

WEATHER INSURANCE, PRICE INFORMATION, AND HEDGING:
FINANCIAL INITIATIVES IN GUJARAT TO HELP THE POOR MANAGE AGRICULTURAL RISK

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ABSTRACT

This project proposes to develop and evaluate two complementary interventions, which together will allow households to manage agricultural risk. The first is weather insurance, a financial derivative that pays farmers when rainfall is low. The second links farmers to spot and futures markets, promoting forward-looking planting decisions, and eventually the hedging of risk directly through commodities exchanges. Both interventions will be accessible to, and benefit, women.

These innovative interventions are market-based, financially sustainable, and easily scalable, with the potential to transform the lives of poor agricultural households by addressing two of the most important obstacles these households face to accumulating assets and increasing productivity: output risk and price risk.

The U.S.-Indian research team will conduct rigorous evaluation, build program capacity, and offer education and policy outreach, with three primary goals: demonstrating the effectiveness of the programs; sharing the lessons with other organizations and governments; and building local capacity for research.

The team, together with an NGO, will conduct a randomized evaluation involving thousands of households in nearly 200 villages in rural Gujarat, India, building on the success of pilot projects. A comprehensive series of household interviews will measure the effects of the interventions on asset accumulation, investment decisions, and household welfare.

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Research Narrative

I. Introduction

A vast majority of the world's poor rely on agriculture for subsistence. For these households, output risk and price risk constitute major obstacles to asset accumulation. Poor monsoons can have a devastating effect on yield, particularly for poor farmers who lack irrigation. Because farmers operate on thin margins, and are often in debt, negative price shocks can have devastating consequences. This project, involving hundreds of rural villages across three districts in Gujarat, India, will develop a complementary pair of initiatives to address these risks, and evaluate their efficacy with a series of randomized field experiments.

The first initiative, rainfall insurance,¹ is an index-based financial product which provides policy holders a cash payout in the event of low rainfall during the summer growing season. Rainfall insurance mitigates risk relating to the quantity of agricultural output. The second initiative, price information and hedging (hereafter, "PI/H"), links small farmers to futures markets, providing up-to-date futures price information, to aid in planting and storage decisions and assist when selling products, with the eventual goal of allowing small-scale farmers to manage risk directly through futures or option contracts.² We will also disseminate spot prices at harvest time, which should reduce the chance farmers realize a poor price, either by informing farmers to which markets to travel, or aiding in price negotiations. Combining the two initiatives will offer poor farmers an integrated package of risk-management tools, consistent with best practices in the developed world.

Historically, one of the most significant barriers to asset accumulation for poor households in India has been the risk of negative aggregate income shocks. A drought or an unexpectedly low price for a main crop can harm an entire village. Informal risk-sharing networks, though well-suited for

¹ We refer interchangeably to "rainfall insurance" and "weather insurance" throughout this proposal, though in principle weather insurance contracts could be indexed to temperature, wind, or sunlit days.

² In a futures market, two parties (a buyer and a seller) agree to exchange a fixed quantity of a crop (a certain grade of wheat) on a fixed day in the future. While this may sometimes lead to actual delivery of the good, in most cases the transactions are settled financially. The futures exchange regulates and guarantees the contracts.

household level shocks such as death or illness, may break down when aggregate shocks arrive (Townsend, 1994, 1995; Udry 1994).

Poverty makes households especially vulnerable: adverse shocks can drive a household near bankruptcy, obliging members to borrow at high interest rates, migrate, or reduce investment in children's education. Selling assets, such as livestock, gold, or land, is a common coping mechanism (Rosenzweig and Wolpin, 1993). But aggregate shocks pose particular problems: everyone in the area is affected, so demand for assets is very low while supply is high, reducing the value of assets (Shleifer and Vishny, 1992).

This vulnerability affects the ability to accumulate assets in several ways. First, negative income shocks eat away at the asset base, particularly when a household is obliged to sell assets when everyone else also wants to sell them. Fewer assets mean less investment in productive capital, such as irrigation canals or livestock. Second, anticipating their vulnerability, households employ ex-ante risk-coping mechanisms. Some of these may be costly, such as diversifying crop mix, rather than choosing the variety with the highest expected profits (Morduch, 1995; Rosenzweig and Stark, 1989), or by storing wealth in assets with low return, such as gold.

