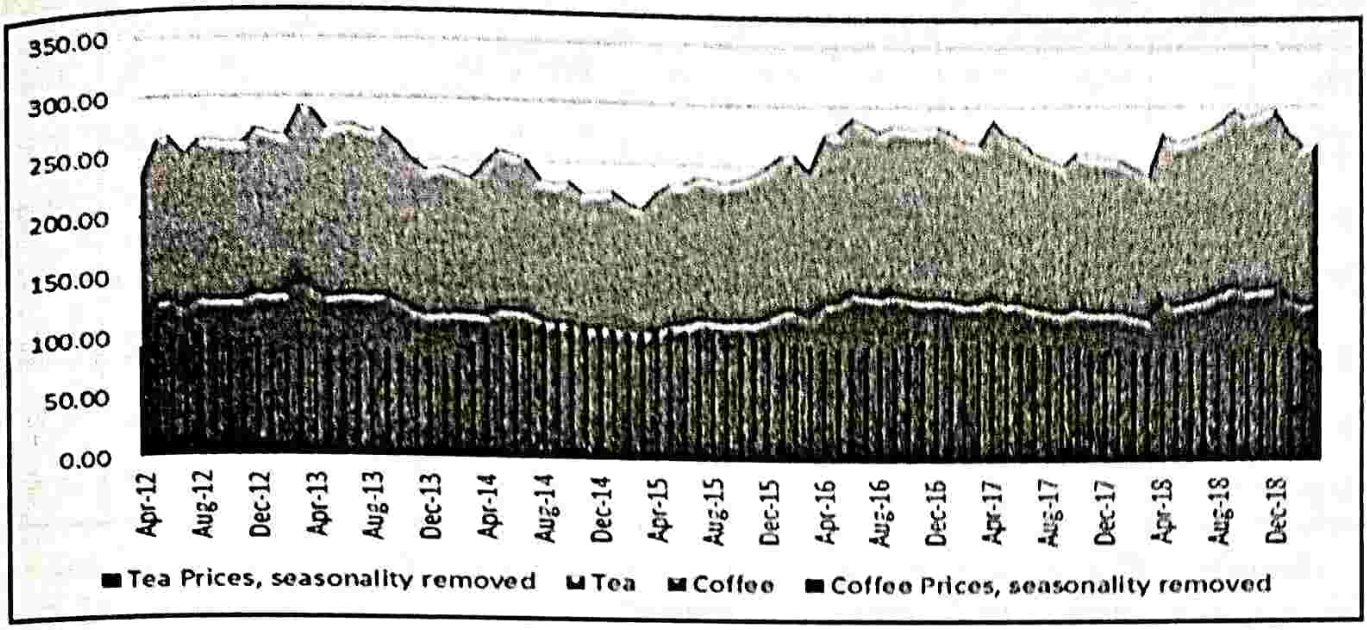
The moving-average index in October is 1.02, i.e., the prices in October are mostly 2% greater than the annual average; while the moving-average index for the months of January, February, March and May are 0.99, which indicates that prices in these 4 months are 1% lower than the annual average. Simply put, the prices in the peak month are 3% more price and the price after removal of seasonality for both tea and coffee. The 'prices with seasonality removed' is ascertained by dividing the original price by the seasonal index. The removal of the seasonal component has not resulted in price variation and this indicates that seasonality is not a major component for price variation either in tea or coffee. The fluctuations are caused by other factors and not seasonality. Irrespective of the presence of low seasonality, derivatives on coffee already exist and there is a need for managing price uncertainties which is not owed to seasonality. Based on this, it can be said that the introduction of tea derivative

products may also be possible.

Conclusion

Historically, agricultural commodities have exhibited seasonal price movements which

Figure 3: Movement in Tea and Coffee Prices



Source : *Constructed on the basis of data sourced from Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, https://www.eaindustry.nic.in/*

Note : *Data of Prices after removal of Seasonality are given in Table 5 and Table 6 respectively.*

Table 5 : Monthly Wholesale Price Index of Tea Seasonality Removed (India) Base Year = 2011-12

Year	*Monthly Wholesale Price Index of Tea (Seasonality Removed)*											
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
2012-13	114.59	129.49	131.44	125.2	132.74	131.88	131.369	131.54	136.98	135.84	136.83	150.48
2013-14	14.99	134.58	136.17	136.84	136.42	136.76	131.74	125.26	120.87	122.64	123.34	122.06
2014-15	121.72	126.73	125.7	124.36	117.83	116.25	117.47	111.92	112.67	113.74	111.13	109.9
2015-16	110.61	115.78	116.71	120.83	121.21	119.14	119.82	120.1	123.91	12946	131.04	125.46
2016-17	134.48	137.33	144.67	143.5	141.59	144.32	141.82	139.11	140.38	139.36	136.35	135.99
2017-18	141.29	136.8	136.63	132.36	130.27	127.66	131.57	129.02	128.37	128.19	125.87	122.49
2018-19	137.9	134.14	136.14	139.51	144.11	149.78	145.72	146.18	148.23	139.04	134.21	134.23

Table 6: Monthly Wholesale Price Index of Coffee Seasonality Removed (India) Base Year = 2011-12

Year	Monthly Wholesale Price Index of Coffee (Seasonality Removed)											
	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
2012-13	92.18	94.43	95.9	97.86	106.96	108.5	99.38	97.76	97.4	91.53	92.84	90.63
2013-14	91.08	90.69	88.39	88.53	88.18	90.02	87.2	83.61	84.96	85.3	85.87	97.3
2014-15	107.15	108.81	1100.86	112.71	114.09	115.16	116.21	114.1	111.29	110.26	107.76	108.32
2015-16	111.6	112.13	111.28	111.63	109.45	108.53	107.1	104.06	102.76	110.87	110.81	99.66
2016-17	97.11	96.03	96.72	97.15	97.85	98.41	101.87	103.15	101.29	101.54	102.2	103.04
2017-18	103.62	103.91	103.02	100.88	100.0	99.47	96.89	95.24	94.33	94.89	94.4	92.97
2018-19	93.61	93.57	9373	93.87	93.89	93.98	94.04	94.23	94.66	95.09	95.51	95.93

Source : *Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India, https://www.eaindustry.nic.in/*

are tied to the seasonal nature of the crop. Crop prices in the cash and futures markets are usually the lowest near harvest time and the highest near the end of the marketing year. Seasonal price movements vary depending on the supply/production and demand fundamentals. It has been observed that the production and processing of tea usually extends over a period of nine months from mid of March to the mid of December. Taking the quality of the tea into consideration, the supply season of the commodity can be arranged over six unique seasonal periods in a year. This makes good the unavailability of one particular quality or variety during the other time periods. Thus, the seasonality of the 'tea' gets extended, facilitating its trade in derivatives market. Overall, tea prices are comparatively higher at the start of the season i.e., in April but during the off-season period tea prices decline further. This may be due to a shorter seasonality gap in tea and better quality of tea in the initial days due to its unique flavour. Despite the absence of adequate seasonality, several agricultural products are being traded in the derivatives market which needs further investigation. The gap in seasonality of coffee is greater than that of tea. Coffee prices also show fluctuations with the supply season and slack season which supports the argument for hedging in coffee whereas in case of tea, seasonality does not seem to be adequate for active industry participation. However, removing the seasonal component from both tea and coffee prices has not resulted in significant price variation. This contributes to the inference that seasonality is not a major factor for price variation either in tea or coffee; the fluctuations seem to be caused by other factors that need further study. So, it can be concluded that the introduction of

tea derivative products may also be possible and in turn it would benefit the various stake holders in risk management.

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