

Implications Of Monsoon on Indian Agriculture & Rural Economy

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Abstract

Agriculture is arguably the most important part of the Indian economy and the sector accounts for at least 17% of the country's economic output while providing employment to approximately half of the country's population. The famine problem is largely the consequence of the vagaries of the monsoon. The ability of technology to mitigate a bad monsoon remains limited. In India, water is more valuable than gold for the farmers or the one who engaged in agriculture. The monsoon has a direct impact on the country's agricultural GDP. Moreover, agriculture isn't the only sector which is affected by the performance of monsoon. In fact, as many as a dozen sectors depend on monsoon, either directly or indirectly. In this paper attempt has been made to study the implications of monsoon on Indian agriculture and other sectors of the economy.

Key Words

Monsoon, economy, drought, monetary, production

1. Introduction

Over the centuries the Indian economy has become reliant upon its agricultural backbone and so is dependent on the quality of a good monsoon season. The country's crop production i.e. rice, cotton, oilseeds and coarse grains etc. varies according to the arrival and quantity of its seasonal rains. The monsoon is the lifeblood for India's farm-dependent \$2 trillion economy, as at least half the farmlands are rain-fed. A large part of the country gets more than 75% of the annual rainfall during the four months, June to September.

Half of India's products originate from its agricultural industry and their level of abundance has a significant impact on economy. Monsoon is a key to determine agricultural output, inflation, consumer spending and overall economic growth.

The Indian monsoons, among the most prominent and oldest weather patterns in the world, are perhaps unique in terms of their profound economic significance, affecting the lives of 25 per cent of the world's population that live in the Indian sub-continent. Monsoon season plays a pivotal role in India, directly or indirectly, 70% of employment is dependent on agricultural sector. The monsoon isn't just the key climatic or agricultural event in the Indian subcontinent — it's the key economic event. In this paper attempt has been made to study the implications of monsoon on Indian agriculture and other sectors of the economy.

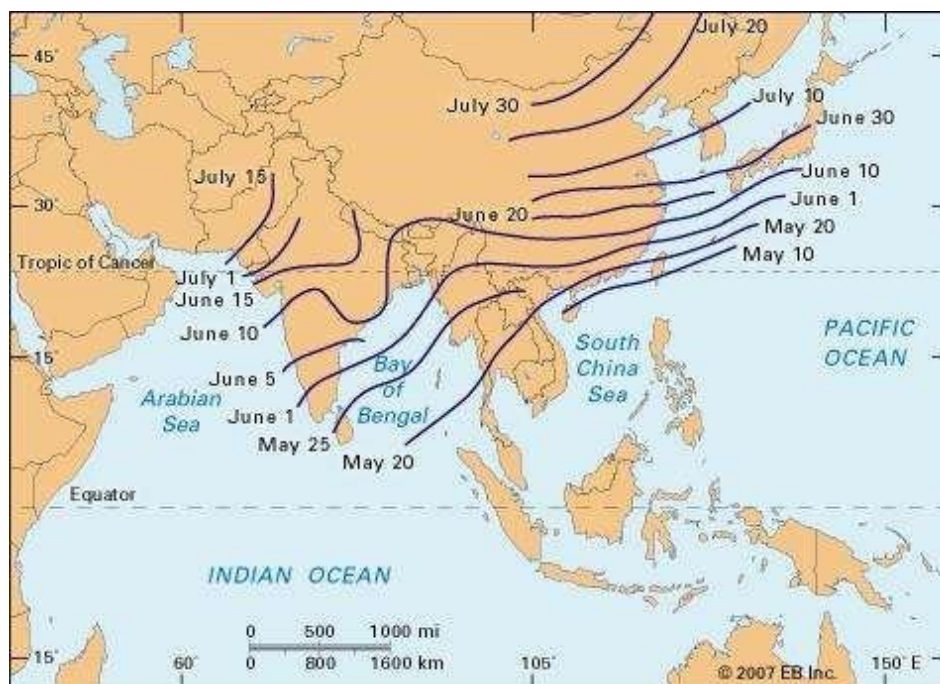
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2. Monsoon

The word monsoon originated from the Indian subcontinent, referring to the big seasonal winds that blow up from the Indian Ocean and the Arabian Sea, bringing heavy rainfall. The season tends to start in June and ends around September of each year. This system of winds is very seasonal and tends to reverse course at roughly the same time every year. With their movements, these winds carry fresh water to millions of farmers and people generally across India, defining social and economic life to the extent that in India the economy tends to be called the ‘monsoon economy’. There are two parts to India’s monsoon season: firstly, moisture from the Arabian Sea is carried up through the Indian subcontinent by the monsoon winds at the start of June, reaching the Himalayas by September before reversing. From late October to December the monsoon finds its way back down over the subcontinent towards the Indian Ocean.