Formal financial markets are well-suited for managing aggregate risks. Because rainfall is virtually uncorrelated with world financial markets, reinsurance companies should, at least in theory, be willing to bear weather risk for a low price.³ Futures markets provide information to farmers about expected prices, reducing price uncertainty, thus aiding farmers in making planting, harvesting, and storage decisions (Danthine, 1978; Anderson and Danthine, 1983). Futures markets also allow farmers to eliminate price risk by selling output forward (Holthausen, 1979).

Until recently, rural households in developing countries have been unable to participate in futures markets. But ongoing financial liberalization in India has the potential to revolutionize the way households manage risk. A financial engineering project led by the World Bank (surveyed by

³ Standard asset pricing models predict firms will charge less to accept risk that is uncorrelated with world asset markets. As the Indian monsoon is nearly uncorrelated with world markets, international reinsurers should be willing to accept this risk for low compensation (close to the risk-free rate).

Manuamorn, 2005) has led to the introduction of rainfall insurance in India. In 2003, the Indian government legalized futures in all agricultural commodities,⁴ leading to the establishment of two large exchanges in Mumbai. These unfolding changes are spurring dramatic growth in futures volume and the range of contracts available, with large farmers gaining access to trading and market information.

These initiatives have important advantages for development impact. First, the initiatives are scalable, and could be expanded to the hundreds of millions of people in India and elsewhere (in the developing and developed world) who derive a livelihood from agriculture. Second, they require no up-front capital investments. Third, rainfall insurance and futures price information and hedging are market-oriented initiatives that can be financially sustainable for the institutions that provide them.

This last point bears emphasizing. It distinguishes rainfall insurance from crop insurance, which has a long but checkered past: we are aware of no crop insurance program in the developing world that has been successful and financially sustainable. Similarly, the typical approach to limit price risk by governments has been to impose price controls (ceilings or floors), which severely distort production and consumption decisions, and again may cost the public treasury substantially. It is for exactly these reasons that the World Bank strongly advocates market-based solutions through the International Task Force on Commodity Risk Management for Developing Countries (ITF). Our project complements the ITF's efforts, by advancing delivery (to our knowledge, this is the first systematic attempt to match small-scale farmers directly to futures markets), building capacity, and rigorously evaluating efficacy.

The proposed interventions have attracted significant research interest and support from multiple local partners. ICICI-Lombard, a major private insurance company, began offering weather insurance in 2003, with support of the World Bank (Hess, 2003, and Manuamorn, 2005). In 2006, the Self Employed Women's Association (SEWA), in collaboration with members of the research team and the Center for Microfinance,⁵ began piloting the ICICI weather insurance product with its members. In 2007, NCDEX, the largest agricultural futures exchange, partnered with SEWA and the research team to

⁴ Contracts for three crops were later restricted.

⁵ CMF is a young research institute, part of the Institute for Financial Management and Research in Chennai, dedicated to producing, supporting, and disseminating high quality research on microfinance in India

pilot an initiative to educate farmers about futures markets.

While our partners have provided financial support for a two-year project pilot, AMA CRSP funds are critical to the project's future. The project will inform current policy debates, in India and abroad. It is closely aligned with BASIS and USAID objectives, developing market-based solutions to manage risk, and will promote asset accumulation, risk mitigation, and economic growth.

Section II of this proposal describes the context of the proposed study. Section III presents our research questions. The fourth section details our research methodology—randomized evaluation, at the village- and individual-level—and our implementation strategy—a four-year study in partnership with SEWA, NCDEX, and the Center for Microfinance. Section V discusses the implications for policy. The following two sections review the capacity-building components of the project and the connection of work with BASIS and USAID goals, and Section VIII briefly concludes. The appendices list deliverables and describe our partners in the work.

