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# Reforming Indian Agriculture

A CASI Working Paper


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# REFORMING INDIAN AGRICULTURE

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## EXECUTIVE SUMMARY:
## REFORMING INDIAN AGRICULTURE

Following an overwhelming election victory, Prime Minister Narendra Modi's new government has a golden opportunity to bring about historic reforms in the agricultural sector to improve farmer livelihoods and national food security. The sector affects the economic well-being of half the Indian population and the access to affordable and nutritious food for all Indians. Fundamental reforms can achieve sustainable and broadly distributed agricultural growth that will add to India's GDP, increase export earnings, help conserve increasingly scarce resources of land and water, and enable the more orderly movement out of agriculture and into other productive sectors.

Reforms in four areas should be the priority if Prime Minister Modi's bold goal of doubling farmer incomes is to be accomplished in the coming years. First, the focus of agricultural policies must shift from production per se to farmers' livelihoods. Second, policies to improve the allocation and efficiency of land and water are essential if the critical resources of water and land are to be conserved. Third, reforms are needed to help farmers cope with the growing risks of weather and price volatility. Fourth, agricultural markets must be opened to greater competition and provided with better infrastructure if farmers are to realize better returns for produce while ensuring nutritional security for low-income consumers.

Agriculture is a state subject but where the Central government has had—and will continue to have—a large role. Reforms can only succeed if the Central and state governments work closely together in a spirit of "cooperative federalism." Many of the important levers of change—water, power, irrigation, extension, agri-markets, etc.—are controlled by the states. Going forward, it would be helpful if the government created an Agri-Reforms Council on the lines of GST Council for a somewhat longer term than is currently done (for two months).

The focus for the Government of India will need to be twofold: actions that it can unilaterally take to raise agricultural incomes; and second, actions to influence state government efforts to improve agriculture with its sustainability at the core. The steps listed should be thought of as a package, which will have an impact if most are implemented and not one or two in isolation.

- Reduce cereal procurement and keep MSP price increases for rice and wheat below inflation, and not exceeding border prices, while encouraging the private sector to develop robust markets in less water intensive crops like pulses and oilseeds by removing controls on stocking, trading, exports, etc. This will also have a beneficial impact on depleting water tables in certain regions, notably in north-west and southern India.

- Implement income transfers scheme for farmers in tandem with reductions in the subsidies for power, water, and fertilizer that distort incentives and hinder change. This will have large positive environmental effects and help toward better natural resource management. Keep the real prices of subsidized grains under the National Food Security Act, 2013 and link them to the MSP to incentivize the production and consumption of non-cereals.
- Scrap the Essential Commodities Act and other laws designed fifty years ago for conditions of scarcity. Those conditions of scarcity have long since disappeared. India is trying to cope more with the problems of surfeit than scarcity.
- Focus on income from livestock to help marginal farmers (<1 ha). Change laws and more importantly the political and social climate that have been so detrimental to the livestock sector lately.
- Eliminate or reduce dramatically export restrictions and export taxes on agricultural products. Trade policies that have been arbitrarily and pro-cyclically imposed (increasing tariffs and import restrictions when world prices come down, and imposing export bans and taxes when domestic prices rise)—must become stable and predictable by setting "trigger levels" well in advance.
- Accelerate the effort to create a single agricultural market by introducing assaying, grading, setting standards, bringing "Uber-type" logistical players on e-platforms to move goods from one region to another, and setting dispute settlement mechanisms so that farmers and farm organizations can transact with any buyer, anywhere in India, and at any time of their choosing.
- Support the creation of public mandis as a viable alternative to private trade. Most importantly, across the board, increase marketing options available to farmers while subsidizing market infrastructure improvements.
- End support for the rehabilitation of inefficient urea plants and create a plan for closing the most inefficient plants.
- Incentivize the passing of state laws to allow easy leasing/renting of agricultural land and relax restrictions on conversion of agricultural land for other purposes. At present, these restrictions keep the value of agricultural land low and raise the barriers to exit from agriculture.

Finally, even as these reforms are undertaken, it needs to be recognized that growth and employment opportunities outside agriculture are critical for long-term improvements in farmers' incomes. Relentless population pressures have meant that most Indian farms are too small to provide viable incomes. The long-term future of Indian farmers fundamentally depends on getting many people out of farming. Ironically, that future will come about more reliably if policies to improve agricultural production and incomes are pursued today.

## REFORMING INDIAN AGRICULTURE

The landslide victory of the Bharatiya Janata Party (BJP), led by Prime Minister Narendra Modi in India's recent Parliamentary elections, offers an opportunity for fundamental economic reforms to achieve high growth and improved livelihoods across the country. India's agriculture sector is one of the areas with the greatest potential for wide-ranging reforms affecting the largest number of Indian families. Prime Minister Modi himself recognized the need and opportunity in the BJP's election manifesto when he stressed, "I am extremely passionate about doubling farmer income…," signalling the goal he set in 2016 would be at the top of his second-term agenda.

Given the many challenges facing the new government, why should agriculture and food be a top priority? First, agriculture affects the economic well-being of nearly half the Indian population. More Indians depend directly or indirectly on agriculture for employment than on any other sector. Eighty percent of India's extremely poor people live in rural areas and most of those are marginal farmers, farm laborers and their families. Second, agriculture holds a key to reducing India's double burden of under- and over-nutrition, directly affecting public health and worker productivity. Third, agriculture has the potential to spur, rather than be a drag on India's overall GDP growth. Agricultural growth of four plus percent is achievable with the right reforms and would add at least a percentage point to GDP, increase exports and improve India's trade deficit. Fourth, agriculture is India's biggest renewable natural resource. India's vital land and water resources on which farmers and food production depend, must be utilized more sustainably, especially in the face of mounting scarcity, environmental degradation, and climate change.

