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The performance of PMFBY and other crop insurance models in India

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Abstract
Agriculture in India is varied, diversified and prone to a variety of risks. Recent upsurge in protests and demonstrations have again pointed out at persistent agrarian crisis. Most farmers are small and marginal. Agriculture, in most areas, is rain fed, leading to a greater degree of yield variability and risk. Agriculture is more vulnerable and prone to risks than ever before. An increasing trend of declining investment in agriculture, coupled with a trend of increase in variation of temperatures and occurrence of disasters is being observed. Crop insurance, which aims at addressing yield risk is subject to structural, design and financial problems. Problems of asymmetry of information, moral hazard and adverse selection and co-variability are more pronounced in crop insurance amongst other forms of insurance. Various crop insurance models in India have been continuously modified solving the recognized lacunae. Sometimes, new schemes were introduced on a pilot basis even before the ongoing scheme stabilized. One such response was schemes based on the area approach in the 1980s which replaced the earlier practiced individual farm approach. More recent insurance schemes are based on weather, and adopt technology of remote sensing. The recent modification in this area is Pradhan Mantri Fasal Bima Yojana (PMFBY), launched on Jan, 2016 and implemented since June,2016. This paper seeks to review the provisions, performance and improvements of the scheme in comparison with the other models on completion of one year of the scheme.

Keywords: agriculture, PMFBY, India

Introduction

Agriculture in India is varied, diversified and prone to a variety of risks. Recent upsurge in protests and demonstrations have again pointed out at persistent agrarian crisis. Most farmers are small and marginal. Agriculture, in most areas, is rain fed, leading to a greater degree of yield variability and risk. Agriculture is more vulnerable and prone to risks than ever before. An increasing trend of declining investment in agriculture, coupled with a trend of increase in variation of temperatures and occurrence of disasters is being observed. Crop insurance, which aims at addressing yield risk is subject to structural, design and financial problems. Problems of asymmetry of information, moral hazard and adverse selection and co-variability are more pronounced in crop insurance amongst other forms of insurance. Various crop insurance models in India have been continuously modified solving the recognized lacunae. Sometimes, new schemes were introduced on a pilot basis even before the ongoing scheme stabilized. One such response was schemes based on the area approach in the 1980s which replaced the earlier practiced individual farm approach. More recent insurance schemes are based on weather, and adopt technology of remote sensing. The recent modification in this area is Pradhan Mantri Fasal Bima Yojana (PMFBY), launched on Jan, 2016 and implemented since June, 2016. This paper seeks to review the provisions, performance and improvements of the scheme in comparison with the other models on completion of one year of the scheme.

Agriculture is crucial for the economy not just for food security but also employment and income and agrarian stress is an emerging issue which needs urgent attention from government. Time and again, there have been various attempts to address these issues by the Government of India and the various state governments in the form of debt waivers, subsidies, tenancy rights etc. Some of these policies were a result of response to the crisis and did not identify the root cause of the problem, and hence backfired (majorly due to moral hazard problem).For Instance, Debt waivers did provide temporary reliefs to the farmers, yet a simultaneous trend in the decline of institutional credit and a rise in non institutional credit was observed.

Given the importance of agriculture and the state of Indian agriculture, there is an urgent need to move towards risk free agriculture. Though, the inherent nature of agriculture does not allow it to be completely risk free. Yet, we can try to make it partially risk free to avoid the unfortunate events of suicides and make agriculture more sustainable. This can be achieved by attempting to devise sustainable methods for protecting rural households from covariate risks. A reliable risk management system can serve as an important catalyst for widespread agri value chain based models in India

The first step in catering to the risks and the root cause of the agrarian crisis is to identify the risks inherent in agriculture. Risks can be understood in terms of impact of uncertain outcome on the quantity or value of some economic variable, here, agricultural income, which can be segregated into production risks, marketing risks or price risks, financial & credit risk, Institutional risk, Technology risk and Personal risk. Even if all the safety mechanisms and farm level risk mitigation mechanisms are in place, a crop failure may occur

due to an unanticipated event. Hence, a safety net is required to cater to the resultant crop failure. This is where crop insurance comes into place. A financial mechanism is created to minimize impact of loss in farm income by factoring in a large number of uncertainties which affect crop yields. Agriculture being a highly risky economic activity which is complex and challenging, needs a safety net. Thus, the role of the government is to design a public safety net with a rationale to avoid drastic and widespread income downturns which have the potential of jeopardizing production cycles and destabilize rural incomes.