II. Financial Innovation, Risk Management, and Asset Accumulation

Rainfall Insurance

Until now, the only formal risk management available to farmers in developing countries has been government-provided crop insurance.⁶ While these programs look good on paper, they are typically limited in scope and politicized (Sinha, 2004). Private crop insurance is impeded by the transaction costs of sending claims adjusters to measure the extent of loss and by adverse selection, in which only the riskiest customers sign up.⁷

Weather insurance solves these problems. Because the contract is based on measured rainfall at a government-run station, the payment decision is objective and transparent, and transactions costs may

⁶ Several other potential strategies for risk mitigation exist, though they have other disadvantages. Farmers can self-insure by saving, but financial institutions may not be convenient and rates of return are low. Farmers can borrow from moneylenders, but only at extremely high interest rates. Or, farmers can use informal insurance networks (Townsend, 1994), though these networks are less likely to be able to cushion against an aggregate shock, like a drought that affects a wide geographical area.

⁷ Moral hazard is less of a concern, at least in India, as insurance payouts are based on yields at selected test farms, rather than visiting each policy-holding household.

be kept to a minimum. Historical rainfall data contain less measurement error than crop loss data, making rainfall-based policies easier to design and price.

However, in order for weather insurance to help Indian farmers, it must first be accepted by them. This is a challenge for many reasons. First, insurance premiums are typically due at the same time farmers are making farm investments, and any money spent on insurance means less money available for seed or fertilizer. Second, marketing to farmers in rural locations can be costly and difficult: reaching the farmers takes time, and each individual farmer purchases only a small policy.

Third, little is known about how to design weather insurance products. Both droughts and floods endanger crops; yet the likelihood of extreme events is uncertain. Good weather insurance design requires assessment of different bundling approaches and refinement of pricing models.⁸

Fourth, and perhaps most importantly, farmers have very limited experience with complex, state-dependent financial products (i.e., derivatives) like insurance.⁹ A common question farmers have when first hearing about weather insurance is: “If I purchase the insurance, and the rain is good, so the policy does not pay out any money, can I get a refund of the premium?” These low levels of financial literacy inhibit adoption of the product. Insurers face a trade-off when designing the product: a more complex product can reduce the basis risk faced by policy-holders.¹⁰ Yet this additional complexity renders the policy less transparent to potential customers.

Our proposed research, elaborated below, will study how to overcome these four obstacles to acceptance.

Futures Markets

⁸ Gine, Vickrey, and Townsend (2007) have made major contributions to our understanding of the design and effectiveness of weather insurance. Their work, with BASIX and ICICI Lombard in Andhra Pradesh, uses household survey data to measure predictors of insurance take-up, and they are currently running randomized evaluations of the price sensitivity of demand. Our work complements and expands on theirs by conducting a randomized impact evaluation, and by focusing carefully on barriers to effective delivery.

⁹ Lusardi and Mitchell (2006) jump-started analysis of financial literacy among representative Americans.

¹⁰ Basis risk is the risk the holder of the insurance faces because rainfall is not perfectly correlated with output. For example, crops could fail because of pest, which would not trigger an insurance payout.

While some goods are subject to minimum government price supports, many are not. Moreover, a certain scale and level of sophistication may be required to take advantage of the government procurement system, which farmers may lack. The Indian government has shown a significant interest in moving away from minimum support prices to market-based risk mechanisms, in agreement with the consensus from international organizations (World Bank, 1999) and the goals of the AMA CRSP.

A program seeking to help farmers hedge price risks through futures markets faces many obstacles. Even in the US the percentage of farmers using futures or options markets has been repeatedly estimated at around 5-10% (Goodwin and Schroeder, 1994; Patrick, Musser and Eckman, 1998). The reasons for low usage of risk management by US farmers are not yet fully understood. Explanations focus on rational reasons (e.g. Lence, 1996), or on behavioral explanations for low take-up (Pennings and Leuthold, 2000). But linking farmers to futures markets in developing countries has received almost no attention.

