Azadi Ka Amrit Mahotsav

POLICY BRIEF 47

To Insure or Not to Insure: What Explains Low Uptake of Crop Insurance?

Pratap S. Birthal, Jaweriah Hazrana, Digvijay S. Negi, and Ashok Mishra

Agriculture and agriculture-based livelihoods are highly vulnerable to extreme climatic events such as droughts, floods, cyclones, heat waves, cold waves, and frosts, especially in developing countries that lack access to technologies, finances, and institutions for risk management. The frequencies of most such events have increased in the recent past and are predicted to increase in plausible future climate scenarios. In India, from 1980-81 onwards, climatic shocks have reduced the productivity growth of agriculture by one-fourth, and the effect had been more significant in the low-income states that derive a larger share of their gross value added from agriculture and allied activities[1]. In the long run, socioeconomic consequences of the negative impacts of climatic shocks on agriculture could be devastating, resulting in the depletion of household savings, sales of productive assets, indebtedness, poor adoption of improved technologies, less investment in farm assets, and an increase in poverty, hunger, and malnutrition. It is likely that without mitigation and adaptation, poor producers and consumers may not recover fully from the impacts of climatic shocks and remain in a perpetual state of poverty and malnutrition[2].

Farmers do not accept the risks passively. Based on their experience in the past climate anomalies, they often implement several adaptations, ex-ante and ex-post the shocks, to manage their adverse effects. These include the traditional measures like the cultivation of stress-tolerant crops, changes in planting or sowing dates, conservation of soil and water resources, supplemental irrigation, and alternations in input applications in terms of their timings and quantities. Such traditional measures represent autonomous adaptations happening in farmers' fields in response to a gradual change in the climate. Farmers also use modern risk-mitigating measures like hedging and crop insurance that transfer the expected production loss due to the risks and uncertainties from farm households to financial institutions for a fee or premium.

Uptake of Crop Insurance

The uptake of crop insurance in most developing countries has remained low despite considerable policy and institutional support for its promotion. For example, in India, even after five decades of its introduction in 1972 and several economic incentives, its uptake has not been as expected. In 2016, the Government of India launched a country-wide insurance scheme called the *Pradhan Mantri Fasal Bima Yojana* (PMFBY), aiming to cover at least half of the gross cropped area with insurance by 2018. The PMFBY is superior to the earlier schemes in several aspects, for example, the crops and risks covered, lower and subsidized premiums, higher sums insured, and greater levels of indemnities. Despite this, the target of bringing half of the cropped area under insurance remains elusive. By 2020-21, only one-third of the gross cropped area could be brought under the

Pratap S. Birthal is Director, ICAR – National Institute of Agricultural Economics and Policy Research; Jaweriah Hazrana is Assistant Professor, CHRIST University, New Delhi; Digvijay S. Negi is Assistant Professor, Indira Gandhi Institute of Development Research, Mumbai; Ashok Mishra is Kemper and Ethel Marley Foundation Chair, Morrison School of Agribusiness in WP Carey School of Business, Arizona State University, USA.

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PMFBY, most of which lies in the rainfed regions. Its coverage in the irrigated areas is poor because the irrigation partially protects crops against climatic shocks.

Several demand and supply-side explanations have been put forth for the limited uptake of crop insurance in developing countries, including India[3]. These include: (i) farmers' lack of information on insurance products, liquidity constraints and poor access to institutional credit, and financial illiteracy (ii) higher insurance premiums, low claim settlement ratio, and delay in claim settlements; (iii) asymmetric information on farmers leading to a higher search, administrative and transaction cost of reaching out to millions of smallholder farmers; (iv) policy-induced distortions in credit and input markets (i.e., loan wave-offs, and input subsidies); and (v) poor gains from crop insurance.

Notwithstanding, the expected net gains from adopting crop insurance matter the most in farmers' decision 'whether to insure or not to insure'. There are two conditions: A farmer will buy an insurance contract if he expects to be better off with it. This is a necessary but not sufficient condition. Simultaneously, he also expects that gains from switching over to crop insurance are significantly more than the existing adaptation measures such as crop diversification and irrigation. Nonetheless, most of the available evidence on the gains from adopting crop insurance has been generated independently of the gains from using other risk management measures. Another gap in the literature on the relationship between crop insurance and agricultural performance is that the effects of crop insurance have been evaluated in terms of net productivity gains, ignoring the evaluation of its primary function of risk reduction.

This brief compares the income and risk effects of crop insurance vis-à-vis irrigation to demonstrate that the expected utility from the adaptation measures other than crop insurance also matters in farmers' decision to buy or not to buy an insurance contract. And it is perhaps the most critical factor that may explain the limited uptake of crop insurance in smallholder-dominated agricultural economies. Still, this issue has not received much attention from the economists, policymakers, and insurance agencies.