Insurance models are based on actuarially fair premium according to the risk involved with carefully avoiding systematic risks because the entire model of insurance is based on the law of large numbers where the loss is paid out the premiums collected and the insurance company makes sure all losses do not occur at the same time. As agriculture risks are primarily systematic in nature, Private instruments for crop insurance are mostly not available. Also, it takes proper care in ensuring that the problem of adverse selection and moral hazard does not occur as the problem of asymmetric information is present commonly in insurance markets, where the buyer of insurance has more information than the seller of information. Both these conditions are violated in case of agriculture risk as the crop failure is systematic in nature. Moreover, for such a large area, it is very difficult and costly to monitor the insured for problems of adverse selection and moral hazard and lead to huge losses for insurance companies. In the absence of the reliable data and asymmetric information among insurer and insured will create many well-known problems, outcomes of which will deviate from the Pareto optimal conditions. The two distinct sources of deviation from Pareto optimality being moral hazard and adverse selection.

Moral hazard has been defined in the economic literature as an alteration in input use which deviates from social optimality and which occurs because of incompatible incentives and asymmetric information. In insurance models, moral hazard problems occur because the insured can take actions, which affect the probability of losses and cannot be observed by the insurer. Moral hazard occurs after a loan is taken or after the insurance contract is obtained. Moral hazard involves a change in behavior so that the customer represents more risk than what was believed to be the case. Those who are insured may change their behavior in a way that increases the risks beyond what insurer believed. There is great chance of occurrence of moral hazard in case of individual yield. Therefore, Area yield based crop insurance is suggested over individual Area-Yield based crop insurance. However, Area based yield crop insurance might create problem of adverse selection thus farmers with lower expected yields than the area average could purchase more protection than farmers with yield above the average. Farmers with higher expected yields opted out, and farmers with lower expected yields purchase crop insurance. Thus increasing indemnity payments relative to premiums paid which can make the model unsustainable as people will opt out of the insurance system as the premium increases. Moral hazard and adverse selection can be avoided only if insurance contracts are based on near to perfect information about each individual's risk.

Public subsidy and public provision of agricultural insurance can be used to counter the problems of moral hazard and adverse selection in the developing country context. As the public subsidy encourages more participation from the high yield farmers and hence reduce adverse selection. Farm level expected yields and a measure of farm- level variability are fundamental to an individual farmer's decision to purchase crop insurance. As level of protection ideally should be tied to some measure of variability. However for the time being until well historical data about individual farmers is generated, Indian crop insurance should focus on area yield based insurance approach as it currently following since the 1980s

Theoretically if the scheme is to be viable in the long run premium payments should equal to the claim payments (indemnity payments) over time, which is also equal to expected loss. And therefore, for an insurance model to be sustainable, a model should be designed in a way that claims equal premium in the long run. Another, problem is the calculation of actuarially fair premium due to lack of data related to yield for 8-10 years. Moreover, in a diverse country like India, it is difficult to narrow down to a few particular risks and cater them because with change in agro climatic zone, the intensity and impact of risk varies drastically. Therefore, implementing an agriculture insurance model is a very complex and challenging task.

Models in India

The discussions regarding crop insurance models can be traced back to 1947-48 where the feasibility of implementation of crop insurance models and the individual and area approach were discussed. In individual approach, it is hard to obtain reliable and accurate data for sufficiently long time to fix actuarially fair premium. The absence of reliable data and existence of moral hazard led to application of homogeneous area approach over individual approach, however individual approach was expected to be more targeted and was expected to lead to fewer claims than area approach. In area approach, same benefits and premium is decided for all the farmers irrespective of the differential yield as the premium and settlement of claims is done on the basis of crop cutting experiments.