The futures exchange NCDEX has recently developed a plan for an aggregation business model, which will allow small farmers to participate directly in the exchange. We will work with NCDEX and SEWA to pilot this aggregation mechanism. As with insurance, limited financial literacy represents a challenge to the adoption of futures contracts. As a first step, we have begun a pilot project to disseminate futures prices to farmers. The goals of this project are several: first, to aid farmers in their decisions on which crops to plant; second, to build familiarity with futures markets, such that they may eventually participate directly in the markets, through futures or options contracts¹¹, and third, to shed light on farmers' understanding of futures markets.

One aspect that may be crucial to farmers' use of hedging mechanisms will be acceptance of the prices that the market gives. While futures price information is readily available in urban centers, futures prices are virtually unknown in rural areas, and play no role in farmers' investment decisions. Farmers, even if they would benefit from using futures prices to update their harvest time price

¹¹ A put option gives the holder the right, but not the obligation, to sell a pre-specified commodity at pre-specified price on a pre-specified date. Farmers holding put options would therefore be guaranteed at least this price for their output.

expectations, may not use these prices for many reasons. First, they may find it difficult to understand what futures prices really represent, and how they can be used to estimate harvest time prices, even after training. Second, they may not, rationally or otherwise, believe these prices are more accurate than their own estimates of harvest time prices. Third, the medium for explaining what futures prices are may not be adequately suited to increasing understanding, trust of futures prices, and how these prices can be used to update price expectations.

The futures price dissemination infrastructure will also be used to disseminate spot prices. Jensen (2007), studying the spot market for mackerel in southern India, shows that greater price transparency can lead to spectacular gains in efficiency, and improve the wellbeing of producers. In rural Gujarat, price information may be helpful in bargaining with middlemen, or spur a decision to take the goods directly to the market. Better information may increase prices along the entire distribution chain, or only for the farmers.

III. Research Questions

In light of this context, the project will address two broad research questions.

How Effectively do Rainfall Insurance and Price Information and Hedging Improve Asset Accumulation and Welfare?

The primary question is how beneficial rainfall insurance and PI/H will be to farmers. Insurance facilitates consumption smoothing and asset preservation, protecting households when adverse shocks arrive. Insurance helps these households to continue to invest in their children's education and avoid selling assets at inopportune times. Information on harvest-time 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 (which produce more on average, but are more sensitive to weather shocks),

greater use of capital inputs (which are typically less scalable than labor), and the decision to invest in crops whose expected price is highest.

However, it is unknown *how much* these innovations will help households.¹² Rainfall insurance pays only in years with particularly poor rains. Futures price information only helps to the extent farmers now make errors in crop choice. But most importantly, neither will have an effect unless they are understood, and correctly used, by rural households. This generates our second research question.

What is the Optimal Design of Rainfall Insurance and Price Information and Hedging Initiatives?

The design of weather insurance and PI/H is complicated for many reasons. Most poor households have almost no experience with formal financial contracts. Moreover, intermediaries such as cooperatives, MFIs, and NGOs require substantial, scalable, capacity-building support (Bryla, 2003).

Financial Literacy

Median educational attainment for the individuals in our sample area is less than middle school completion. Illiteracy is common, and experience with any formal-sector financial products is limited. This project will seek to measure household financial literacy,¹³ and attempt to determine cost-effective approaches to improving it (through village meetings, personal visits by NGO staff, distribution of educational material, or use of portable electronic media).

There is often a trade-off in product design between complexity and transparency. More complex products (for example, rainfall insurance which uses a different weighting scheme for rainfall in different months) can provide more complete coverage of household risk, yet will be more difficult to market. Similarly, the minimum futures contract size, costs associated with the margin costs, and

¹² It is also unknown which households will benefit most from rainfall insurance and access to futures markets. Relatively poor and uneducated households may benefit most if they have little access to existing insurance opportunities. On the other hand, wealthier and more educated households may be better poised to take advantage of potentially complicated products.

