

Index-based insurance is an innovative financial product that has been introduced in recent years in countries as diverse as India, Malawi, Mongolia, and Thailand. It allows individual smallholder farmers to hedge against agricultural production risks, such as droughts or floods. The product pays out in events that are triggered by a publicly observable index, such as rainfall recorded on a local rain gauge. As a result, advocates argue that payouts can be calculated and disbursed quickly and automatically without the need for households to formally file a claim. This arrangement in turn reduces transaction costs, which would otherwise tend to drive up the price of the insurance. Fast payouts are also likely to be valued by policyholders in an environment where households are poor and often liquidity-constrained. Finally, the insurance product is free of adverse selection and moral hazard problems that often plague insurance markets because payouts are based only on publicly observed data rather than on private information reported by the person filing claims.

Index-based insurance appears, therefore, to hold significant promise for rural households. Weather shocks to agricultural income generate fluctuations in household consumption that are not perfectly insured; at the extreme, they may lead to famine or death. Indeed, plenty of evidence suggests that households in developing countries are only partially insured and may thus avoid more profitable but riskier investments.

Despite the benefits of index-based insurance, there are also some concerns. First, the product pays depending on the realization of an index, not on the actual crop yield or income of the farmer. Crop yields will relate to the index in complex ways that depend on soil moisture, evaporation, soil type, water runoff, and a variety of other factors. A good product will be one that maximizes the correlation between the index and what the client cares about. A variety of factors may discourage participation, such as household credit constraints, limited understanding of the product among potential consumers, limited trust in the insurance provider, or high transaction costs that raise the price of insurance.

In a 2007 study on southern India by Giné, Townsend, and Vickery, the ratio of expected payouts on rainfall index insurance relative to premiums was estimated at only around 30 percent on average, compared with expected payouts equal to 65–76 percent of premiums for automobile and homeowners' insurance in the United States. This relatively low payout rate may reflect a number of factors, including a lack of economies of scale given the small initial market for the product and the fact that the market is still in its infancy. More important in India, however, is the fact that high weather insurance payouts are correlated with poor macroeconomic conditions because of the dependence of the Indian economy on agriculture and the monsoon. These properties of insurance contracts are problematic to an insurer from a risk-management perspective. If rainfall insurance were written at a large scale, underwriters could limit their risk exposure by selling part of their

rainfall risk to a reinsurer or by holding a significant capital buffer against potential losses. But both of these options are likely to be costly because of transaction costs, informational frictions, and tax concerns.

The pros and cons of these types of products raise an important set of interrelated questions: What types of households buy index insurance? What factors prevent the remaining households from participating? And does the purchase of index insurance result in more efficient risk taking?

### Evidence on uptake of index insurance in Malawi and India

A recent paper on Malawi and two papers on India try to shed light on the questions raised above. In Malawi, smallholders were offered credit to purchase high-yielding seed varieties. Farmers in some localities were randomly selected to be offered credit only, whereas farmers in other localities were offered a bundle of credit and weather index insurance. In India, smallholders were offered a stand-alone weather index insurance product whose price elasticity was estimated by randomly varying the price of the policy. To understand the role of liquidity constraints, certain households were given a positive liquidity shock. To measure the importance of trust, some households received a product endorsement by a trusted local agent. To understand whether limited financial education about the product impedes adoption, a subset of households received additional information relating the unfamiliar concept of rainfall in millimeters to the familiar concept of soil moisture. Finally, to understand the effect of product framing, information was presented to households in subtly different ways.

In Malawi, uptake of the credit was 33 percent for farmers offered the loan without insurance and only 17.6 percent for farmers offered the loan bundled with rainfall insurance. This result suggests that smallholders did not value insurance, perhaps because the lack of collateral and the lender's inability to sanction defaulting borrowers was already providing implicit insurance. After the pilot, lenders decided to bundle all agricultural loans with insurance. The insurance covers only the loan, however, and anecdotal evidence suggests that borrowers remain largely unaware that the loans are insured. Therefore, although insurance may have increased access to credit, it is less clear that farmers are ultimately insured.