The first crop insurance bill can be dated back to 1965. Experiments started in 1972-73, though they were limited and at a scattered scale. Some private models were also suggested. However, the predominant challenge was to scale up distribution and ensure fast claim settlement. As the model involved huge cost, private players were driven out and government had to step in.

The emergence of publicly administered crop insurance model started in 1972. This was an individual approach model initially started for H-4 cotton and later extended to groundnut, wheat, potato, gram in Gujarat, Maharashtra, and Tamil Nadu, Andhra Pradesh, Karnataka and West Bengal. This approach continued till 1978-79 and covered 3110 farmers for a premium of 4.54 lakhs against claims of 37.88 lakhs indicating non viability and non popularity.

In 1979, on the recommendations of V.M Dandekar, the government decided to move away from individual approach to area approach in a pilot crop insurance scheme (PCIS)-1979. This program covered cereals, millets, oilseeds, cotton, potato and the claims were shared between GIC and state

governments in 2:1 ratio. This scheme was extended to only loanee farmers on voluntary basis with maximum sum insured to be 100% of the loan amount which was later extended to 150%. 50% of subsidy was also applied for the insurance charges of small and marginal farmers which was shared by state and government of India.

First scheme to be implemented on a nation wide in India was Comprehensive Crop Insurance Scheme (CCIS) on 1st April 1985, where insurance was linked to short term crop credit and homogeneous area approach was followed. This scheme was extended to all states but was not implemented in all states as it was not mandatory. However, it was compulsory for financial institutions dealing with food crops and oilseeds. It was restricted to 100% coverage of crop loan subject to maximum of 10000 per farmer. The premium rates were also differentiated with 2% for cereals and millets and 1% for pulses and oilseeds. Small and marginal farmers received a subsidy of 50% on payable premium which was shared equally by central and state government. The centre and state government shared the premiums and claims in the ratio of 2:1. It was a multiagency effect with the agencies being central government, State government, Banking Institutions and GIC.

Due to bureaucratic hurdles, corruption and underestimation of crop yields during Crop cutting experiments and lack of technological infrastructure in accessing the actual loss, there was a surge in the claims. It is worthwhile to note that the indemnity payment was more than the premium received in all the seasons except for two Rabi seasons. In other words, there were losses in 27 out of 29 seasons. Thus, CCIS was financially unviable.

This scheme was followed by Experimental crop insurance schemes (ECIS) for Rabi in 1997-98 and was implemented in 14 districts of five states. This was same as CCIS except that it offered 100% subsidy in premium for Small and Marginal Farmers (both loanee and non loanee farmers were included for the first time) which was shared by central and state government in ratio 4:1. The scheme was discontinued after one season due to financial problems. India's modified crop insurance program in 1999-2000 was called National Agricultural Insurance Scheme (NAIS) which was later replaced by Modified National Agricultural Insurance scheme (MNAIS) in a few areas.

NAIS was available to all farmers-loanee and non-loanee both- irrespective of their size of holding. While, the scheme is compulsory for loanee farmers and optional for non-loanee farmers. The limit for sum assured is the thresholds yield of the crop in the specified area and covers all crops for which a reasonable past yield data is available. The premium rates are fixed at 3.5 for bajra and oilseeds and 2.5 % for other kharif crops, 1.5 % for wheat and 2% for other Rabi crops. In case of small and marginal farmers 50 % of premium charges are born by the government. Separate agency namely agricultural insurance company of India (AIC) has been established for implementation of NAIS with the help of rural financial institutions, state governments and farmers.

National Agriculture Insurance Scheme (NAIS) pays out policyholders in designated areas based on the shortfall of the measured crop yield relative to a threshold value related to historical yields estimated over a specified window period (generally 3 to 5 years).

The differentiation in premium rates of different crops according to the risk factor was a welcome step. However, Due to the high claim/premium ratio there was a need to refine the program to enhance its economic viability, so that the scheme could sustain overtime to serve large section of the farmers to insure their risk and hence productivity and also enhance competitiveness of Indian agriculture by regional specialization. In recent years some new methods in crop insurance have been come up with innovative actuarial technologies. These have been experimented at pilot basis, but the majority of them were not successful due to high claims.