Finally, history tells us that economic transformation in developing nations is propelled by increases in agricultural incomes underpinning industrial growth. China's growth story began with rapid agricultural growth made possible by dramatic economic reforms. Rising farm productivity and incomes enable the movement of labor out of agriculture, provide greater demand for industrial and consumer goods and further ensure that wage inflation is low. The first is critical for long-term increase in farmer incomes in India, as land fragmentation means that many Indian farmers are farming in plots of such small sizes (especially those below 1 ha), that even doubling their incomes would leave them with meager earnings.

In this paper, we examine four areas that can contribute to the government's goal of doubling farmer incomes. First, we consider how the shift in policy focus from production per se to farm incomes can be best accomplished. Second, we focus specifically on policies that can improve the allocation and efficiency of the two key factors of production—natural resources that are so central for agriculture but are increasingly binding constraints, namely land and water. Third, we examine reforms to help farmers cope with

the growing risks in agriculture from sudden changes in policies, weather variability and price volatility, all of which have put great stress on India's farmers in recent years. Fourth, we examine how markets for agricultural products can be improved to provide farmers with better prices for their produce while ensuring nutritional security for low-income consumers. We conclude with some thoughts on the links between agriculture and the wider economy.

## 1. Doubling Farmers' Incomes (DFI)

India's agriculture policies have had multiple mandates including a production imperative (national food security), a consumer imperative (keeping food prices low for a large low-income population), and a farmer welfare imperative. The tensions between these mandates have resulted in costly, contradictory policies whose costs have been increasingly borne by farmers, the government purse, and the natural environment. The new focus on improving farmer incomes is a welcome departure and throughout this paper we are guided by this shift, believing that must now be the lodestar of India's agricultural policies.

There are several distinct policy options for increasing farmer incomes:

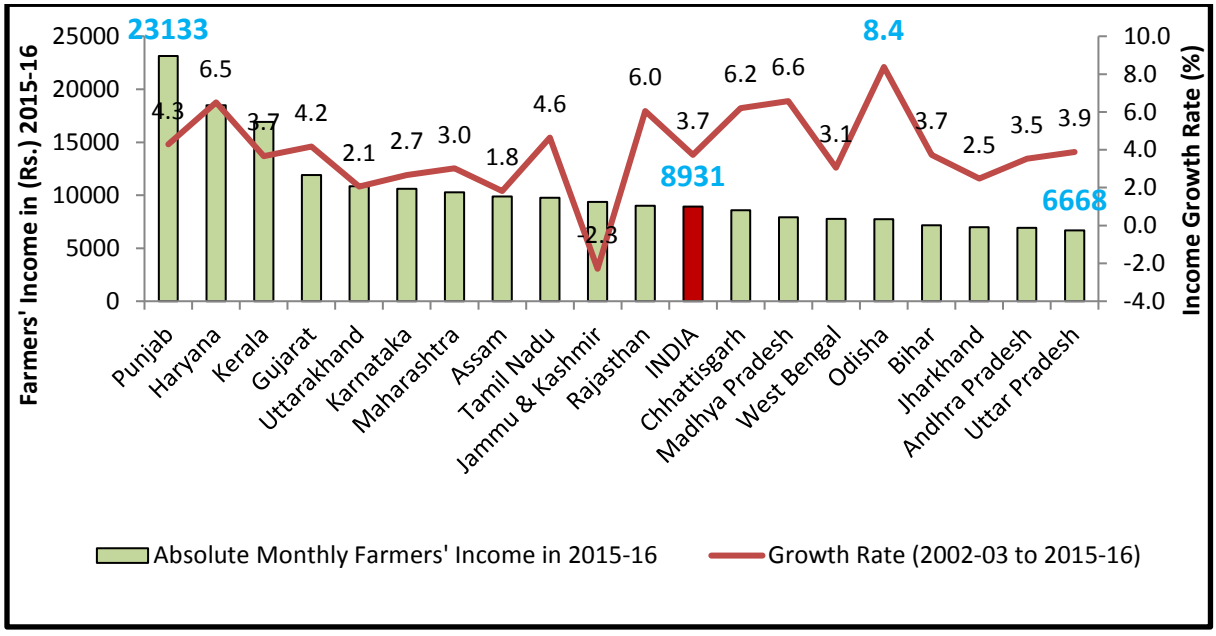
i) Subsidizing input costs (such as water or fertilizer) to decrease production costs
ii) Increasing yields through better farming practices and timely availability of quality inputs, especially high yielding seeds and water
iii) Increasing output prices, through MSP and public procurement
iv) Getting a greater share of the marketing surplus for farmers
v) Improving the terms of trade between agriculture and non-agriculture
vi) Augmenting non-crop related agriculture income
vii) Providing direct income transfers to farming households

In April 2016, the government set up the "Committee on Doubling of Farmers' Income" (chaired by Ashok Dalwai), which issued a comprehensive 14-volume report in September 2018. The Committee estimated that the income of an average farm family in 2015-16 was Rs 8,059 per month, and the objective was to double it to Rs 16,118 per month by 2022-23 in real terms (after discounting for inflation). This required a growth rate of 10.4 percent per annum for the next seven years until 2022-23. The Committee also looked at previous NSSO surveys on farm incomes for 2002-03 and 2012-13 and projected the data through 2015-16 based on overall growth trends. It found that farmers' real incomes grew by 3.6 percent per annum during this period. The Committee also found that the agri-GDP growth rate also hovered around 3.6 percent during that period, indicating that farmers' incomes increased broadly in line with the growth in agri-GDP.

While we don't have data on farmers' incomes after 2015-16, given growing farmer distress, it is unlikely to have increased more rapidly than at the earlier pace of 3.6 percent. While the goal of doubling farmers' incomes by 2022-23 is very unlikely (at least if the source of income is solely agriculture), a combination of increases in farming income, non-agriculture farm income, off-farm income, and income transfers, can achieve this goal in the near future.

