

Delhiites and Mumbaikars, the often genially warring siblings over supposed supremacy for most lively city tag, were joyously united by an unlikely seasonal guest; the Great Indian Monsoon that hit both on June 25<sup>th</sup> a somewhat inexplicable phenomenon occurring after a gap of 62 years! Behind the serendipity, accentuated by cyclone Biporjoy and later developments in Bay of Bengal, **we find evidence of myriad changes unfolding in the monsoon pattern** that could become new fault lines as climate change on a global scale becomes a sword of Damocles for policy makers and populace alike though there is some good news on rainfall pattern and distribution.

Beyond such changes, given the critical impact of southwest monsoon, the current status of shortfall (-23% below normal as compared to -7% last year, though improving sharply) and delayed arrival imparts a coefficient of fear on inflation and growth estimates as spatial patterns and distribution of rainfall assume utmost significance. **For the record, uneven spatial distribution in select states within an 'overall normal' monsoon in 2022 (6% above LPA) saw CPI food inflation increasing to 6.7% from 4.2% of preceding year.**

The "SBI Monsoon Impact Index / MI" incorporates four parameters from 15 major food grains producing states, viz. their share in total food grains production, rainfall deviation from normal, irrigation status, and overall skewness in rainfall among states. On a scale of 0-100, values closer to 100 indicate lesser impact while values with increased distance from 100 indicate rising impact of spatial distribution of rainfall on economy.

The current MI Index, with present value of 64.0 fares better than 2022 full season MI Index at 60.2. It strengthens our belief that better prospects of monsoon from this point should transgress MI Index towards 90, where the negative impact on economy would be virtually nil. Within the agriculture sector, food grains production is highly reliant on monsoon performance and hence it is more appropriate to appreciate the performance of monsoon with CPI cereals & products inflation. While the correlation of CPI cereals inflation with IMD monsoon LPA is low and positive (which is obviously incorrect), the correlation with our monsoon impact index is high and negative. This validates the effectiveness of our index in predicting actual impact. **Interestingly, even though on an overall basis rainfall is deficient, the cereal producing states have received plenty of rainfall in FY23 unlike in FY22 when it was in deficient.**

The predictions of somewhat normal monsoon is propagated by IMD factoring Indian Ocean Dipole (IOD) indicator, an interplay of warm and cold waters in distinct parts of Indian Ocean, despite strong possibility of El Nino developing in the Pacific. **India has received lower than long period average rainfall at times when El Nino was accompanied by neutral or negative IOD index. The IOD is currently neutral (>0.4 is positive, <-0.4 is negative and values in between read neutral) though a positive IOD is likely to develop in the coming months, thereby ruling out any negative impact on monsoon in India due to El Nino. We further estimate that in case of prevailing El Nino conditions but supportive conditions in Indian ocean (IOD>0), there is no impact on real agriculture GVA, barring a worst case scenario of an unlikely severe El-Nino occurrence that could push up food prices.**

On policy rate front, of the 44 central banks whose meetings took place in June 2023, only 10 central banks raised rates, while 29 went for a pause and 5 cut their policy rate. Clearly, divergence can be seen with Fed pivoting to 'wait & watch' by skipping rate hike in May FOMC meet while both ECB and BoE decided to stick to rate hikes with BoE going ahead with a 0.50% rate push to highest level post 2008. BoJ, however, has refrained from any pivot, keeping its ultra-loose monetary policy intact to spur growth in a fledgling economy despite CPI staying above mandated 2% for the last 14 months (3.2% in May against 3.4% of April).

**We believe that BoE will have to raise rates much more as independent estimates show close to a quarter of fiscal stimulus (% of GDP) post covid had happened.** Also, most consumers in UK have fixed rate of mortgages, limiting the impact of rate increases for now. **Labour markets in UK have also been disrupted with a lot of people missing from the labour force. No wonder, on a lighter note, sale of non-fictional books in UK has expanded at close to 30%, basis some estimates. Is it possible that the missing labour have resorted to reading more of books now at leisure time, or are the prospects of economy too bleak there to seek comfort between printed lines?**