As per Indian meteorological department, monsoon is considered normal if rainfall is 96% to 104% of the long period average (50 years average). If the rainfall is 104% to 110% of LPA, it is above the normal level and a rainfall of 90% to 96% of LPA is regarded as below the normal level.

The Moving Monsoon in India



Source: Indian Meteorological Department

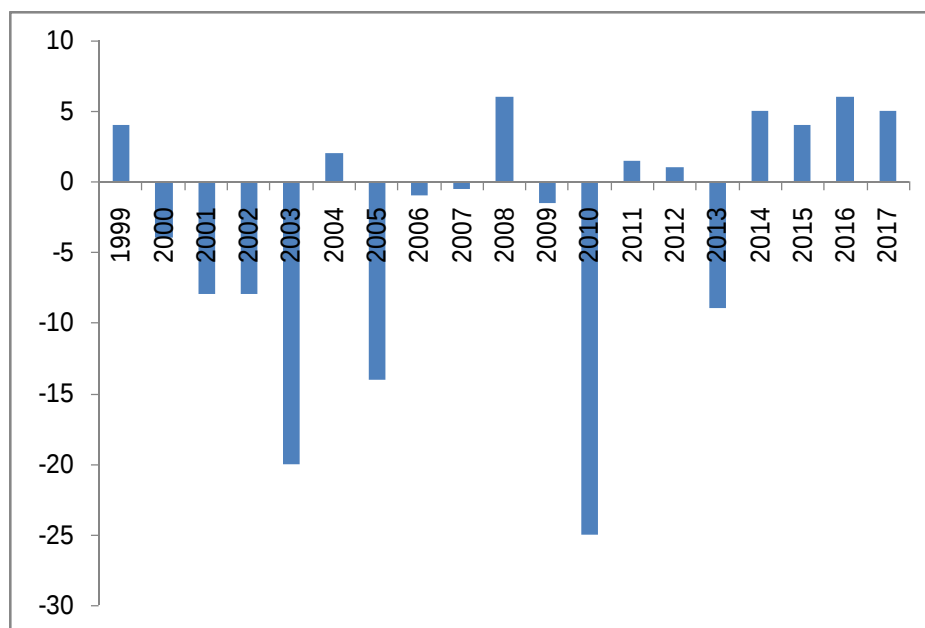
Figure 1.

Southwest Monsoon in India is a four month long affair from June till September. The fate of the Kharif crop depends on the performance of the southwest Monsoon. Good rains during the season result in bountiful crops which further benefit the farmers.

Kerala is the south-west monsoon's first port of rainfall in mainland India. It arrives in Kerala in the first of week of June, after covering Andaman and Nicobar islands a week before. After hitting Kerala, it breaks out into two branches: one over the Bay of Bengal and the other over the Arabian Sea. In a normal year, it covers the entire country in a month. It hits Maharashtra around June 15 and Delhi around June 29 before travelling further into the north-west.

After hitting the south coast, it takes about a week to cover the coffee, tea and rubber growing areas of south India. It spreads to the rice areas of eastern parts in the first 10 days. It usually covers half of the country in the first fortnight and enters the oilseed-producing areas of central India in the third week of June. Cotton areas in the western region get rains by the first week of July. It covers entire country by mid-July. In South India, most of the rivers are rain-fed. Thus, the irrigation canals in Peninsular India get their water indirectly from the monsoons. Hence, the importance of the monsoons to India is eminent.