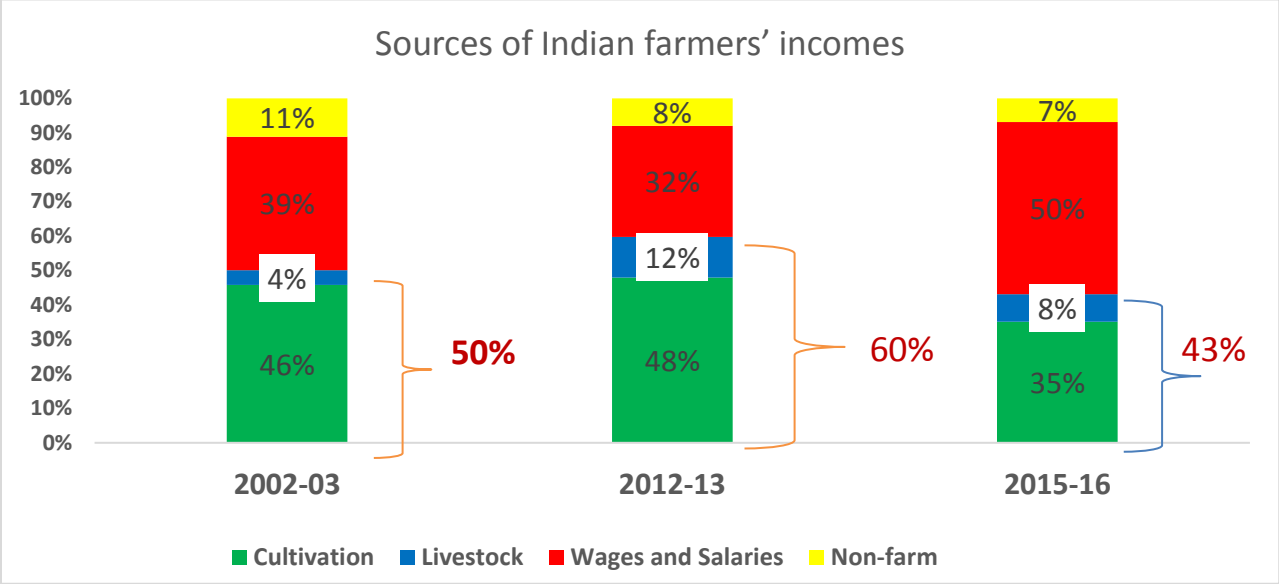
Before we spell out what we conclude are some of the core elements of policy, we should highlight one additional piece of information. The National Bank for Agriculture and Rural Development (NABARD) conducted a Financial Inclusion Survey (NAFIS) of farming and non-farming rural households (HH) for the agricultural year July 2015-June 2016. The report (released in 2018) found that an average farming HH in 2015-16 had an income of Rs 8,931 per month, about 10 percent higher than the estimates in the Dalwai Committee Report (DCR) (due to differences in the sampling frame and definitions of farming HH). For our purpose, we compare farmers' incomes from the three main sources (NSSO 2002-03; NSSO 2012-13; NAFIS 2015-16) and estimate their level, growth, and composition patterns to establish trends before laying out policy options. Figures 1 and 2 present these levels, trends, and composition in farmers' HH income.

**Figure 1. Level of average farming HH income in 2015-16 (Rs) and compound average growth rate in real incomes of farming HHs between 2002-03 and 2015-16 (%)**




Source: NSSO 2002-03), NSSO 2012-13), NAFIS (2015-16)

**Figure 2. Sources of average farming HH Income, all India (%)**




Sources: NSSO (2002-03); NSSO (2012-13); NAFIS (2015-16)

It may be noted that according to NAFIS (2015-16), the average farming HH income at the all India level was Rs 8,931 per month (a notch higher than estimated by the DCR). This varied between Rs 6,668 per month in Uttar Pradesh to a high of Rs 23,133 per month in Punjab, a ratio of almost 3.5 times. The overall compound average growth rate (CAGR) in real incomes (at constant prices, nominal incomes deflated by CPI) was 3.7 percent at the all India level (similar to the 3.6 percent estimated in the report of the Committee on Doubling of Farmers' Income), and it varied between -2.3 percent in Jammu and Kashmir to high of 8.4 percent in Odisha, with UP at 3.9 percent. It may be important to note that where levels of incomes are low and agriculture productivity much below the frontier (like in UP, Bihar, Odisha, Jharkhand, etc.), it is easier to increase growth rates significantly.

But what is more important for policy purposes is to note the sources (composition) of income of average farming HHs. Figure 2 shows that the income coming from cultivation and farming of livestock constituted about 50 percent of average farming HH's income in 2002-03, which went up to 60 percent in 2012-13, but then dropped significantly to just 43 percent in 2015-16. This sudden drop could be due to some variation in the NAFIS sample selection but more likely 2015-16 was a severe back-to-back drought year. In such a drought year, when cultivation underperforms, farming HHs depend more on wages and salaries either by working on others' farms who may have irrigation facilities or outside the farming sector.

The reality is that income from agriculture alone will be small for the majority of Indian farmers. India has far too many people (45 percent of the workforce) currently in

agriculture compared to its contribution in GDP (only 15 percent). Global experience shows that as the economy grows, people move out of farming (migrating to urban areas) and for those who remain, the share of non-farm income increases in farming HHs. Employment and income opportunities increasingly come from small scale industry (Town and Village Enterprises in the case of China), labor intensive manufacturing, and the construction sector, including housing.

It is therefore critical that the government create an enabling environment for people to move out from farming to higher productivity jobs. While that will take time, there is considerable scope for increasing non-agriculture farm income.

The foremost asset of the farmer is land. Our simple suggestion is that the GOI, in association with state governments, should free up land markets, especially land lease markets that can help provide farmers with steady income while maintaining asset security. In remote dry areas, leasing land to solar or wind power companies could provide farmers with far greater—and more steady—income than what their low productivity farms ever will. In other areas, farmers may choose to lease land to factories or commercial development. Currently, strict land laws ostensibly designed to help farmers either lead to skirting the law or to unscrupulous land mafias preying on poor farmers. Empowering the farmer to lease land (as opposed to selling land) through legal changes and model contracts could help at least a section of Indian farmers who wouldn't mind leaving agriculture if they had viable income options.