The US Fed paused in Jun'23 meeting unanimously as some of the members were dissatisfied by the higher rates hence it made sense to pause the rate in order to assess evolving macro conditions. As per the latest Summary of Economic Projections, most of the indicators (real GDP, unemployment, PCE inflation) have been changed favourably, except for Core PCE inflation whose median projection for 2023 has now been updated to 3.9% from 3.3% given in March meeting. **June CPI is also expected to remain low and will be the only CPI data available before the Jul'23 meeting, therefore making a case for another pause in Jul'23.** Though Fed has indicated 2 more rate hikes by Dec'23, we remain sceptical of such move. **The question is will Fed return to more hikes after a second pause in July? Fed History shows otherwise. By September, there could be enough data points (banking system, credit markets) to suggest that Fed may have just been done with rate hikes! If this is so, then Dollar Index would decline indicating rupee to continue its appreciating trend. India has already received \$11 bn portfolio inflows till June 27 (FY23).**

**MONSOON IMPACT INDEX**

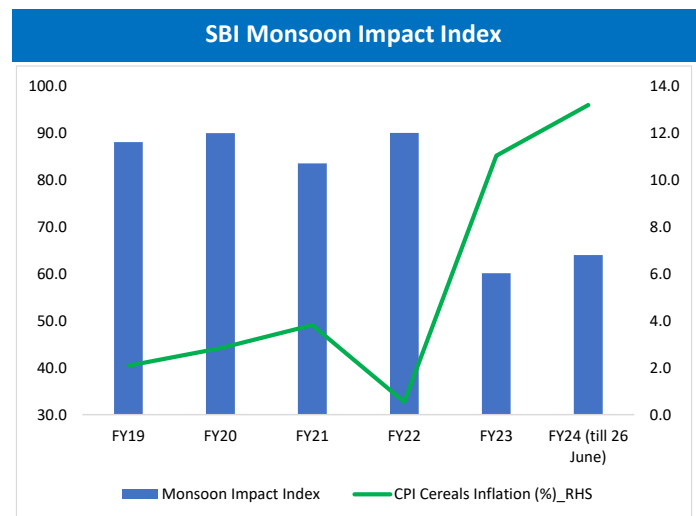
- ◆ The impact of southwest monsoon season on India’s growth and inflation is crucial. The current status of monsoon (-23% below normal as compared to -7% in last year, though improves sharply) impart a coefficient of fear in growth and inflation estimates. However, what matters most is not the overall monsoon but the spatial patterns and distribution of rainfall. States which are major foodgrains producers are most impact by the distribution and intensity of rainfall and hence subsequently befall more impact on foodgrain prices. For example, in 2022 the southwest monsoon was 6% above LPA, however the CPI food inflation increased to 6.7% from 4.2% previous year. This is due to the fact that while overall monsoon was ‘normal’, the spatial distribution was quite uneven (MP: -23%, Rajasthan: -36%, Maharashtra: -23%, etc.,).
- ◆ Against this background, we constructed “**Monsoon Impact Index**” to fathom the impact of spatial distribution of southwest monsoon on Indian economy. We have used four parameters of 15 major foodgrains producing states, viz. their share in total foodgrains production, rainfall deviation from normal, irrigation status, and overall skewness among states. An interplay of these four factors gives us an index value in the range of 0-100. A value near to 100 indicate NIL/ Less impact while a value far from 100 indicate severe impact of spatial distribution of monsoon on Indian economy.
- ◆ As per our results, the “Monsoon Impact /MI Index” so far attains the value at 64.0, which is surprisingly greater than the 2022 full season monsoon impact index (60.2). We strongly believe that as the monsoon progress the index is going to improve and if the value of index will reach near 90, it will have almost no impact on India’s inflation and growth.
- ◆ Interestingly, even though on an overall basis rainfall is deficient, the cereal producing states have received plenty of rainfall in FY23 unlike in FY22 when it was in deficient. This is substantiated by the correlation of CPI cereals inflation with MI index being high and negative.