¹³ Lusardi and Mitchell (2006) find surprisingly low levels of financial literacy in the United States. Moreover, they show that low financial literacy predicts lower retirement asset accumulation. We will adapt their measures of financial literacy (comprehension of inflation, compound interest, and diversification) to the context of rural India, and complement them with basic math, probability, and insurance knowledge questions.

marking to market, render intermediaries necessary. Key project goals will be to design products that are accessible and attractive to households with limited financial literacy, and to determine how best to communicate the benefits and risks of these products to households with varying levels of financial literacy. This will be accomplished through the systematic testing of different types of educational programs, methods, and messages.

Product Design

The design of financial products is complicated. While NGOs have a very good sense of their clients' needs, they typically have limited or no experience modeling risk, and evaluating the trade-offs from different design choices may be difficult. The research team will collaborate closely with SEWA, NCDEX, and insurance providers, as well as international groups working in this area, such as ITF-Commodity Risk Management, to develop a product well-suited for poor households.

Product Delivery

Delivering products and information to rural households is expensive: the population is widely dispersed, and the quality of infrastructure, such as roads (particularly during the rainy season), and telephone connectivity varies. 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 MFIs to distribute products to potential clients.

Yet, financial products are complicated, and NGO staffs have little experience with products other than credit. Those providing financial services must fully understand them, and be able to explain them to households in a fashion that makes sense to the household. Traditional insurance products, such as life and health insurance, which provide a payment following a specific loss, are relatively easy, compared to rainfall insurance, or conveying the intricacies of futures markets.

An integral part of the research component of this project will be to develop, test, and make freely available four sets of curricula, for training staff and households about rainfall insurance and

futures markets. These will be developed with the assistance of Indian masters students, and two Indian Ph.D. students will conduct research on the relative efficacy of different approaches.

IV. Analytic Strategy

This research program has benefited from two years of careful piloting, during which much has been learned by both the research team and the NGOs administering the programs. In this section, we describe progress to date, preliminary results, and proposed plans for the next four years. While the total time-frame for this study program is perhaps longer than many, we feel this is not only appropriate but necessary: it takes households substantial amounts of time to learn about new financial products, and to adopt them to a scale such that it affects their investment decisions.

Randomized Evaluation

Our primary analytic strategy will be randomized evaluation. Randomized evaluations are recognized as the most effective of evaluation methodologies, (Duflo, Glennerster, and Kremer, 2007), and provide more consistent estimates than other research methodologies (Glazerman, Levy, and Myers, 2003). We will implement randomization of *access* to these initiatives at the village level and randomization of *messages* about the initiatives at the individual level.

For each initiative we have identified a set of villages, half of which will serve as treatment villages and half as comparison villages. The weather insurance pilot currently comprises 100 villages in three districts (Ahmedabad, Anand, and Gujarat). One-third of these were offered insurance in 2006. In 2007 an additional 18 villages were added, so that 50 villages are now treated. The futures information pilot began in 2007; 74 villages in 4 districts were identified, of which 37 are treated. This number would expand to 100 villages in 2008, of which 13 more will serve as treatment villages.

Village level randomization is the only feasible method for these programs, as it would not be practical to vary the *availability* of insurance or PI/H to selected households within a village. In contrast, randomizing informational and educational treatments at the individual level is possible, and will

provide variation in take-up that allows statistical measurement of the effects of insurance or PI/H *adoption* on asset accumulation and welfare.

Measuring Development Impact

While risk management can affect nearly all aspects of a household's life, we will focus on four of the most important impacts: awareness of and participation in financial markets, agricultural productivity, household consumption, and asset accumulation. The primary source of data for measuring these outcomes will be periodic household surveys.

While it remains to be shown how beneficial these projects are, an important outcome will be households' ability to make informed decisions about risk. Substantial effort will be focused on educating farmers about insurance and futures markets. Farmer knowledge will be measured objectively (testing farmers' knowledge of risk and risk mitigation) and subjectively (measuring farmers' self-reported familiarity and attitudes towards formal financial markets).

A key goal of both interventions is to improve agricultural productivity. Risk management should allow farmers to select crops that are more profitable (ones with relatively higher futures prices), greater yield (high-yield variety crops can be riskier than standard crops), and operate with higher capital to labor ratios. Information on crop planting decisions, input use, crop yield, and time of sale and price obtained will be collected.