Gains from Crop Insurance vis-à-vis Irrigation

The primary function of crop insurance differs from that of irrigation or, for that matter, any other existing traditional adaptation measure. Hence, it can be argued that irrigation is not a perfect substitute for crop insurance. The literature shows that although irrigation's primary function is to improve yields, it also provides partial protection to crops from the climatic shocks, especially droughts, heat waves, cold waves, and frost[4], and thus reduces the variability in their yields. Crop insurance, on the other hand, reduces farmers' exposure to downside risk, i.e., the probability of loss in crop yield due to climatic shocks. Therefore, an actuarially fair insurance contract should leave farmers' ex-post expected farm income unchanged. In that sense, the demand for irrigation competes with the demand for crop insurance[5].

Nevertheless, the implementation costs and expected payoffs of different adaptation measures differ. Payoffs to investment in irrigation are almost certain. On the other hand, payoffs to investment in crop insurance are highly uncertain — gains from an insurance contract can be realized if the yield of a

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crop falls below the administratively pre-determined threshold.

Crop insurance can also influence crop yield through its feedback on farmers' decisions regarding the adoption of improved technologies, inputs, and agronomic measures. The positive and synergistic indirect effects of crop insurance on the use of other inputs are also reflected in the higher-order moments (i.e., variance and skewness) of crop yield or farm income. This implies that the decisions on the adoption of crop insurance and other risk management measures should be studied in a unified framework that can explicitly accommodate such effects. From the policy perspective, it is imperative to distinguish between the productivity and risk benefits of crop insurance vis-à-vis other adaptation measures like crop diversification, stress-tolerant seeds, and irrigation.

The evidence on the productivity and risk benefits of crop insurance and irrigation, that is, their average treatment effects (ATTs), presented here, have been derived from an application of the Multinomial Endogenous Switching Regression. The data have been extracted from a nationally representative survey, the Situation Assessment Survey of Agricultural Households conducted by the National Sample Survey Office (NSSO) of the Government of India for 2012-13.

Figure 1 shows the productivity and risk benefits from adopting crop insurance and irrigation independently and also jointly[6], after controlling for the effects of several covariates and selection biases. Crop insurance and irrigation positively impact farm productivity, measured as net income per hectare of cropped area. But, the gains from these differ significantly. The productivity gains from adopting crop insurance are one-third of the productivity gains from use of irrigation. However, the payoffs magnify when both the measures are used in conjunction. Likewise, both these measures reduce variability in farm income, but the effect of irrigation is twice that of crop insurance, and it is larger from their joint adoption.

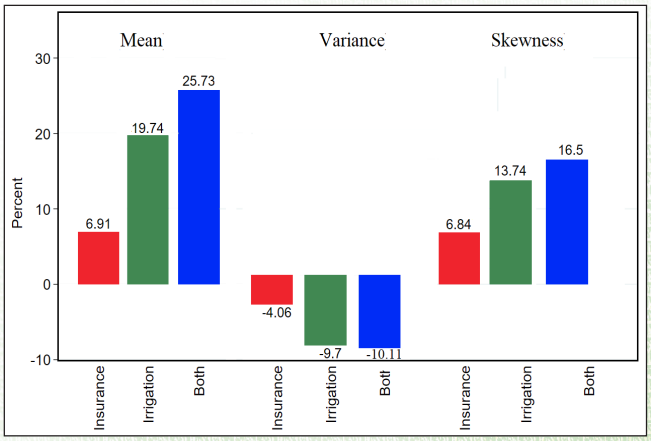
Skewness is a better measure of risk. Note that positive skewness means a lower exposure to downside risk or probability of crop failure. Figure 1 shows an increase in the skewness of productivity due to adoption of crop insurance as well as irrigation. The risk benefits from the use of irrigation are almost twice the crop insurance, and the payoff is larger to their joint adoption.

India is a large country with considerable spatial heterogeneity in resource endowments and agro-climatic conditions. The productivity and risk benefits of crop insurance and also of other adaptation measures are, thus, expected to differ across regions. Figure 2 distinguishes their adaptation gains between the low-rainfall and the high-rainfall regions. Both the crop insurance and irrigation and also their joint adoption lead to an improvement in productivity and a reduction in downside risk exposure, irrespective of the level of precipitation. However, the gains from irrigation are more significant at a lower level of precipitation, and the difference between the low-, and high-rainfall regimes is substantial. On the other hand, crop insurance appears more effective in enhancing farm productivity and reducing downside risk exposure at a higher level of precipitation.

Interestingly, at higher rainfall levels, crop insurance is as effective as irrigation in raising farm productivity and reducing downside risk exposure. Conversely, irrigation gains far outweigh crop insurance gains at lower rainfall. As expected, the payoffs to their joint adoption are more significant than any of these measures if adopted in isolation, irrespective of the rainfall regimes.