Status of Monsoon (% deviation from Normal)		
Major Foodgrains Producing States	Till 26 June	
	2022	2023
Andhra Pradesh	12	-27
Bihar	-24	-78
Chhattisgarh	-24	-43
Gujarat	-50	74
Haryana	-28	41
Karnataka	-21	-56
Madhya Pradesh	-15	-36
Maharashtra	-34	-70
Odisha	-33	-25
Punjab	-13	42
Rajasthan	20	203
Tamil Nadu	69	10
Telangana	13	-55
Uttar Pradesh	-77	-29
West Bengal	-3	-29
<b>All India</b>	<b>-7</b>	<b>-23</b>

Source: IMD; SBI Research

Categories of Rainfall	
Categories	% Deviation form Normal
Large Excess	>=60%
Excess	20% to 59%
<b>Normal</b>	<b>19% to -19%</b>
Deficient	-20% to -59%
Large Deficient	<=-60%

Source: IMD



Source: SBI Research; Cereals CPI FY24: Apr-May Average

Correlation Matrix	
Correlation between	CPI Cereals Inflation
IMD Monsoon LPA	0.38
<b>SBI Monsoon Impact Index</b>	<b>-0.98</b>

Source: SBI Research

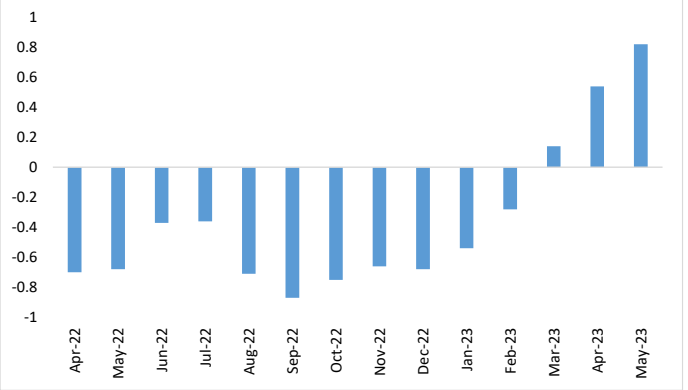
**EL NIÑO & MONSOON**

- ◆ IMD has predicted normal monsoon despite the increasing possibility of El Nino developing. This is because El Nino alone doesn't predict the monsoon pattern in India.
- ◆ An El Nino condition occurs when surface water in the equatorial Pacific becomes warmer than average and east winds blow weaker than normal. The opposite condition is called La Nina. El Nino typically occur every 3 to 5 years.
- ◆ The current data shows high probability for the development of El Nino conditions.
- ◆ The Indian Ocean Dipole (IOD) is another indicator which affects the rainfall. During a positive IOD phase, warm waters are pushed to the Western part of the Indian Ocean, while cold deep waters are brought up to the surface in the Eastern Indian Ocean. This pattern is reversed during the negative phase of the IOD.
- ◆ We looked at the historical data of deviation of monsoon from the LPA, together with the IOD SST index (which if greater than 0.4 is considered as positive, if it is less than -0.4 it is considered negative and it is neutral if the values lies in between) and Nino 3.4 SST for El Nino or La Nina conditions (positive is El Nino and negative is La Nina).
- ◆ The data shows that India has received lower than long period average rainfall by an average of 10% at times when El Nino was accompanied by neutral/negative IOD index. The IOD is currently neutral however a positive IOD is likely to develop in the coming months as per all the models, thereby ruling out any negative impact on monsoon in India.

**COMBINED IMPACT OF EL NINO/LA NINA AND INDIAN OCEAN DIPOLE ON AGRICULTURE OUTPUT AND FOOD INFLATION**

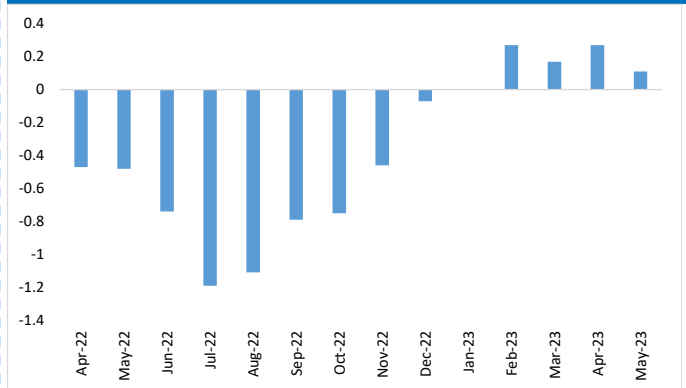
- ◆ When ENSO (El Nino– Southern Oscillation) index is positive, it is El-Nino phenomenon which creates Rain in USA and drought in India. Likewise, when ENSO index is negative, it is La-Nina event which creates rain in India and Drought in USA. While El Nino impact on USA is isolated but La-Nina impact on India is further moderated by Indian Ocean Dipole.
- ◆ Federal Reserve Boards International Finance Discussion paper had estimated that one s.d surprise in El Nino raises world real commodity price inflation by 3.5% to 4%.