The threshold yield or guaranteed yield for a crop in an insurance unit was the moving average yield, based on the past three years, in case of rice and wheat, and five years' yield in case of other crops, multiplied by the level of indemnity. Three levels of indemnity—90 per cent, 80 per cent and 60 per cent, corresponding to low-risk, medium-risk and high-risk areas—were available for all crops. The insured farmers of each unit area could also opt for higher level of indemnity on payment of additional premium. If the actual yield (AY) per hectare of the insured crop for the defined area fell short of the specified TY, all the insured farmers growing that crop in the defined area were deemed to have suffered the same amount of shortfall in their yield. Government of India and States shared claims beyond 100 per cent of premium for food crops and oilseeds on a 50:50 basis. In case of annual commercial/horticultural crops, claims beyond 150 per cent of premium in the first three or five years and beyond 200 per cent thereafter was borne by Centre and State on 50:50 basis. One of the major problems with this model are there is no incentive for insurers to practice sound actuaries practices, as losses will be born by government. No private sector participation in crop insurance business due to lack of incentives.

Modified National Agricultural Insurance Scheme (MNAIS) was initiated during the 11th Plan from Rabi 2010–11 on pilot basis on the recommendation of the GoI Joint Group, in 50 districts. The new improvement in the model was reduction of unit area of insurance to village/village panchayat level for major crops inclusion for post-harvest losses due to cyclone (in coastal areas), etc. Setting up a catastrophe-relief fund at the national level was also a improvement, with 50:50 contributions from the Central and State governments, to provide protection to the insurance companies in the event of premium to claim ratio exceeding 1:5 at the national level and failure to procure appropriate reinsurance cover at competitive rates. NAIS was withdrawn from those area(s)/crop(s) where MNAIS was implemented.

The recent modification before Pradhan Mantri Fasal Bima Yojana was on 1 November, 2013, during the course of this Committee's review, a GoI circular introduced the National Crop Insurance Programme (NCIP). NCIP comprised three components: the MNAIS, WBCIS and the Coconut Palm Insurance Scheme (CPIS), and was stipulated to come into force from 2013–14. Even States notified to implement NAIS during Rabi 2013–14 would have to withdraw such notification and implement NCIP instead. In other words, NAIS was to be discontinued from Rabi 2013–14. However, on the representation of some State governments, GoI

reconsidered the already notified NAIS for Rabi 2013–14 could continue its implementation. Further, States which had already notified NCIP should continue to implement it. There would be no further extension for NAIS beyond Rabi 2013–14.

If try to trace down the models, there were actually reform versions of the initial model was done and a little bit variation from the previous models was followed. The point to be noted here, is that despite shifting to and from area and homogeneous models alternatively, the process to arrive at actuarially fair premium which would also be key component in achieving the sustainability of the model is still not been achieved. A number of crop insurance schemes have been introduced in the last three decades, and modified as and when required to address operational issues. Payment of crop insurance claims were delayed in many cases because of anomalies in data relating to insured area, insured crops and estimated yield of insured crops. Inconsistencies relating to the insured area of a crop and the area reported to be under such crop in a particular season posed a problem. Committees and groups were also set up periodically to address various issues.

Amongst the issue of high premiums for farmers, low premiums for insurance, another major issue is the lack of awareness among farmers about the mechanism of crop insurance leads to lower participation, adverse selection and dissatisfaction among those who do participate.

The report of an AFC study—"Report on Evaluation and Impact Assessment of Crop Insurance Schemes"—submitted to the Ministry of Agriculture in August 2013 finds that there is widespread ignorance about crop insurance schemes among farmers. It finds that 65.4 per cent of farmers surveyed were not aware that crop insurance is mandatory for loanee farmers who avail of crop loans for a notified crop. Even among those insured, only 10 per cent knew the difference between various crop insurance schemes. Only 28 per cent were aware that insurance premium is deducted from 16 crop loans of loanee farmers. About 57 per cent did not even know the sum for which they were insured. It is necessary to undertake insurance awareness programmers for farmers in a big way as a multi agency approach between government extension agencies, banks and insurance companies. An important role can be played by mass media and self help groups as well.

PMFBY: How far has the problem been solved?