Consumption and employment for the entire household will be tracked, along with expenditures on education and temporary migration decisions. Comprehensive survey instruments will also 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.

Evaluation Schedule

The second year of piloting is currently underway. We propose to address the above research questions during a four-year study. The detailed timeline is given in Appendix D. This subsection

provides an overview of progress to date and plans for continuation. The first three years of the BASIS study will involve scaling up the pilots, refining design, and extending collaboration with local NGOs. The final year will be devoted primarily to communication of findings.

PILOTS: In March 2006, a comprehensive survey was administered to 1,500 households in 100 study villages (15 households per village). These villages were located in the Ahmedabad, Anand, and Patan administrative districts in Gujarat. This survey measured household demographic characteristics; income, consumption, and savings; attitudes towards risk; levels of financial literacy; and experience with insurance products.

Following the survey, rainfall insurance was offered (to *all* residents, not just those surveyed) in 33 villages randomly selected out of the 100 study villages. The insurance policy, designed by SEWA and ICICI Lombard, had three phases. Phases I and II protected against deficit rainfall during the planting and growing portions of the agricultural 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.

SEWA-run village meetings communicated the potential benefits of the product to farmers, and were complemented by informational visits, during which randomly-varied flyers were distributed directly to households.

In November 2006, the 1,500 study households were surveyed again. Households that had purchased insurance, but were not part of the baseline group, were also surveyed.

In the 2007 agricultural season, the insurance pilot continued, and we began piloting the futures information project. The futures information project consisted of a one hour presentation from NCDEX trainers well-acquainted with futures markets, on what futures markets are, and how futures prices can be used in planting and storage decisions. The presentation was followed up with small group (3 on 1) sessions, in which farmers could ask further questions and discuss topics they did not understand. Following the training SEWA disseminated futures prices weekly through their village networks,

beginning prior to planting and continuing through harvest. A central location in each village was found for a notice board which displayed the futures prices for all locally relevant crops.¹⁴

Preliminary results from the insurance pilot demonstrate high individual-level 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.

BASIS STUDY YEAR 1: The weather insurance product will be revised to include coverage for flood damage. Randomized evaluation of informational and awareness-raising techniques will continue. An advanced Ph.D. student at an Indian institution will be invited to assist in the development and evaluation of methods to assess financial literacy. This will serve as a portion of her or his thesis.

If operationally feasible, we will expand the insurance project to 100 additional villages in three new districts.¹⁵ The futures project will be expanded in scale (to encompass 100 villages), and in scope, with targeted information sessions to different segments of the village population. It will include all farmers within a village, and additional randomly-assigned training programs. The futures project will also be extended to include spot price information, with an emphasis in the training that this information will be available at harvest time to assist farmers in their decisions on when to take their goods to market, and aid in negotiations with buyers.

BASIS STUDY YEAR 2: Farmers will be offered direct access to futures markets. By this time, NCDEX will have completed the development of a system which allows farmers to enter into futures and options markets transactions. Households in the 37 original treatment villages will have had two years of experience with futures prices, and will be offered the opportunity to transact in the market.

We will also refine materials for training staff in conveying weather insurance and futures price information. Further educational material will be developed. An Indian Ph.D. student will work with

¹⁴ Guar seed, castor seed (for 3 different base locations), and cotton.

¹⁵ Each district has one weather station at which rainfall data are collected. Since the payout-relevant rainfall index depends on these observations, expanding to more districts increases the probability of observing insurance payouts.

one or two members of the research team to design and conduct experiments to test the efficacy of these materials. We will prepare a guide for managers of organizations interested in implementing either initiative.

A workshop will be held in Ahmedabad, hosted by SEWA, for CEOs and managers of MFIs interested in offering weather insurance and PI/H programs to agricultural households.

In Year 2 we will also “cross” the futures and insurance treatments, offering both to a (randomly selected) subset of households, in the 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.