How reliable is the finding that crop insurance is not as effective in improving productivity and reducing risk as irrigation or any other adaptation measure? The empirical evidence is scarce. In the humid

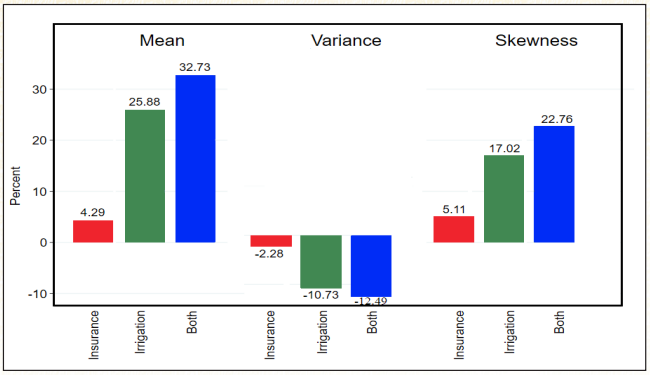
Figure 1. Average treatment effects on farm income



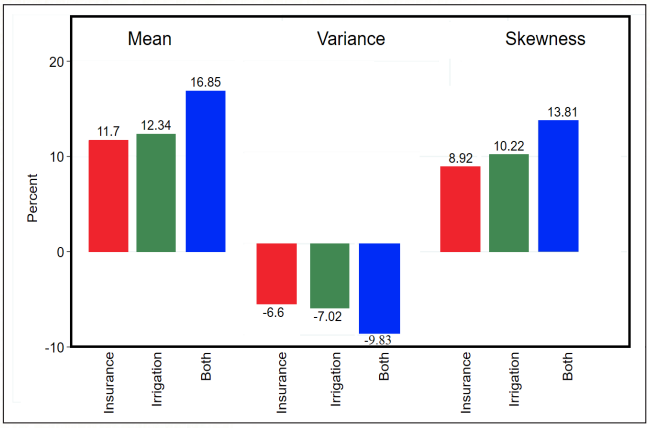
[6] The average treatment effect (ATT) provide the effect of an adaptation measure on an outcome indicator (i.e., mean farm income, its variance and skewness). Alternatively, it can be interpreted as the effect of an adaptation measure its post-adoption over its counterfactual of non-adoption.

Figure 2. Average treatment effects on farm income across rainfall regimes

(a) Low rainfall



(b) High rainfall



environments of the United States, crop insurance has been found less effective than supplemental irrigation[7]. Another study from the United States shows crop insurance as an efficient means of mitigating risk in the rainfed regions[8]. In Ethiopia, crop diversification is identified as an efficient substitute of crop insurance[9]. In France and Hungary, in the case of wheat crop, insurance is found to provide fewer benefits compared to other adaptation measures such as varietal diversification and production contracts[10].

Policy Implications

From the policy perspective, a few crucial issues that have emerged from the empirical evidence on the gains from crop insurance vis-a-vis other adaptation measures merit attention.

First, crop insurance is not an efficient substitute of irrigation or, for that matter, any other adaptation measure; and given that farmers often use more than one adaptation measure, crop insurance is unlikely to substitute these completely. To make crop insurance acceptable to farmers, it is imperative to consider the risk benefits of different ex-ante adaptations in pricing the insurance products.

Second, one size does not fit all. There is a significant difference in the adaptation gains of crop insurance and irrigation across rainfall regimes. Therefore, the need for a regionally-differentiated strategy for accelerating the uptake of crop insurance cannot be undermined.

Third, the insurance premium is paid before the sowing of crop(s), when farmers face competing demands on the available financial resources to purchase inputs and services. Is it feasible that farmers buy insurance contracts on credit at the sowing time and pay the premium after the harvest? Thus, relaxing liquidity constraints and expanding outreach of financial institutions to smallholders may accelerate uptake of crop insurance.

Fourth, the implementing agencies should leverage the power of digital technologies (mobile phones and the internet) and mass media for faster dissemination of information on crop insurance products.

Finally, the need for innovative methods for crop loss assessment due to climatic and non-climatic factors cannot be undermined. This will reduce measurement errors and help estimate crop yields accurately even at the farm level.

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ICAR – NATIONAL INSTITUTE OF AGRICULTURAL ECONOMICS AND POLICY RESEARCH
(Indian Council of Agricultural Research)
P.B. No. 11305, Dev Prakash Shastri Marg, Pusa, New Delhi-110 012, INDIA
Phone : 91-11-25847628, 25848731, Fax : 91-11-25842684 E-mail : director.niap@icar.gov.in
http: // www.niap.icar.gov.in