Another possibility is a large scale program to distribute solar water pumps (also known as photovoltaic water pumping) which, today, are operationally and financially sustainable. In parallel, free/subsidized electricity should be terminated while at the same time allowing surplus power from the solar powered pumps to be sold back to the grid, which would help pay for the solar pump. For farmers, this becomes an extra source of income, and at the margin, they have to decide which will fetch more income: selling power to the grid or pumping more water for their farm.

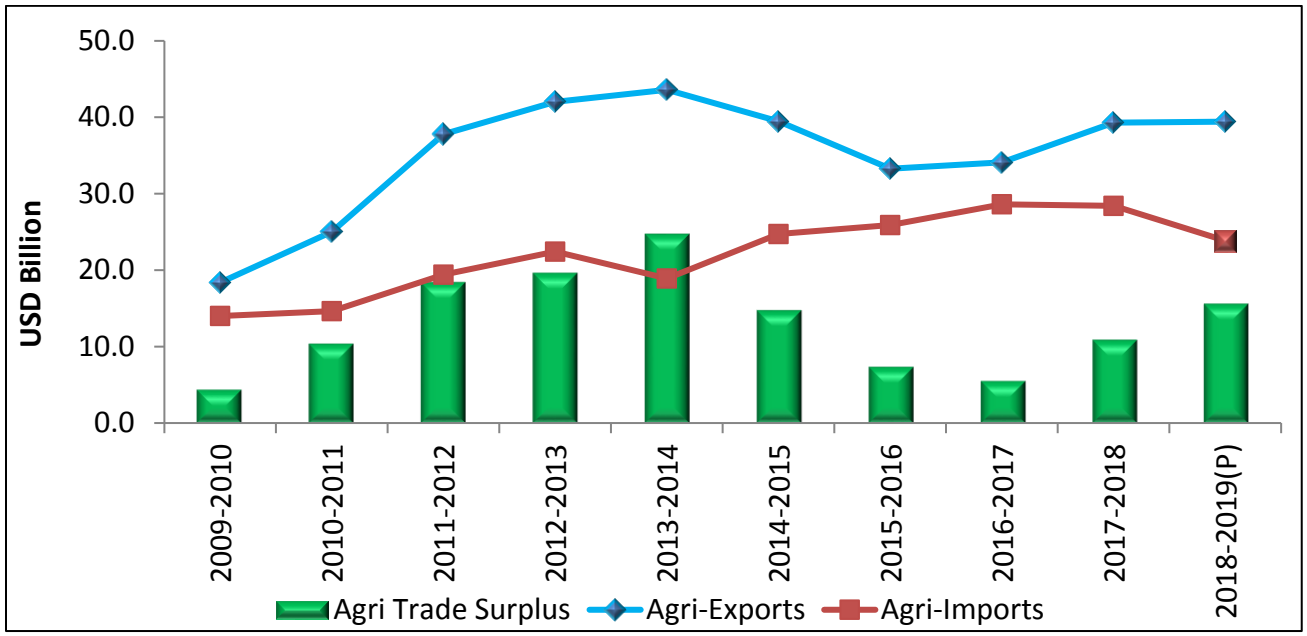
A third option is to develop value-added uses of the large biomass of Indian farmers. Bamboo for construction and other applications, rice husk and bagasse-based mini-power plants, and ethanol from sugarcane and corn can all help augment farmer incomes in sustainable ways while developing more dynamic local rural economies.

## 2. Supporting Indian Farmers the Smart Way: Moving from Subsidies to Investments and Direct Income Support (DIS)

The most sustainable way to augment farmers' real incomes over the long term is through investments in productivity-enhancing areas, ranging from agri-R&D, irrigation to rural

and marketing infrastructure. Investments in increasing productivity can lower per unit costs, make Indian agriculture more competitive globally, increase agri-exports, and augment farmers' profitability and incomes. A troubling feature of the last five years is that Indian agri-exports have not only stagnated but declined from the peak of 2013-14 (Figure 3). While agri-exports more than doubled, from USD $18.4 billion in 2009-10 to USD $43.6 billion in 2013-14, they dropped to USD $33.3 billion in 2015-16 and recovered only to USD $39.4 billion by 2018-19.

**Figure 3. Agri-exports under UPA-2 and Modi 1.0**




Source: DGCIS

While robust agriculture exports will increase the demand for India's farm output, and hence, incomes of farmers, the reality is that whenever prices rise, the government has chosen to ban exports to protect Indian consumers. This, coupled with the Damocles sword of the Essential Commodities Act (ECA), has meant lower private investment in export infrastructure such as warehouses and cold storage systems. Instead of protecting consumers at the expense of farmers, the government should expand its repertoire of instruments such as buying at market prices when prices rise and subsidize consumers if it becomes politically necessary.

However, India needs to address the composition of its agriculture export basket. Currently agricultural exports constitute 10 percent of the country's exports, but the majority of its exports are low value, raw or semi-processed, and marketed in bulk. The share of India's high value and value-added agriculture produce is less than 15 percent. Today, India is the world's largest exporter of water, which, as we note below, it can ill

afford. While it should remove any restrictions on agriculture exports, it should also not subsidize scarce inputs such as water to promote exports such as rice.

India spends significant public resources on agriculture, especially on subsidies for agriculture inputs and price support (MSP) and procurement for certain crops. The range and costs of subsidies for agriculture are extensive: fertilizer subsidies in the central government budget for FY20 is around Rs 80,000 crores (with pending bills of fertilizer industry at more than Rs 30,000 crores); power subsidy by states amount to more than Rs 65,000 crores; subsidies on canal water is another Rs 25,000 crores plus; and subsidies for crop insurance premiums and agri-credit are at interest rates of zero or highly subsidized rates of 7 and 4 percent).

Subsidies are a policy instrument to achieve certain goals. Many of them were instituted to incentivize farmers to take up the Green Revolution package at a time when raising total food production was the key policy goal. Later, subsidies were seen as ways of reducing the cost of production for farmers and thereby providing them with implicit income transfers as well as a way to check food price inflation and protect consumers.