Monthly variation of Nino 3.4 index (SST anomaly °C)



Source: SBI Research

Monthly variation of IOD Index (SST anomaly °C)



Source: SBI Research

Nino 3.4, Indian Ocean Dipole index & Monsoon

CY	IOD SST index	El Nino or La Nina based on Nino 3.4 SST	Monsoon % deviation from LPA
2012	neutral	El Nino	-11%
2013	neutral	La Nina	5%
2014	neutral	El Nino	-12%
2015	neutral	El Nino	-9%
2016	negative	El Nino	-9%
2017	neutral	El Nino	-5%
2018	neutral	El Nino	-14%
2019	positive	El Nino	10%
2020	neutral	La Nina	10%
2021	neutral	La Nina	5%
2022	negative	La Nina	8%
2023 till date	neutral	El Nino	-11%

Source: IMD, Bureau of Meteorology, Australia,CEIC, SBI Research

- ◆ El Nino typically occurs at three to seven years interval and last about two years. Due to the Serial Correlation of the ENSO event, we have used Prais Winsten Regression.
- ◆ For the ENSO event, we have used ENSO 1+2 index. Further, we have used a categorization dummy, wherein ENSO >0.5 is considered as El Nino Event, -0.5<ENSO<0.5 is considered as Neutral, and ENSO<-0.5 is considered as La Nina Event.
- ◆ Indian Ocean Dipole (IOD) is important for Indian Ocean weather conditions. We have used IOD Index. Further, IOD dummy has been used for IOD>0 as supportive conditions in Indian Ocean and vice versa.
- ◆ It has been estimated that in case of prevailing El Nino conditions but supportive conditions in Indian ocean (IOD>0), there is no impact on real agriculture GVA. However, in the same scenario, when quarterly average of ENSO increases by 1 point from already higher base of 0.5 points, it increases food inflation by 3.2%.
- ◆ In La Nina Scenario (ENSO<-0.5) along with supportive Indian Ocean conditions (IOD>0), increase in IOD index leads to 1.36% increase in real Agriculture GVA. Impact of same weather conditions on Food Inflation is however is not been ascertained due to lesser number of observations and collinearity problem.

**CENTRAL BANK’S POLICY ACTIONS IN JUNE 2023**

- ◆ While headline inflation eased further in April/May across most economies, core inflation remained stubbornly high, driven by services inflation and the prospect of sustained strong wage growth. With headline inflation softening, major central banks have shifted gears to a pause or relatively less aggressive rate hikes, while hinting at further rate hikes if warranted by incoming data. UK is one of among the handful of countries which raised its policy rate in latest meeting. An analysis of 44 central banks whose meeting have happened in June 2023, only 10 central banks raised rates, 29 went for pause and 5 cut their policy rate.

Prais Winsten Regression			
Dependent Variable : Log of real Agriculture GVA			
Time period: 2011Q2 to 2023Q1			
Scenario: ENSO >=0.5 (El NINO) & IOD >0			
Independent Variable	Coefficient	Std Error	P value
ENSO Index	-0.158	0.145	0.39
IOD Index	-0.401	1.22	0.774
Constant	13.349	0.551	0.002***
Scenario: ENSO<-0.5 (LA NINA) & IOD >0			
Independent Variable	Coefficient	Std Error	P value
ENSO Index	0.339	0.152	0.113
IOD Index	1.36	0.202	0.007***
Constant	13.79	0.159	0.000***
Source: SBI Research			

Prais Winsten Regression			
Dependent Variable : Food Inflation			
Time period: 2011Q2 to 2023Q1			
Scenario: ENSO >=0.5 (El NINO) & IOD >0			
Independent Variable	Coefficient	Std Error	P value
ENSO Index	3.294	0.544	0.026**
IOD Index	9.0005	4.238	0.168
Constant	-5.469	1.949	0.107
Scenario: ENSO<-0.5 (LA NINA) & IOD >0			
collinearity problem			
Source: SBI Research			

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**Contact Details:**

Dr. Soumya Kanti Ghosh  
Group Chief Economic Adviser  
State Bank of India, Corporate Centre  
M C Road, Nariman Point, Mumbai - 400021  
Email: soumya.ghosh@sbi.co.in,  
gcea.erd@sbi.co.in  
Phone:022-22742440  
 : kantisoumya