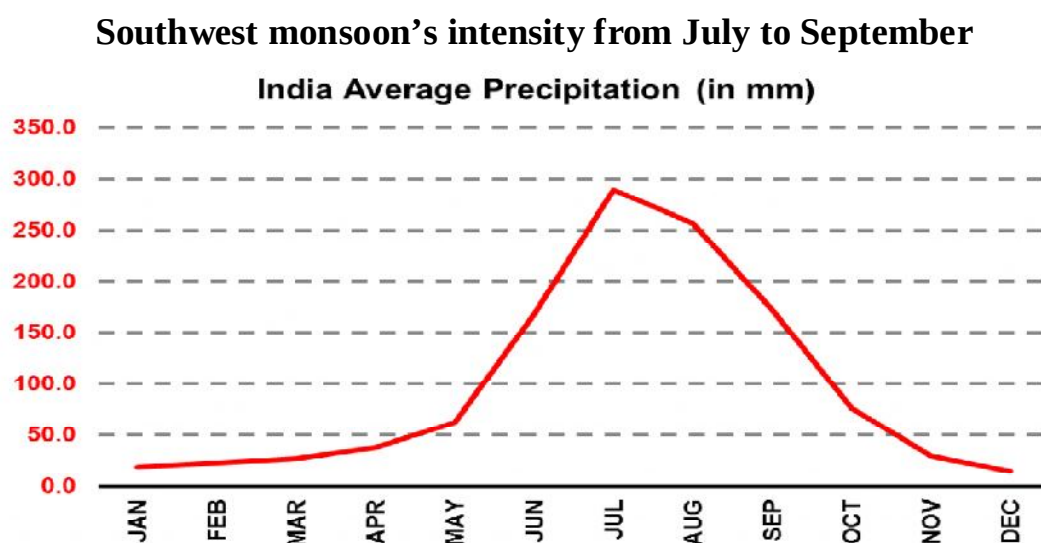
Departure of rainfall from normal (%)



Source – Indian Meteorological Department

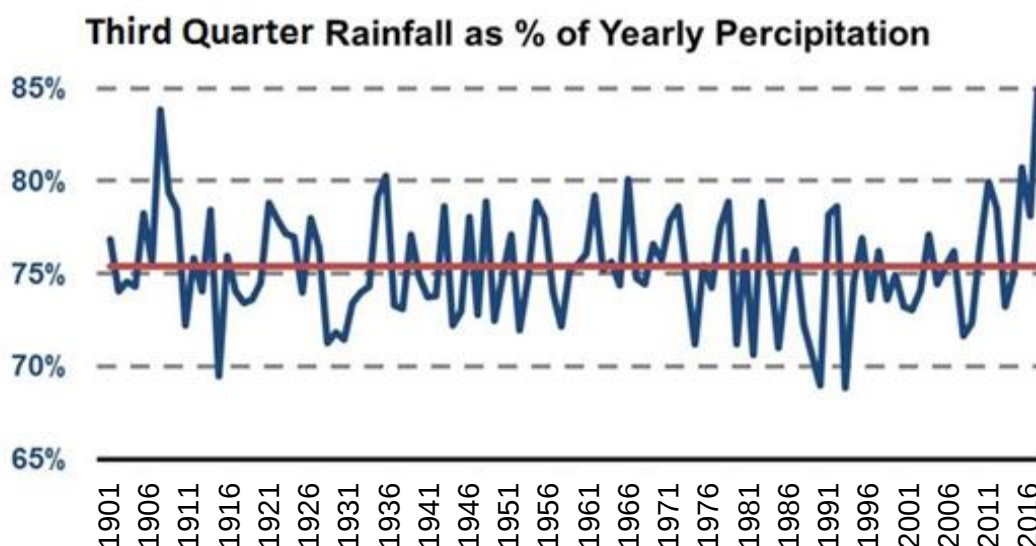
Figure 2.

El Nino – or “the boy child” in Spanish – is a weather phenomenon characterized by an abnormal warming of the eastern Pacific Ocean that triggers weaker rains and droughts in the Indian sub-continent. El Nino, an abnormal warming of surface ocean waters in the eastern tropical Pacific, is one part of what’s called the Southern Oscillation. The Southern Oscillation is the see-saw pattern of reversing surface air pressure between the eastern and western tropical Pacific.



Source: Indian Meteorological Department

Figure 3.