Today, it has become apparent that subsidies are inflicting significant damage on different aspects of the economy, even as there are better policy options to achieve the government's own goals.

- Fertilizer subsidies have essentially subsidized many inefficient high cost fertilizer plants and led to massive overuse of nitrogenous fertilizers, leading to damaged soils and pollution of local water bodies. Excessive use of urea (urea prices in India at about USD 80/MT are perhaps the lowest in the world) has led to increased acidity in the soils even as they are highly deficient in micro-nutrients like zinc.
- Power subsidies have not only led to an alarming overuse of groundwater that is poised to become one of India's gravest challenges, but it has severely damaged the health of power distribution companies and retarded the growth of industry which is saddled with a high cost crucial input. States like Punjab have seen depletion of ground water table at the rate of almost 1 meter a year and more than 75 percent of blocks in Punjab are overexploited. It is an alarming situation, and India has been extremely slow to recognize the magnitude and gravity of the problem. Future generations will pay a very heavy price if the government does not act to address this with utmost urgency.
- Credit subsidies like loan waivers have damaged the banking system, again with negative spill-over effects on the rest of the economy.
- Output price supports in the form of MSP basically apply to only a handful of crops, especially wheat and rice that are procured by the government in a handful of states. Sugarcane pricing is forced on sugar factories, even when sugar prices are

low, leading often to large cane industry arrears (in March 2019, they touched Rs 30,000 crores) and causing disruption in the sugar sector.

To be politically feasible, any solution to the subsidies crisis would need to address three policy goals:

- Supporting food security and farm output
- Increasing farmers' incomes
- Maintaining stable food prices

The solutions would need to:

a) Free up input prices to market levels, or charge at least full cost pricing for fertilizers, power, agri-credit, and canal waters fees.
b) Earmark the resulting savings for expenditures on:
    a. Agri-investments in agri-R&D, irrigation, marketing infrastructure, building value chains by involving farmer producer organizations (FPOs) and linking farms to organized retail, food processing, and export markets.
    b. Direct income transfers to farmers' accounts leveraging the trinity of Jan Dhan-Aadhaar-Mobile (JAM)

Such shifts will curb leakages in the system, reduce inefficient use of scarce natural resources, be neutral between chemical-based agriculture and organic agriculture, help support sustainable use of scarce water supplies, and improve rural income inequality since larger farmers obtain a much larger fraction of current subsidies.

The government has already accepted the idea of direct income support (DIS) to farm HHs through its recently announced PM-Kisan (Kisan Samman Nidhi) scheme, whereby all farming families will receive Rs 6000/- per annum. This new direction in policy towards DIS is greatly welcome and a potential game-changer, but it would be truly transformative for the better only if the input subsidies are also put on this platform and prices of those inputs set free. That will go a long way in promoting greater efficiency in the use of natural resources, and be more equitable and environmentally sustainable.

## 3. De-risking Agriculture

Indian agriculture is often labeled as a gamble in nature. The monsoon failures in the past have often driven the farmers to distress and put the country in a precarious situation. The back-to-back droughts of 1965 and 1966, when foodgrain production dropped by a fifth (17 MMT) between 1964-65 and 1965-66, is a grim reminder of the precarious past. Nearly four decades later, the drought of 2002-03 saw a decline of food grain production by 38 MMT—more than double than the debacle in the mid-1960s. But thereafter, Indian

agriculture emerged as much more resilient to the droughts of 2009-10 and then back-to-back droughts of 2014-15 and 2015-16, preventing large drops in production. Irrigation investments, along with some buffer stocking for basic staples, helped India overcome any challenges on the food security front.

The core challenge of low incomes facing Indian farmers is compounded by the volatility of incomes. Farming, more than almost any other major economic activity, faces a host of risks. Managing these risks is critical to ensure sustained increases in famer incomes.

*A. Production Risks*

These largely stem from the vagaries of nature, ranging from rainfall volatility (floods and droughts) to hailstorms on the one hand and pests and plant disease on the other, all of which affect both the quantity and quality of commodities produced.

On the supply side, the key policy to address rainfall volatility is, of course, irrigation. While there is a need to increase the coverage of irrigation and overall water storage capacity, building large dams and major canal networks have often languished for want of resources. The gestation lags are unduly long and costs per ha very high in some states, especially Maharashtra. It would be better that irrigation investments focus on building village level storage facilities, better surface irrigation management, and investments in drip irrigation, tile drainage, trap crops, etc. that can give results in a relatively short period of time.

The need to create local water storage capacity is manifestly apparent. The government can incentivize this by steering NREGS to build and maintain local water storage facilities in each panchayat. There is also great need for institutional reforms on surface irrigation management, especially last-mile connectivity that needs to move out of irrigation departments to farmer-managed water users associations. Irrigation systems are much better managed when the principal user—the farmer—has a strong sense of ownership. Farmers are more willing to pay for irrigation services and for repair and maintenance of distribution systems if the water reaches their farms. The potential of drip irrigation applications is estimated at 27 million hectares, but famer take up will be slow unless the cost of water reflects its long-term scarcity value.

However, improving the supply side will go only so far unless there is much greater attention on water demand management. Inefficient and misuse of scarce water will continue unless water and power are appropriately priced. Policies should incentivize less-water intensive crops, as well as seed varieties that are more tolerant of water stresses. There are two problem crops that gobble up more than half of India's irrigation water—rice and sugarcane. Rice in Punjab and sugarcane in western Maharashtra need a special focus, with a medium-term plan for diversification to low water-guzzling crops such as maize, oilseeds, and pulses.

The provision of free electricity and the dangerous decline of groundwater levels are inextricably interlinked and together shape crop choice, which is amplified by government procurement patterns. They cannot be addressed piecemeal. The government must first simply stop any public procurement of water intensive crops (rice, sugarcane) in any block where the water table is falling. Instead, it should sharply step up procurement of crops like pulses and millets that are much less water intensive, as well as have high nutrition value and encourage the private sector to buy and store these by abolishing/pruning the ECA. Free electricity should cease and be replaced by cash transfer programs. The latter should be a replacement for the former and not an addition. Since free electricity is provided by states, but procurement is largely done by central agencies, the central government needs to condition its procurement on the states ceasing to supply free power to farmers.