In India, government crop insurance, which has long been available, is mostly compulsory; government bank clients in many states are required to purchase the insurance when borrowing for agricultural purposes. Most borrowers perceive the premium as a fee and remain uninformed about what they are paying for. Thus, the provision of explicit market-based rainfall insurance to Indian households remains a new and relatively untested concept.

Demand for index insurance in India has been sensitive to price and to endorsement from a trusted third party. But uptake has remained low, even when the price of insurance was less

than its expected value. These results are consistent with the view that in addition to price and liquidity, trust and financial literacy significantly influence uptake.

Table 1 presents some basic information about the growth in index rainfall insurance contracts sold by BASIX, a microfinance institution. The number of villages where insurance is available has expanded substantially since the initial 2003 pilot surveys. The number of policies sold per village, however, has remained relatively constant. In 2006 one contract was estimated to be sold for every 13.2 households in villages where rainfall insurance contracts were available. An insurance contract costs between about 100 and 300 Indian rupees (about US\$2–\$7) depending on whether it is linked to a single phase of the monsoon or to all three phases.<sup>1</sup>

**Table 1—Rainfall insurance sales by BASIX, Andhra Pradesh, India**

Year	Number of villages where insurance is sold	Total number of contracts	Average number of contracts per village
2003	17	194	11.4
2004	43	318	7.4
2005	422	3,214	7.6
2006	538	6,039	11.2

Source: BASIX; also cited in S. Cole, X. Giné, J. Tobacman, P. Topalova, R. Townsend, and J. Vickery, "Barriers to Household Risk Management: Evidence from India," Working Paper (World Bank, Washington, D.C., 2009).

In addition, households that buy insurance generally purchase just one or two policies, hedging only a modest fraction of monsoon agricultural income, which suggests that early adopters are still experimenting with the product.

## Policy implications

A number of policy implications follow from these findings.

- **The implementation and marketing of index insurance should be carefully designed.** The product must be simple

enough for farmers to understand, and yet it must pay out in the events the smallholder cares about. This payout can be a complicated function of the event being insured against. In addition, it is not clear who should bear the cost of educating potential clients and how detailed the messages should be. More research is needed to shed light on these issues.

- **Trust can be built by designing a product that initially pays fairly often.** It is easier to sell insurance in villages where a positive past insurance payout has occurred. To build trust in the product, insurance providers could modify the contracts, at least in the beginning, to ensure that they pay out a positive return with sufficient frequency. Unless premiums are raised, however, the contracts that pay out frequently will offer less coverage in catastrophic events, making them less valuable to clients.
- **Since liquidity constraints matter, lenders could offer loans to pay for the premiums.** In this case, lenders would have to provide education and financial literacy training to inform borrowers explicitly about the events that trigger a payout so that the culture of repayment is not undermined.
- **The benefit of index insurance to lenders is clear, so the focus of research should be on the demand side.** From a lender's standpoint, weather insurance is an attractive way to mitigate the risk of credit default. It can thus become an effective risk-management tool with the potential to increase access to agricultural credit at lower prices. ■

**For further reading:** X. Giné, R. M. Townsend, and J. Vickery, "Statistical Analysis of Rainfall Insurance Payouts in Southern India," *American Journal of Agricultural Economics* 89, no. 5 (2007): 1248–54; X. Giné, R. Townsend, and J. Vickery, "Patterns of Rainfall Insurance Participation in Rural India," *World Bank Economic Review* 22, no. 3 (2008): 539–66; X. Giné, and D. Yang, "Insurance, Credit, and Technology Adoption: Field Experimental Evidence from Malawi," *Journal of Development Economics* 89, no. 1 (2009): 1–11; S. Cole, X. Giné, J. Tobacman, P. Topalova, R. Townsend, and J. Vickery, "Barriers to Household Risk Management: Evidence from India," Working Paper (World Bank, Washington, D.C., 2009).

<sup>1</sup> The cropping season was divided into three phases roughly corresponding to the planting, crop maturity, and harvesting periods. Individuals could purchase a contract on a single phase or all three phases together.

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