Source: Indian Meteorological Department

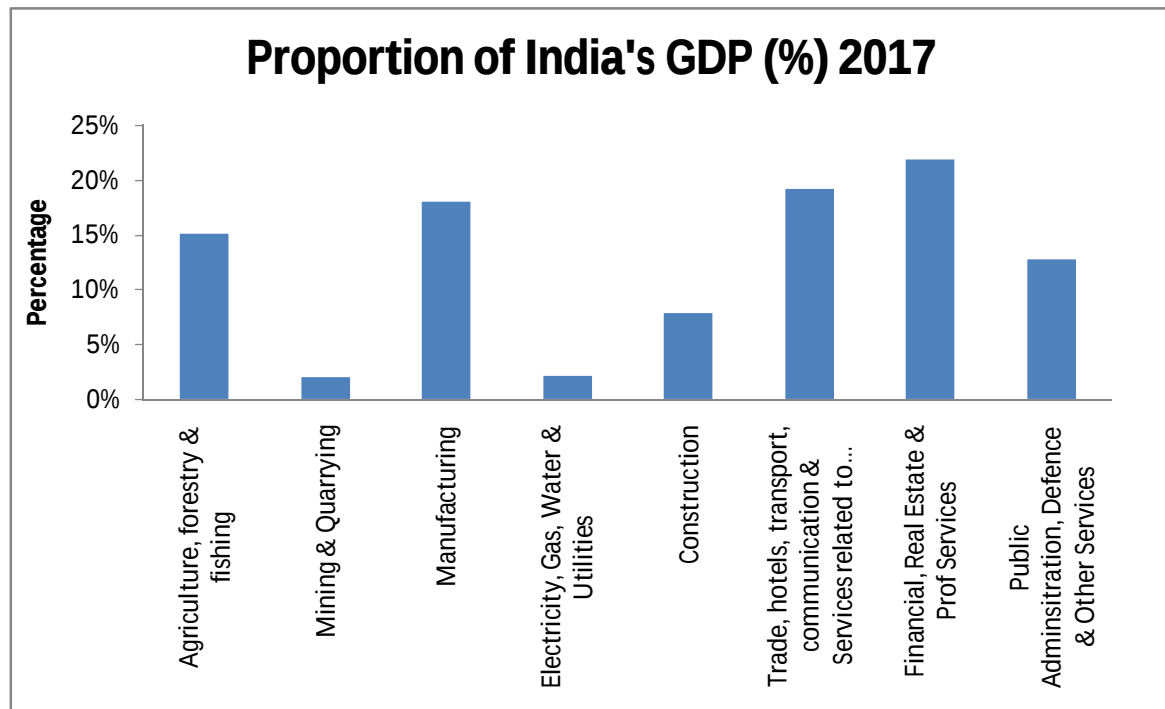
Figure 4.

From the above graph, it is seen that July is the wettest month of the year. The year 2011 had a good monsoon season.

3. India's Agricultural Economy

Agriculture is arguably the most important part of the Indian economy, and the sector accounts for at least 17% of the country's economic output, providing employment to approximately half of the country's population. Agriculture and the rural economy are heavily dependent on rain. If the monsoons fail or are delayed there is a shortage of grain and food inflation soars. The price of food grains go to unheard levels and the food budget of the layman are thrown into disarray.

Output of food-grain is supposed to be reduced. This will also hamper the overall growth in this sector. If it is a drought then food production will be reduced by 10% compared to the previous year. There will be a significant reduction in Kharif output as well. This is the production that happens during the summer season and rains play a major role in that. The soil will be drier compared to normal and there will also be lesser water to be used for irrigation. All these factors will mean that there is lesser production during the Rabi or winter season as well.



Source: NitiAyog, Government of India, 2017

Figure 5.

It is important that the sector is well supported and given stability as India is one of the world's biggest producers of pulses, rice, wheat, spices, fruit, vegetables and tobacco, a large proportion of which is consumed internally. The spice industry alone generates approximately \$3 billion in global revenues for India. It is evident that most Indians are directly or indirectly dependent on agriculture, whether this is through farming or by being involved in doing business with agricultural goods.

If a good harvest brings prosperity in the economy, people's standard of living and per capita income will be increased. Similarly, increased output reduces the nation's dependency on import of food grains, thus enabling domestic producers to gain out of this situation. India is regarded as world's second largest producer of rice, wheat, sugar and cotton. Higher farm output will be reflected in food prices and help the government to take steps to cut the fiscal deficit and farm subsidies. It can also impact the demand for gold in India. Despite the economic slowdown and depreciation of Indian rupee, India continues to be a major importer of gold in the international market. Higher rainfall facilitates the irrigation of farm lands without depending on the motors which are run by using diesel and other oil products. This reduces Indian agriculture's dependency on oil, which makes up about 40% of the country's total oil product demand.

Most Indian crops require abundant, at least sufficient, supply of water. Where there are no irrigation works, the agriculturist gets his water supply entirely from the monsoon. Even if the monsoon is delayed by few days, it can have an adverse effect on the economy as about half of India's farm output comes from crops sown during the June-September rainy season. The monsoon indeed has a direct impact on food production but its influence on the country's growth rate is tempered by other variables also.

