



## WEATHER INSURANCE, PRICE INFORMATION, AND HEDGING: HELPING THE POOR MANAGE RISK

by Shawn Cole [scole@hbs.edu](mailto:scole@hbs.edu), Raghavendra Chattopadhyay, Stefan Hunt, Jeremy Tobacman, and Petia Topalova

### Protecting assets

THE RISK OF A SHOCK SUCH AS DROUGHT or an unexpectedly low price for a primary crop can prevent poor households from acquiring assets or making the most of the ones they have. Informal risk-sharing networks, though well-suited for localized shocks such as family illness or death, often break down when faced with a shock that impacts an entire village.

Selling assets is a common coping mechanism, yet when everyone in the area is affected, the low demand and high supply reduces their value. For households, fewer assets mean less investment in productive capital, such as irrigation canals or livestock. Anticipating the increased vulnerability that comes with selling productive assets, agricultural households often employ other risk-coping mechanisms. These too can be costly, however, as when borrowing at high interest rates, reducing investment in children's education, or diversifying the crop mix rather than choosing the variety with the highest expected profits.

This BASIS-funded research activity, involving hundreds of rural villages across three districts in Gujarat, India, will develop a complementary pair of products that will enable poor farmers to better manage agricultural risk, especially by helping them accumulate assets and increase productivity even in the face of shocks.

The first initiative—weather insurance—provides policyholders a cash payout in the event of low rainfall during the summer growing season. This mitigates risk

relating to the quantity of agricultural output. The second initiative—price information and hedging—links smallfarmers to futures markets, providing up-to-date futures price information. This promotes forward-looking planting decisions and the ability to hedge risk directly through commodities exchanges.

Importantly, these interventions are market-oriented and can be financially sustainable for the organizations offering them. Combining the two initiatives will offer poor farmers an integrated package of risk-management tools, consistent with best practices in the developed world.

### Building understanding and acceptance

Financial liberalization in India has the potential to revolutionize the way households manage risk. Until now, the only formal risk management available to farmers in developing countries was government-provided crop insurance. High transactions costs and adverse selection, in which only the riskiest customers take insurance, made this insurance extremely expensive and unsustainable. In contrast, the weather insurance contract is based on measured rainfall at a government-run station, so the payment decision is objective and transparent, and transactions costs are kept to a minimum. Historical rainfall data contain less measurement error than crop loss data, making rainfall-based products easier to design and price.

In order for weather insurance to help Indian farmers, however, they must understand it. In our

sample area, experience with formal-sector financial products is limited. A common question farmers have when first hearing about weather insurance is, “If I purchase insurance and the rain is good so that the policy does not pay out, can I get a refund of the premium?” Even when they understand the concept of weather insurance, the farmers must believe in its benefits. Typically, premiums are due at the time of farm investments, and money spent on insurance means less money for seed or fertilizer.

We will study how to overcome obstacles to farmer understanding and acceptance of weather insurance by first measuring household financial literacy and determining cost-effective approaches to improving it. Then we will design products that are accessible and attractive to households with limited financial literacy, and determine how best to communicate the benefits and risks of these products. The research team will collaborate closely with the National Commodity and Derivatives Exchange Limited (NCDEX), the Self-Employed Women’s Association (SEWA), insurance providers, and international groups to develop a product well-suited for poor households.

A program seeking to help farmers hedge price risks through futures markets also faces obstacles. Even in the United States only 5-10% of farmers use futures or options markets, and linking farmers in developing countries to futures markets is almost unheard of. NCDEX recently developed a plan that will allow smallfarmers to participate directly in the exchange. We have begun a pilot activity to aid farmers in deciding which crops to plant and to become familiar with futures markets so that they may participate. With knowledge of spot prices at harvest time, farmers will know the best markets to travel to and will have information that supports them in negotiating prices.

Delivering products and information to rural households is another challenge. The population is widely dispersed, and the quality of infrastructure, such as roads and telephone connectivity, is often poor. Internet access is nearly unavailable. Reaching a significant portion of the population requires a large network, but formal firms often do not find it profitable to employ workers to interact with the rural population. Instead, most rely on NGOs and microfinance institutions to distribute products to potential clients.

Yet, staffs of these organizations have little experience with products other than credit. Those providing financial services must fully understand them and be able to explain them in a way that makes sense to

households. Traditional insurance products, such as life and health insurance, which provide a payment following a specific loss, are relatively easy compared to weather insurance or conveying the intricacies of futures markets. An integral component of this activity is to develop, test, and make freely available curricula for training staff and households about weather insurance and futures markets.

## **Improving the products**

The BASIS investment enables us scale up our pilot programs, refine their design, extend collaboration with local organizations, and communicate findings to policymakers. Importantly, it also helps us evaluate the effectiveness of these initiatives that have the potential to transform the lives of poor agricultural households not only in our activity region but throughout the developing world.

We know that insurance facilitates consumption smoothing and asset preservation, thus protecting households when adverse shocks arrive. Insurance helps these households to continue to invest in children’s education and avoid selling assets at inopportune times. Information on futures prices, provided at planting time, can likewise help farmers plant crops with high expected harvest-time prices.

In addition, weather insurance and futures price information may have beneficial effects on investment decisions. The ability to manage risk may lead to specialization in crops, adoption of high-yield output varieties, greater use of capital inputs, and investment in crops whose expected price is highest.

To gauge how much these innovations might help households, half the villages in our study sample will receive information and training on how to use insurance and futures markets, while the other half will receive no targeted support. Periodic household surveys will focus on four important aspects of household risk management: awareness of and participation in financial markets, agricultural productivity, household consumption, and asset accumulation.