However, the production risks facing Indian agriculture are becoming more daunting with climate change. The predictions of IPCC for India are that it will face greater frequency and intensity of droughts and floods—droughts in Deccan plateau states of the west and southern peninsula and floods in the Himalayan foothills from melting glaciers in the Himalayas. With temperatures rising by one degree Celsius, estimates are that wheat production will drop by at least 5 MMT, and if temperatures rise further beyond 2 degrees C, the losses will increase more rapidly.

Most concerning for India is the large uncertainty of the effects of climate change on the Indian monsoon—the lifeblood of the country. While advances in climate modelling have improved understanding of the monsoon from year-to-year, even today, meteorological models remain poor at predicting the monsoon's weather more than a few days out. More concerning, there is little consensus on how well the models which best capture the effects in the 20th century will work in the hotter 21st century. Monsoon meteorology's big challenge will be to improve predictions of intra-seasonal shifts together with improving models of changes in global climate. Given how much is at stake for Indian farmers, India needs to make concerted efforts toward building a strong scientific base in monsoon and climate modelling.

Disease risks are best managed by encouraging crop diversification and crop rotation. The fixation on two cereals, and the resulting mono-cropping increase pest and plant disease susceptibility, which, in turn, increases the spraying of expensive (and hazardous) pesticides, evident in the increase in cancer incidence in rural Punjab.

Income losses due to production risks emanating from natural shocks are best addressed through crop insurance, which stabilizes incomes during times of loss. The Pradhan Mantri Fasal Bima Yojani has been a worthy initiative, requiring all farmers taking an institutional loan to take insurance coverage under this scheme. Between kharif 2016 and

rabi 2018-19, 115 million farmers enrolled in the scheme, of which nearly three-fourths had taken institutional loans.

Almost 90 percent of the premium subsidy is given by the government (equally shared by the centre and the states). But the scheme has faced teething problems and after a rapid rise, the coverage has in fact declined. The states are largely to blame with reports of manipulation of crop-cutting experiments, tardiness in providing their share of premium subsidies (leaving the farmer effectively uninsured when afflicted by shocks), and delays in payment of compensation due to hurdles in damage assessment and disbursal of compensation.

The implementation challenges can be addressed. Some of the steps taken by the central government—imposing a 12 percent penalty on insurance companies if the settlement takes longer than two months, and for state governments if they delay settlement beyond three months of the due date—are very much in the right direction and could be tightened further. However, it would be a severe mistake to make the scheme voluntary even for those farmers who have obtained institutional loans. If fewer farmers are enrolled, it would raise actuarial premiums, and undercut the large insurance purpose.

Technology today allows air-based (drone or satellite) surveillance that can provide close to real-time crop damage assessment that can be overlaid with farm plots and their owners, and can automatically make payments without multiple (and arbitrary) bureaucratic layers. These technologies can identify each farm, monitor the progress of crops on each plot on a weekly basis, and can be linked to the bank accounts and aadhar numbers of each farmer, reducing the scope for manipulation.

In the long-term, production risks can only be addressed by much greater attention to agricultural R&D, preferably by putting it in a mission mode. Improving Indian agricultural productivity, which still considerably lags behind other countries such as China, as well as creating resilience to the looming challenges of rising temperatures, variable precipitation, water scarcity, and increases in pests and crop diseases, requires a major thrust in agricultural science and technology.

A national mission could help overcome the weaknesses in existing institutions of agricultural research and technology. This is one area where India could fruitfully collaborate with some BRICs countries (especially Brazil and China), and on water-saving technologies with countries such as Israel and Australia. For a start, the government must fill senior vacancies at the more than 100 ICAR institutes, the majority of which lack a director, a troubling testimony to how seriously policy makers actually care for building India's domestic research capabilities.

Finally, the government needs to be open to advances in science. There is lot of ongoing research on drought-resistant seed varieties, both via normal selection processes as well

as through gene-editing. India needs to invest much more in this type of R&D than has been the case so far. While it should promote organic farming based on the former, curbing publicly-funded research and the use of GM crops will amount to a form of unilateral disarmament, not only exposing Indian farmers to much greater risks, but also to MNCs whose monopoly power will only amplify.

*B. Market Risks*

Market or price risk refers to uncertainty about the prices farmers pay for inputs or the prices they receive for their farm output. Government policies have sought to address input price risks by price controls, especially on fertilizers and power. Ironically, output price risks are most acute precisely when farm output is good. Bumper harvests go hand-in-hand with falling output prices and government policies have sought to address that via price support (MSP) for outputs. And in an open economy, sometimes the price shocks that emerge in global markets are imported into domestic markets.

Volatility in input prices is best handled through vigorous competition with many suppliers—and, when needed, imports—so that monopoly rents are whittled away. Competition policy is the best antidote to price risks, whether inputs or outputs. In the next section, we address how agriculture output markets can be improved to benefit farmers.

In addition, farmers need to organize by forming (or joining) marketing cooperatives such as FPOs to enhance their bargaining power and get better prices for their produce. This would also allow them to spread harvest and sales over the season by scheduling planting and storage. Government needs to incentivize and regulate the development of FPOs, not seek to form or control them directly.

*C. Financial Risks*

Financial risk results when the farm business borrows money and creates an obligation to repay debt. Rising interest rates, the prospect of loans being called by lenders, and restricted credit availability are also aspects of financial risk.

Despite the presence of a welter of government programs, official credit for agriculture varies widely across the country. The introduction of Kisan Credit Cards has given farmers working capital options, although efficient implementation is still some ways away. In some cases, the financial cycle of banks does not synchronize with the agricultural cycle, which leads to pressures on farmers to repay before harvest. Delinking the two would help farmers.

Given the small size of most Indian farms and the need to increase mechanization and raise productivity, steps should be taken to improve leasing and rental options rather than purchasing machinery, equipment, or land.