If the monsoon fails over a wide area, then the result will be famine. The famine problem is largely the consequence of the vagaries of the monsoon. As the incomes of the agriculturists fall their capacity to buy the goods and services of other classes of people is diminished. Lawyers, doctors, and even teachers find their incomes reduced. Products of industry do not find a ready market. The supply of raw materials to industry also suffers. As many agricultural commodities figure prominently in our export trade, a failure of the monsoon affects unfavourably the volume and the balance of India's foreign trade. Due to the fall in the national income, the revenues of the Government undergo a sharp decline and the Government may, in addition be faced with extraordinary expenditure because of famine relief. Hence, so great is the dependence of Government revenues on the monsoons.

The ability of technology to mitigate a bad monsoon remains limited. In the year 2009 India suffered a drought and this, in turn, forced global agricultural prices to rise sharply, especially within the sugar and grain markets, ultimately causing a spike in Indian inflation. Good monsoons correlate with a booming economy, thus, giving signs of improved economic conditions and growth prospects. On the other hand, a weak or failed monsoon can result in declined agricultural output, poor economic conditions, poverty and substantially hinder overall economic growth.

In India, water is more valuable than gold for the farmers or the one who engaged in agriculture. Timely rains mean a good crop which pushes down the prices of food grains, pulses, vegetables and cash crops leading to a fall in inflation. Industries use raw materials like cotton in the textile industry, sugarcane used in sugar industry, oilseeds used in vegetable oils and natural rubber used in the tyre industry. The prices of these cash crops used as raw material in industries fall in times of good monsoons and all goods manufactured using these products come down.

India's rural life revolves around agriculture and allied activities in small villages, where the overwhelming majority of the population lives. As per the 2011 census, 64.68% of the

population live in about 638,000 villages and the remaining 35.32% lives in more than 5,100 towns and over 380 urban agglomerations. The unseasonable and pre-monsoon rain damages the crops, especially those areas where monsoon rain is adequate, and then it would hit the farm output and affects the rural demand. The monsoon is the life-line of Indian economy just like blood is required for survival or life and so is that without monsoon our agrarian economy cannot survive.

In the past decade India has grown by leaps and bounds in the technological and services industry, still a huge part of the GDP is contributed by the agro based industry. The Indian economy is highly sensitive to agronomics and so a slight change in the pattern of the monsoon affects the food prices. An unfortunate delay in the “Great Indian Monsoon” affects cultivation causing food prices to soar leading to inflation in the country. The inflation is not the happiest time for investors.

4. Impact of Monsoon on the Indian Economy

The monsoon has a direct impact on the country's agricultural GDP. The planting of key kharif, or summer, crops like rice, sugar cane, pulses and oilseeds begins with the arrival of monsoon rains in June. Summer crops account for almost half of India's food output and a delayed or poor monsoon means supply issues and acceleration in food inflation, a key metric which influences Reserve Bank of India's decision on interest rates.

A good monsoon increases food output and improves farm income. Abundant rains can push up rural spending on several items such as televisions, cars and gold. The fast-moving consumer goods (FMCG) i.e. toothpastes, shampoos and instant noodles etc. and fertilizer sectors would benefit the most from normal monsoon. Likewise, about 40 percent of India's cement demand comes from rural housing. Adequate monsoon, therefore, is critical for steady growth of cement companies. Below normal monsoon will also negatively impact agricultural and related sectors like fertilizers, agro products, farming equipment (tractors). Rural spending on consumer goods is also crucial for the broader economy. For instance, rural buyers account for close to 40% of India's total motorcycles sales.

A deficit monsoon could also lead to a drought-like situation, thereby affecting the rural household incomes, consumption and economic growth. A poor monsoon not only leads to weak demand for fast-moving consumer goods, two-wheelers, tractors and rural housing sectors but also increases the imports of essential food staples and forces the government to take measures like farm loan waivers, thereby putting pressure on finances. Whereas a normal monsoon results in a good harvest, which in turn lifts rural incomes and boosts spending on consumer goods. It also has a positive impact on hydro power projects.

Around 50% of India's total food output comes in the form of summer crops. A delayed monsoon can lead to supply issues and even accelerate food inflation.