We will investigate if a household’s ability to manage risk improves after the interventions. Successful risk management should allow farmers to select crops that have relatively higher futures prices, that are riskier but have potential for greater yield, and that operate with higher capital-to-labor ratios. The information we gather on crop planting decisions, input use, crop yield, and time of sale and price obtained will help show the extent of the effectiveness of the program.

Consumption and employment for the entire household will be tracked, along with expenditures on education and temporary migration decisions. We also will collect information on asset sales and purchases, ownership and rental (in and out) of land, durable goods, formal and informal financial saving and borrowing, and gift exchanges with relatives and neighbors.

In a pilot project, we carried out an initial survey of the sample households. Following the survey, weather insurance was offered to all residents, not just those surveyed, in villages randomly selected from the 100 study villages. The insurance policy had three phases. Phases I and II protected against deficit rainfall during the planting and growing portions of the agricultural



***Trainees complete a session on futures markets.***

season, while Phase III protected against excess rainfall during the harvest. Because weather patterns were different in different districts, separate policies were sold in each of the three districts.

Preliminary results demonstrate high sensitivity of demand to subtle differences in educational materials and to the price of the policy. Because rains have been normal in the two pilot years in all three districts, no insurance payouts have yet been distributed, and no effects on investment and asset preservation have been detected.

We also plan to offer farmers direct access to futures markets. Households in the original treatment villages will have had two years of experience with futures prices and will be offered the opportunity to transact in the market. In the following year, we will “cross” the futures and insurance treatments, offering both to a randomly selected subset of households in areas that have had at least one product for several years. This will measure the degree to which these products are viewed as complements or substitutes by households, shedding additional light on how households smooth their agricultural revenue.

By the third year of the BASIS-funded portion of the research activity some villages will have had weather insurance for five years. At this point, farmers should be comfortable enough with the product that those seeking to manage risk will purchase significant quantities, and we should be able to detect changes in investment behavior, including level of investment, the use of higher-risk, higher-return cropping patterns, and the capital-labor ratio. We will also be able to precisely measure how these products affect consumption, particularly in the presence of adverse shocks. In the final year we will further analyze results and communicate the findings through presentations, *BASIS Briefs*, and professional journals.

### **Extending the reach of insurance**

A key policy debate in India is whether liberalization and growth benefit only the urban elite and middle class, or whether the poorest of the poor also stand to gain. The premise behind our research activity is that, with proper policies and an emphasis on extending access to all, financial liberalization holds the promise of helping all levels of society.

In India, two-thirds of the population rely on agriculture to earn a living. The risk inherent in agriculture is demonstrated most dramatically by the thousands of farmer suicides that occur following a bad agricultural output. The effect of agricultural output on individual and aggregate welfare is enormous, with one recent estimate arguing that rainfall variation explains 45% of the variation in GDP growth.

Demonstrating that weather insurance helps the poor, and can be profitably sold, may render moot current Indian policy debates about whether the government should continue to require insurance companies to draw a certain share of their revenue from rural areas. Demonstrating effectiveness would





## BASIS Briefs

### Authors

**Shawn Cole**

**Stefan Hunt**

Harvard University, USA

**Raghendra**

**Chattopadhyay**

Indian Institute of  
Management, India

**Jeremy Tobacman**

Oxford University, UK

**Petia Topalova**

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ing organizations.

Edited and layout by  
**BASIS CRSP**

Comments encouraged:  
Department of Agricultural  
and Applied Economics,  
University of Wisconsin,  
Madison, WI 53706 USA  
[basis-me@facstaff.wisc.edu](mailto:basis-me@facstaff.wisc.edu)  
tel: +608-262-5538  
fax: +608-262-4376  
<http://www.basis.wisc.edu>

also provide guidance for policymakers in many other countries where output risk is a major impediment to asset accumulation.

Futures markets also are at the center of a vigorous policy debate in India. Critics of the commodity exchanges allege that futures speculation caused increases in the price of food grains. By demonstrating the potential (or lack thereof) of futures markets to improve investment decisions and farmer welfare, our work will constitute a major contribution to the current policy debate and may encourage other developing countries to consider commodities exchanges.

This research activity will provide a better understanding of the product design and informational conditions under which farmers are more likely to use intermediaries to reduce commodity price risk, and the training and price dissemination mechanisms under which farmers will use futures markets to aid in planting and storage decisions. Such understanding is critical for those interested in helping farmers overcome vulnerability to shocks and achieve competitiveness. It should be particularly useful to policymakers in developing agricultural extension programs.

### Informed households

Agricultural risk threatens the security of hundreds of millions of farmers around the world. Providing access to weather insurance and futures price information can assist in managing risks to agricultural output and agricultural prices, respectively. The initiatives are, first and foremost, risk management programs for poor farmers. Our impact assessment will enhance understanding of how weather insurance and futures price information can help farmers protect and accumulate assets. The initiatives can improve the creditworthiness of farmers, creating greater opportunities for borrowing. Also, they can help farmers stabilize and increase income and reduce the need to sell off assets.

Importantly, the activity promotes economic opportunities for women.

Almost all employees and members of our partner SEWA are women, and the bulk of the training will benefit them. The lessons learned will assist development in India, but are much more broadly applicable and have relevance for other developing countries interested in agricultural innovations. In particular, the financial products and price information and hedging programs could be delivered in Africa and support the Presidential Initiative to End Hunger in Africa with relatively minor adjustments for local culture and levels of education.

Financial liberalization, combined with efforts from development agencies and the private sector, will significantly increase the range of products available to agricultural households around the world. It is important to understand these products and to ensure that households obtain the information and education necessary to make informed financial decisions. This research activity provides a solid framework to address both the challenges and opportunities of innovations in agricultural risk management.



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