PMFBY shows considerable improvement in the model especially in area of premium with uniform premium of only 2% to be paid by farmers for all Kharif crops and 1.5% for all Rabi crops. In case of annual commercial and horticultural crops, the premium to be paid by farmers will be only 5%. The premium rates to be paid by farmers are very low and balance premium will be paid by the Government to provide full insured amount to the farmers against crop loss on account of natural calamities. There is no upper limit on Government subsidy. Even if balance premium is 90%, it will be borne by the Government. Earlier, there was a provision of capping the premium rate which resulted in low claims being paid to farmers. This capping was done to limit Government outgo on the premium subsidy. This capping has now been removed and farmers will get claim against full sum insured without any reduction. The use of technology of Smart phones to capture and upload data of crop cutting to reduce the delays in claim payment to farmers and Remote sensing to reduce the number of crop cutting experiments is the most considerable modification to reduce losses and make the financial viable. Without adequate use of technology in previous schemes, burden fell on state governments to conduct crop cutting experiments to estimate the actual yield and thereby calculate losses. Such experiments were often poorly done and do not give real value of the produce. Moreover, the calculation of premiums in NAIS and MNAIS were based on 3 year past records which made the premiums hefty. Delinking the premiums with past records is progress on determining actuarially fair premiums.

The insurance unit defined in the scheme is a village as against the revenue administrative unit of a block in previous schemes. A block covers a large area with sub regional weather variations, risk of exclusion in previous scheme was higher. Localised risk coverage of hail storms, land slide and inundation are included. Post harvest coverage of cyclonic and unseasonal rains are also covered under the scheme. Provision of direct transfers to accounts will try to reduce the time taken in settling the claims in addition to reducing corruption.

Table 1: Comparision of PMFBY with NAIS and MNAIS.

No	Feature	NAIS [1999]	MNAIS [2010]	PM Crop Insurance Scheme
1	Premium rate	Low	High	Lower than even NAIS (Govt. to contribute 5 times that of farmer)
2	One Season – One Premium	Yes	No	Yes
3	Insurance Amount cover	Full	Capped	Full
4	On Account Payment	No	Yes	Yes
5	Localised Risk coverage	No	Hail storm, Land slide	Hail storm, Land slide, Inundation
6	Post Harvest Losses coverage	No	Coastal areas - for cyclonic rain	All India – for cyclonic + unseasonal rain
7	Prevented Sowing coverage	No	Yes	Yes
8	Use of Technology (for quicker settlement of claims)	No	Intended	Mandatory
9	Awareness	No	No	Yes (target to double coverage to 50%)

Source: PIB

Progress so far

Though the actual assessment of claims and losses are yet to be arrive, the scheme has performed significantly well in terms of the coverage area as compared to the previous

schemes. Inclusion of crops and areas under the PMFBY/RWBCIS are however, decided/notified by the concerned State Governments. The Central Government on its part, should continuously persuaded the State Governments to notify maximum number of crops and areas under crop insurance schemes, so that the coverage can be enhanced from the present level of about 30% of cropped area in 2016-17 to 50% of cropped area over the next two years.

This is the first year of implementation of PMFBY/RWBCIS and 23 States implemented the schemes during Kharif 2016 and 25 States and 3 Union Territories during Rabi 2016-17. Disparities among States in coverage is attributable to the schemes being optional for States, notification by States of food and oilseeds crops & annual commercial/horticultural crops on selective basis, poor infrastructure of insurance companies for coverage of non-loanee farmers etc. Apart from these factors, coverage of farmers differs from State to State also due to perception of risk of areas and crops, being higher in more risky areas and crops. Due to the improved features of the new schemes and efforts made by the Government, coverage under PMFBY/RWBCIS has increased substantially over that of the erstwhile schemes.

Table 2: State-wise tentative coverage of farmers under PMFBY/RWBCIS during Kharif and Rabi 2016-17.