5. Monsoon's effect on inflation, RBI's policy

A good Monsoon season leads to bumper farm output that keeps food prices under control. This is so because food accounts for 50% of the country's consumer price index, which is closely monitored by RBI. During droughts, the government has to support farmers through incentives, subsidies. These widen the fiscal deficit. Good monsoon season, hence, also checks government spending.

The Indian economy gains due to good Monsoon rains in the country. On the other hand, weak Monsoon rains result in crop failure which affects the economy in a negative manner due to lower production. Later on, this translates into price-rise, low industrial output, and other issues. Normal Monsoon rains keep a check on food inflation due to the availability of food produce. However, in a situation of drought, prices soar significantly. Not only do the prices increase drastically but the cost of living also tends to reach a new high. Also, if poor Monsoon results in less crop output, the country may even need to import.

More than anything else, the failure of Monsoon has a huge impact on the life of the Indian farmer. Most Indian farmers rely on good crop produce during Monsoon to earn their living and in order to overcome debts incurred. Crop failure and/or deficient rainfall are the big reasons for mass farmer suicides across the country. This further cements the importance of Monsoon in an agrarian economy like India.

(a). Impact of good monsoon in India

1. Increased output of grains and oil seeds: A good rainfall tends to increase the productivity of rice, sugarcane, millet, oil seeds and cotton. This encourages the government to ease the edges on the export of wheat and rice.

2. Better irrigation: A good rainfall increases the ground water level and replenishes the reservoirs. This helps in good irrigation system and better hydroelectricity power output.
3. Reduction in inflation: The good monsoon in the country also increases the production of vegetables and fruits. This reduces the price and thus calms down the inflation.

(b). Impact of less rainfall in India

1. Price of agricultural products rises: Due to shortage of rainfall, sowing of groundnut, paddy fields, soya-beans, and kharif crops in the different states will be affected. Productivity of rice, oil seeds, sugarcane is also affected. The agricultural sector is undergoing a bad experience. Since, the farmers are dependent on the monsoon; they are not able to do anything except to wait for the monsoon. The shortage of supply and huge demand of the agricultural products has increased the price.
2. Shortage of power supply: Rise in temperature has resulted in shortage of power supply in many states of India. The power cut is also one of the main reasons for shortage of products. And this finally results in the hike in the price of agricultural products.
3. Shortage of water supply: In states like Maharashtra, where the water supply of whole year is dependent on the monsoon rainfall, people experience the shortage of water supply. In Mumbai, the rainwater is collected in the huge tanks which is processed and supplied across the city around the year.
4. Inflation: Less rainfall will result in less production. This will create drought like situation. Though India is self-sufficient for production of agricultural needs, but, if such situation occurs, then, India will be pushed into global market. This will result in inflation. Normally, whenever there is poor monsoon, food inflation goes up by 4 to 5 percentage points.
5. As per the statistical data poor rains can impact the country's GDP by anywhere between two per cent to five per cent. This is largely because, despite agriculture's declining contribution to GDP, it has a big impact on the purchasing power of a large section of the population that lives on agriculture.

6. Inflation and Monetary Policy

There is linkage between monsoon, agriculture output and inflation i.e. a good monsoon can lift agricultural production and bring down food prices which in turn ease inflation. Inflation

also has its effect on the Reserve Bank of India's monetary policy movement as it is one of the primary tools available with the central bank to control inflation. For instance, the RBI hiked the interest rates in January 2014 to tame retail inflation which was 9.9% in December 2013. As per the latest numbers available, retail inflation measured by the consumer price index (CPI) came in at 8.31% in March compared with 10.39% in the same month a year ago. This dip in inflation had raised hopes of monetary easing by the RBI; however, poor monsoon forecasts have stoked fears of reduced agricultural output and food price hikes factors that are likely to restrict the central bank's monetary easing policies.

7. Impact on Rural Demand:

There is very little probability of rural demand going down but consumption in the rural areas is supposed to be moderate. One of the major reasons for this is that people are nowadays more dependent on non-agricultural sector for their income. Therefore, impact of rural demand will be negligible.

As a result of the deficient rainfall current account balance would be reduced by 0.3 percentage points. Similarly, fiscal deficit will increase by 0.2-0.4 percentage points. A number of drought-relief measures will be taken and ferrying food stocks from one place to another will become costlier. Minimum support prices are supposed to increase and the various employment guarantee schemes will have to increase their allotments to deal with the precarious situation. All these factors will increase the fiscal deficit.