An important source of financial risk is the government itself, in particular uncertainties surrounding government actions. Export controls, sudden imports, and the level of price support payments are examples of government decisions that can have major unexpected impacts on farmer incomes.

Finally, good risk management depends on accurate information, which requires reliable data. The rapid spread of smart phones means that IT-enabled farm services (including market price data) from government and private sources, extension workers, and other farmers, can now be disseminated rapidly, which should also help in managing risk.

## 4. Improving Agriculture Markets

Farmers' income can improve substantially if they are able to capture a greater share in the supply chain from farm-gate to consumer. For this to happen, farmers must have the freedom to sell what they want, where they want, and when they want without any restrictions on sale, stocking, movement, and export of farm produce. These will require legal and institutional changes, major investments in market infrastructure and storage (including cold-chain storage), and incentives for the creation and operation of infrastructure by FPOs.

There is growing evidence that farmers and traders across the country are capable of integrating digital technology and online platforms into their marketing practices. However, there must be a clear recognition that agricultural markets are highly specific, diverse, and differentiated in terms of their structure and organization across different agro-ecological regions and commodity systems. When farmers are able to access multiple market sites, their bargaining power increases, not just in terms of selling price, but also in other crucial ways such as lower commissions, more accurate weighment, and faster payment.

Hence, regulatory reform to open up the current agricultural produce market committee (APMC) mandi system to competition from multiple channels and sites of exchange—including local traders, private corporations, co-operatives, producer companies, and other physical and electronic spot markets—is exceedingly important. Farmers should have access to multiple market sites, and especially to inclusive multi-buyer local wholesale markets that operate around the agricultural year.

The introduction of E-NAM—an online trading platform for agricultural commodities in India—is a step in this direction. However, its effects have been underwhelming due to three major bottlenecks: time cost of transactions, quality assessment challenges, and transportation logistics.

Farmers' time is valuable. In the current system, farmers bring their produce to a mandi, traders bid for the crop, the transaction is completed within an hour, and the farmer can go home. Payment from the commission agent might happen later but the farmer does not have to wait in the mandi for long hours. In the current version of e-NAM (Stage I), open outcry auctions are being replaced by electronic auctions but traders are still not allowed to bid across mandis.

Two points need emphasis. First, just because traders enter bids through a computer, this does not increase competition—after all they can still talk to each other and collude. The switch to e-auctions is not bringing in new traders to participate. Second, the market is not allowed to clear until all electronic bids have been submitted for all lots of produce that have been brought into the mandi for the day. This process takes anywhere between six to eight hours and all the while, farmers have to wait in the mandi with their crop. It also increases congestion in mandis. Hence, farmers prefer to sell outside e-NAM and the uptake of a "good policy" remains low. The waiting time for farmers should be voluntary and they should know the highest bid on their lot at any instant. Whenever they think they have a good enough price, they should be allowed to take that offer and leave.

The real benefits of e-NAM will be realized when traders from any mandi can bid in any other mandi (even one outside their state). The current plans are that in the 2nd stage of e-NAM, bidding would be allowed across mandis within a state and then in the 3rd stage, trades across mandis throughout the country would occur. However, this is unlikely to happen unless a key constraint—reliable, real-time quality assessment—is addressed. Traders in Chennai will only bid for paddy in a mandi in Bhatinda, if they know the quality of paddy on sale. This differs by each lot of crop the farmer brings to a mandi. In the absence of any reliable alternative mechanism for quality assessment, the traders have to physically show up in the mandi and verify it themselves (or through a representative). This means that even if mandis were electronically connected, trades across mandis will not occur and markets will remain fragmented. The same constraints also force traders to show up in a mandi (to physically verify crop quality) in the current stage of e-NAM. What all this indicates is the dire need to fix quality standards and set up dispute settlement mechanisms if the dispatched quality differs from what is shown on the computer while bidding.

Finally, transportation is a major bottleneck. Suppose a trader sitting in Lucknow buys 100 quintals of soya bean from Harda mandi in MP. Who ensures transportation? The trader may not have local contacts. Will the burden fall on the farmer? What if the quantity bought was low or diversified across crops? Therefore, to integrate national markets—and for farmers to get higher prices—it is important to have traders who can arrange for quality assessment and transportation remotely. Remote bidding and quality assessment can reduce transactions costs and increase competition, but bottlenecks in

the transportation sector will have to be addressed, perhaps by creating an Uber-like transportation platform for trucking.

To help e-NAM perform to its full potential, the government needs to push the creation of assaying, sorting, and grading infrastructure at the mandis. This will help reduce variance in the quality of produce from mandi to mandi, and encourage retailers and processors to procure through e-NAM. In addition, the government needs to ensure wider adoption of electronic Negotiable Warehouse Receipts (e-NWRs) to help further strengthen the market.

The Agricultural Produce and Livestock Marketing Act 2017 needs faster adoption at the state level. Its recommendations, including single levy of market fee, single licences for traders, and de-listing perishables from the ambit of the APMCs, will improve market access and realization for farmers.

These gains will be limited unless accompanied by:

a) The removal of a host of statutory restrictions on commodity trade—whether on sale, stocking, movement, or export—that governments indiscriminately impose.
b) Concomitant public investments in enhancing the system's regulatory capacity, dispute settlement mechanisms in e-commerce platforms, and core market and logistics infrastructure.

It is certainly the case that the government will continue to play a role in the procurement, stocking, and distribution of certain major commodities, but this should be done in a way that works with—rather than against—markets.

Finally, it should be emphasized that markets cannot function effectively unless the institutions governing agri-marketing in India, especially the Essential Commodities Act and Agriculture and Livestock Produce Marketing Act, are changed to give full freedom to the private sector to directly buy the produce from farmers, stock it as much as they feel appropriate, and sell it anywhere in India or abroad. Only light monitoring of stocks for information is needed for government policy, which can be done by registering warehouses and asking them to file the stocks levels on a weekly basis.