S.No.	State	No. Of Farmers Covered (In Lakh)	
		Kharif 2016	**Rabi 2016-17**
1.	Andaman & Nilobar Island	Not Implemented	0.00324
2.	Andhra Pradesh	15.89	1.44
3.	Assam	0.52	0.078
4.	Arunachal Pradesh	Not Implemented	
5.	Bihar	14.86	11.54
6.	Chandigarh	Not Implemented	
7.	Chhattisgarh	13.96	1.46
8.	Daman & Diu	Not Implemented	Data Not Available
9.	Dadra And Nagar Haveli	Not Implemented	
10.	Delhi	Not Implemented	
11.	Goa	0.007	0.00013
12	Gujarat	18.42	1.16
13	Haryana	6.95	5.75
14	Himachal Pradesh	1.37	2.03
15.	Jammu & Kashmir	Not Implemented	Data Not Available
16.	Jharkhand	8.28	0.54
17.	Karnataka	17.39	11.72
18.	Kerala	0.32	Data Not Available
19.	Lakshadweep	Not Implemented	
20.	Madhya Pradesh	40.29	28.80
21	Maharashtra	110.21	8.05
22	Manipur	0.09	Not Implemented
23	Meghalaya	.0006	Data Not Available
24	Mizoram	Not Implemented	
25	Nagaland	Not Implemented	
26	Odisha	17.64	0.58
27	Puducherry	Not Implemented	0.09
28	Punjab	Not Implemented	
29	Rajasthan	50.22	30.76
30	Sikkim	Not Implemented	Data Not Available
31	Tamil Nadu	0.16	15.19
32	Telangana	6.80	1.56
33	Tripura	0.02	.15
34	Uttar Pradesh	33.96	36.26
35	Uttarakhand	1.75	0.90
36	West Bengal	30.91	9.08
Total		390.02	167.14

***Source*:** PIB

The way ahead

Majority of farmers are small and marginal farmers and hence use of technology is difficult for them. Moreover, mere including the provision of technology would not solve the problem. As suggested by, the Report of the Committee to Review the Implementation of Crop Insurance Schemes in India, submitted to government of India in 2014, Agriculture extension models should have build in incentives such as cash incentives for the ground workers to increase the use of technology.

This scheme is not a income insurance but only revenue loss coverage which insures against weather risk and not crop loss

risk. Risks such as destruction by wild animals are not covered under the scheme. Though including post harvest loss is a welcome step, it should be noted here that Post harvest losses does not include storage losses Problems related to insurance run far deeper than premium rates. For e.g. In many states where premium rates are low in MNAIS still have very low subscription majorly due to lack of awareness and inefficient utilization of agricultural extension services. One key problem of crop loss or damage compensation, the unit of assessment, remains unaddressed in the new scheme. There does not seem to be anything in this scheme to address the problem of tenant farmers who bear the risk of crop failure but are not entitled for compensation and insurance payments.

In the long run, there should be an attempt to delink the insurance from the banks as Financial Stability Report by RBI highlights that linkage of loans with insurance doesn't meet good response from banks as the burden of Priority Sector Lending is already there on the banks. Also, Compulsory deduction of premium from loans hedges the banks and not the farmers. Hence, an separate agriculture insurance agency should be created which cater exclusively to this sector. In addition, as the policy is in its initial phase it is yet to be seen whether the ongoing premium rates are financially viable for government to afford in the long run. Hence a continuous assessment should be undertaken for different agro climatic zones coming closer to the actuarially fair premium for both the farmers as well as the insurance companies.

De-risking agriculture does not begin or end with insurance. This has been proved with the increase in agrarian stress indicated by the farmer protests and demonstrations and the state governments using debt waivers as instruments to gain political benefits. The assessment of risk should begin much before sowing and proceed beyond harvest. The decision of what to sow and reap is currently not a well informed choice based on a sound assessment of soil, yield and prices. If insured, small and marginal farmers show an increasing tendency to sow cash crops reliant on the monsoon—a classic case of moral hazard. It is here that better risk assessment, contract design and cooperatives becomes crucial. Mixed farming and inter-cropping also helps in diversifying the risks generally associated with mono cropping. Commodity futures are yet another solution to achieve price risk management and price discovery. Unfortunately in India, no significant price discovery has occurred in agricultural commodity markets which started their operation a decade ago. This is primarily because of the lack of integration between the futures and spot markets. These loopholes are to be addressed along with making steps to improve the insurance coverage.

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