8. Monsoon: Inflating the Impact

On the contrary, production has been rising steadily owing to the improved irrigation system and better farm yield. It must also be considered that statistical models and sophisticated technology have not been able to predict the rains accurately. Between 2001 and 2009, monsoon predictions have been accurate only twice. A careful study of statistics reveals the true determinants of food price inflation. They are land and oil prices, exchange rates of the domestic currency, the opportunity cost that farmers have to incur and the prevalent interest rates. For any production unit, the land value and transportation cost are the two major components in pricing farm produce.

Among the many reasons for the increase in land prices are increasing urbanisation and the government's industrialisation policy, popularly known as the special economic zones

(SEZs). Another factor that influences the prices of assets - land in this case - is the exchange value of the domestic currency. The most important factor is the transportation cost, which contributes 15-20% to the prices of agricultural products at the final selling point. This cost depends on international oil prices. Opportunity cost is another variable determining the price of farm produce.

The difference in earning based on a farmer's choice to continue ploughing the field and not to cash out, sell his land and put the money in bank, will be reflected in the cost of the product. After a steep rise in land prices, if a farmer were to sell his land and convert it into cash, the interest it would have earned wouldn't have been substantially less than the earnings from farming. Agricultural prices tend to rise as farmers demand a fair compensation for continuing to remain in the profession.

9. Economic Analysis of Monsoon's Implications

In 2009, India experienced a cruel drought with a rainfall deficit of -22 per cent. Consequently, food grain production decreased by 6.8 per cent from 234.47 million tonnes the previous year to 218.11 million tonnes. India had a sequence of droughts during 2001-2003 and this led to a precipitous fall in food production by 38.08 million tonnes, dipping to the lowest level in 20 years, 174.77 million. The overall conformation of India's economy has changed much since the when the monsoon used to be the single most decisive factor. A big deficit in rainfall invariably leads to a dip in food production. We had a 19 per cent deficit monsoon in 1979-80 and food production dipped from 131 million tonnes to 109 million tonnes. Conversely, a copious monsoon inevitably leads to an uptick in farmers' fortunes. In 1988-89, India had 19.3 per surplus rain and it produced a jump of 29 million tonnes in food grains. However, the figures show that all it takes is one normal or good monsoon to arrest the slide in food production. Last year's record food production of 273.38 million tonnes came on the back of a normal monsoon (-3 per cent deficit) after a sequence of two bad monsoons in 2014-15 and 2015-16.

However, the impact of the monsoon on food production does not translate into a similar correlation with overall economic growth. That is because India's economy is not as agriculture-based as it used to be in the first few decades after Independence. And the contribution of industry and services has increased due to the advent of globalization. For instance, in 2011, which had a normal monsoon with 105 per cent rainfall, India clocked up a growth rate of 6.64 per cent but in 2015, which was a drought year with a monsoon deficit of

14 per cent saw the country growing at 7.57 per cent. Again in 2009, the year of the big drought, India's growth rate spurted from 3.8 per cent to 8.48 per cent.

“The growth rate of 8.0 per cent in the GDP during 2009-10 has been achieved due to high growth in transport, storage and communication (15.0 percent), community, social and personal services (11.8 percent), financing, insurance, real estate and business services (9.2 percent), and manufacturing (8.8 percent)”. The share of the agriculture and allied sector in India's economy stands at 17.32 per cent in 2017 as opposed to 51.81 per cent in 1950. The services sector contributes 53.66 per cent of India's GDP. In the 1950s, it accounted for just about 30 per cent. A normal to above-normal and well-distributed monsoon boosts farm output and farmers' income, thereby increasing the demand for consumer and automotive products in rural markets.

Agriculture sector is one of the most important contributors towards India's overall economic growth. Though it is said to only contribute around 17% towards the overall growth, it is emphasized on mainly because of workforce numbers (50% is engaged in farming) as well as size of the rural families in India. While looking at the numbers, in 2013-14, when the monsoon was good, agriculture sector grew 4.2% and industry grew 5%. In 2015-16, during weak monsoons, agriculture sector was estimated to grow only about 1.1% whereas industry grew 7.3% with an overall growth in the economy at 7.3%. This emphasizes on the significance government is giving to rural economy and infrastructure. India's economy is almost certainly more dependent on favourable monsoons than it needs to be in the 21st century.