## 5. Conclusion

This paper has argued that fundamental reforms are needed if rapid increases in farmers' incomes are to occur in ways that are fiscally and environmentally sustainable. Given the strong political mandate of the Modi government, and the large number of states where the BJP is in power (either directly or through NDA partners), this is a golden opportunity to put agriculture on a more sustainable and higher growth trajectory for the long term.

Agriculture is a state subject but where the Central government has had—and will continue to have—a large role. Reforms can only succeed if the central and state governments work closely together in a spirit of "cooperative federalism." The formation of a committee of chief ministers on "Transformation for Indian Agriculture" is a welcome step. Going forward, it would be helpful if the government created a more permanent Agri-Reforms Council on the lines of GST Council.

Changes in policies will be piecemeal and half-hearted unless there are two fundamental ideational changes. First, who is the main focus of agriculture policies: the consumer or the producer (the farmer)? Second, farmers should not be patronized as helpless frail creatures, but as entrepreneurs who need supportive institutional and policy frameworks to thrive. The sad reality is that Indian farmers' interests have been made subservient to the interests of consumers. Unless farm policies put the producers' interests foremost, little will change in practice. Subsidizing the poor (or rich) consumer is not the responsibility of the farmer.

The focus for the central government will need to be twofold: actions that it can unilaterally take to raise agricultural incomes; and second actions to influence state government actions to improve agriculture, remembering that agriculture is a state subject and that many of the important levers—water, power, irrigation, extension etc.—are controlled by the states. While the fate of agriculture will still largely be determined by states and state-level politics, the Center can nonetheless initiate immediate actions, many of which are, politically, not especially difficult. These suggestions should be thought of as a package, which will have an impact if most are implemented and not one or two in isolation. Thus, while cash transfers as income policy are a welcome first step, by itself, that policy will be untenable unless accompanied by efforts to rationalize input subsidies by putting them on a cash transfer platform and pruning them to the fullest extent possible.

Other policy options for the central government include:

- Reduce cereal procurement and keep MSP price increases for rice and wheat below inflation, and not exceeding border prices, while encouraging the private sector to develop robust markets in less water intensive crops like pulses and oilseeds by removing controls on stocking, trading, exports, etc.
- The implementation of an income transfer scheme for farmers must be accompanied by reducing damaging subsidies in power, water, and fertilizer and keeping the real prices of subsidized grains under the National Food Security Act, 2013 constant. To lock in rice at ₹3 per kg, wheat at ₹2 per kg, and coarse grains (millet) at ₹1 per kg for perpetuity, no matter what happens to the state of the world, has fostered a cereal tyranny that has deeply damaged Indian agriculture. It may be time to revisit these issue prices and link them to MSP, say at least half

of MSP, and look to NFSA's provision to revise them after three years of its initiation.

- Laws that were designed fifty years ago for conditions of scarcity such as the Essential Commodities Act—which provided the basis for restrictions on stockpiling which have hurt farmers—must be scrapped. Those conditions of scarcity have long disappeared. India is trying to cope more with the problems of surfeit than scarcity.
- Income from livestock is most important for marginal farmers (<1 ha). Laws and, more importantly, the political and social climate that have been so detrimental to the livestock sector must be changed.
- Export restrictions on agricultural products must be eliminated and export taxes must also be eliminated or reduced drastically. Going forward, trade policies that have been arbitrarily and pro-cyclically imposed—increasing tariffs and import restrictions when world prices come down, and imposing export bans and taxes when domestic prices rise—must become stable by identifying the "trigger levels" well in advance. The government must commit to that stability.
- Ongoing efforts to create a single agricultural market needs to be followed up so that farmers and farm organizations can transact with any buyer, anywhere in India, and at times of their choosing. Creating a common market does not mean dismantling APMCs.
- Mandis are a public good and more mandis, especially public mandis, should always remain a viable alternative to private trade. The idea is to increase marketing options available to farmers. Subsidizing market infrastructure (such as providing "electronic" weighing scales to villages and mandis) has and will have positive externalities.
- Rehabilitation of inefficient urea plants must be stopped; and a plan for closing the most inefficient plants drawn up. Fertilizer subsidies should be for farmers—not for inefficient industries.
- Laws should allow for easy leasing/renting agricultural land. Unfortunately, these changes can only be done by states, and the Center can only incentivize them. Additionally restrictions on conversion of agricultural land for other purposes should be eased. It keeps the value of agricultural land low, and sharply raises barriers to exit from agriculture, thereby keeping farming fragmented and incomes low.

India needs to start thinking about agriculture policies in the broader context of natural resource management. India is a natural resource constrained country. These constraints are becoming more severe due to massive increases in population and the greater consumption that inevitably accompanies growth and income increases. But they are being magnified by distortionary policies and will become even graver as the existential threats posed by climate change become more manifest.

Land in India is scarce and its opportunity cost in low productivity agriculture is high. Its unavailability for higher value-added activities, whether commercial or industrial, slows down exit options, trapping them into ever more precarious lives. But perhaps the natural resource that will be most impaired and poses the most peril for India's future is water. From declining water tables to contentious river-basin sharing to intermittent and poor quality of water supply in urban areas, the crisis is not somewhere in the future—it is already upon the country. Agriculture policies to discourage over-use and waste of water are necessary not just for the viability of agriculture but for the country's very future.

Finally, it needs to be recognized that growth and employment opportunities outside agriculture are critical for long-term improvements in farmers' incomes. Relentless population pressures have meant that most Indian farms are too small to provide viable incomes. Ironic as it may seem, the long-term future of Indian farmers fundamentally depends on getting many people out of farming. The problem of small and fragmented landholdings as a severe constraint on famer incomes has long been recognized. Indeed, more than a century ago, one of India's most influential thinkers argued that this problem could only be addressed by creating employment opportunities in "non-agricultural channels of production." Thus, "strange though it may seem, industrialisation of India is the soundest remedy for the agricultural problems of India." That was B. R. Ambedkar, writing in the *Journal of the Indian Economic Society* in 1918. With India's population having quadrupled since then, that solution is even more compelling today.