About 55-60 per cent of the area sown is still rain-fed. India gets nearly 53 per cent of its agricultural produce from the kharif season (June-September) compared to the rabi season (November-February), where the production is around 47 per cent. The impact of the monsoon is also crucial for rabi crops as it has an impact on the ground water and also reservoirs which are critical for rabi crops irrigation. Any divergence from the normal progress or distribution will have direct impact on the agricultural output and a cascading effect on the overall economy, food inflation and therefore, consumer spending in India.

Apart from monsoon, the distribution across regions and its withdrawal will also play a crucial role in determining production of agricultural commodities.

10. Conclusion

As a whole the Indian economy is still largely dependent on good Monsoon rains. Though the improved irrigation and availability of electricity has reduced this dependence to a small extent - the hydel power generation, ground water availability and its recharge are totally dependent on good monsoon rains.

To conclude, Indian agriculture has not become completely insulated from large fluctuations in rainfall. However, as the 2009-10 experience shows, the impact of adverse monsoon shocks can be ameliorated by proactive policy measures. Of high concern is the declining sensitivity of the value of crop production to positive monsoon shocks, which suggests saturation of land use - exhaustion of economies of scale and stagnation in productivity. Sustainable agriculture and food security warrant comprehensive interventions, including another green revolution in pulses and oilseeds alongside the one that is underway in eastern India.

Since allied activities are less sensitive to variations in the monsoon, ongoing efforts towards diversification of agriculture in favour of allied activities are expected to yield greater resilience than alternative strategies. During summer monsoons, heavy rainfall can cause flooding. Powerful floodwaters can drown victims and damage buildings, leaving people without homes and vulnerable to the elements. Indian economy suffers heavy losses due to floods and droughts almost every year. The summer rains are critical for keeping the economic engine chugging along in India.

Manufacturing also grows much faster than agriculture. What is more, service and manufacturing growth rates are not volatile. Agricultural growth is volatile and rain-dependent, among other things. A good monsoon is associated with some of the following factors. One, food inflation remains under control, which is of all-round benefit to the economy. Two, rural consumption rises, benefiting both FMCG and white goods manufacturers and to some extent, cement companies, etc. as pucca construction picks up.

Third, two-wheelers and tractors tend to do well due to semi-urban and rural buying. Of late, mobile handset sales and other electronic items have also seen a correlation to strong monsoon performance. Fourth, fertiliser companies tend to do well. If monsoon performance is indeed trending towards the normal, this will offer a useful boost to economic growth.

Structural factors such as climate change and rising greenhouse emissions could be at work alongside one-off events such as El Nino. The silver lining is that crop output turns out to be

statistically more sensitive to net area sown than to monsoon variations. This provides the rationale for strategic long-range planning encompassing expansion of net sown area by reclaiming arid and semiarid areas, introducing better technology and efficient water management to make Indian agriculture weather proofed over time.

Lastly, agriculture isn't the only sector which is affected by the performance of Monsoon. In fact, as many as a dozen sectors depend on Monsoon, either directly or indirectly. Thus it is safe to say that Monsoon does play a big role in India. The agricultural output of rain-fed crop areas in the country has social, political, as well as economic implications.

11. Suggestions

The Indian government must initiate some actions to improvise the infrastructure of agricultural sector in order to make the Indian economy independent of monsoon rains. Monsoon rains can be harnessed as hydropower, a valuable energy resource. Hydropower currently provides 25% of India's electricity.

The excessive dependence on India on the caprices of the monsoons may be mitigated by the construction of modern irrigation canals, flood control, afforestation, and diversification of Indian industries. The monsoon doesn't only affect the crops but all the industries in the country making the situations adverse for the economy as a whole. Fiscal, administrative and trade policy tools are usually the first line of defence in tackling a drought-like situation. Authorities may monitor local shortages more strictly and crack down on hoarding, since the gap between wholesale and retail prices remains very wide. The government can also reduce import duties and ban exports, impose stock limits on commodity traders, and impose margins on, or ban, futures trading if prices rise too sharply.

Government should earmark a share of priority sector credit for farmers/others specifically for reclamation/ development of uncultivable/fallow land in the country that can increase the total sown area.

The climate change may emerge as a significant constraint on the supply and availability of agricultural produce. Thus, large investments in micro irrigation, rainwater harvesting, efficient groundwater management, land improvements/ reclamation and more intensive use of technology to enhance productivity can help in mitigating the risks of climate change materialising in the form of monsoons shocks.

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