BASIS STUDY YEAR 3: By this time, some villages will have had rainfall 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 this year, an Indian Ph.D. student will work on a project using sales data of weather insurance across Indian districts (or villages), to study how education, income, and historical rainfall patterns are correlated with demand for insurance.

BASIS STUDY YEAR 4: This year will be reserved for analysis, presentations, and submissions to journals. Raghavendra Chattopadhyay and one Ph.D. student from India will visit Harvard for a semester.

V. Policy Relevance

Both projects are central to the key policy debate in India, about whether liberalization and growth will benefit only the urban elite and middle class, or whether the poorest of the poor also stand

to gain. The premise behind this project is that with proper policies, and an emphasis on extending access to all, financial liberalization holds the promise of helping all levels of society.

Output and price risk are tremendously relevant to India, where two-thirds of the population relies on agriculture for earning a living. This is demonstrated most dramatically by thousands of farmer suicides that occur following bad agricultural output.¹⁶ The effect of agricultural output on individual and aggregate welfare is enormous, with one estimate arguing that rainfall variation explains 45 percent of the variation in GDP growth (Virmani, 2005).

Demonstrating that weather insurance is helpful to the poor, and can be profitably sold, may render moot the 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 also provide valuable guidance for policy-makers in the many other countries where output risk serves as a major impediment to asset accumulation, for example in USAID's IEHA countries. While crop insurance programs may be popular, to our knowledge no developing country has successfully run a crop insurance program that is self-sustaining and accessible to the poorest of the poor. We believe weather insurance has the potential to do all this, and is thus well worth evaluating.

The futures aspect of this project is at the center of a vigorous policy debate in India. In particular, critics of the commodity exchanges have alleged that futures speculation has caused increases in the price of food grains. The Sen Committee has been tasked with adjudicating the truth of this claim, and is due to report in September 2007. This type of critique of futures markets is not unusual. Jacks (2007) describes the historical situation in the U.S.:

“...before the rise of organized commodity exchanges, popular sentiment has, at best, been openly suspicious, but generally, openly hostile to the person of the speculator... This near-universal contempt has probably found no greater expression than that directed towards the various agents on commodity futures markets.”

It is therefore not surprising that futures markets have come under fire in India. This project, by demonstrating the potential (or lack thereof) of futures markets to improve investment decisions and

¹⁶ See “On India’s Farms, a Plague of Suicide,” *The New York Times*, September 19, 2006, among other sources.

farmer welfare, would constitute a major contribution to the current policy debate in India, and may encourage other developing countries to develop commodities exchanges.

Understanding the product design and informational conditions under which farmers are more likely to utilize intermediaries to reduce their commodity price risk, and the training and price dissemination mechanisms under which farmers will use futures markets to aid in their planting and storage decisions, would also aid in policy development for the government, especially the agricultural extension divisions of the Department of Agriculture in each state.

VI. Capacity Building

A key component of our proposed project is capacity building.

Academic Capacity Building

While the quality of undergraduate and masters-level education in India is world class, relatively few Ph.D. students produce theses that attract international attention. As India plans to more than double the number of research-oriented educational institutions in the coming decades, we believe our efforts are best spent in aiding the development of a rigorous research culture among Ph.D. programs in India.

a) Faculty Raghavendra Chattopadhyay, a professor at the Indian Institute of Management-Calcutta, will play an active role in guiding and shaping the research agenda, and in the design of a course on methods to be taught in India. The US researchers will travel to India regularly, spending a significant amount of time interacting with faculty at IIM-Calcutta. Chattopadhyay will visit Harvard University for one term in Year 4, to collaborate in the data analysis, writing, and presentation of results.

b) Indian Ph.D. Students We will involve at least nine students in the multi-year project: the budget provides for the involvement of five Ph.D. students from India. One of these students has already been identified. At least three of these five students will be women. Efforts will be made to identify students from underrepresented groups in India. These Ph.D. students will work in the field, in

collaboration with the authors. Mentoring will be provided for students to conduct separate research projects, which will yield thesis chapters as well as academic publications. It is hoped that members of the research team will serve on the students' doctoral committees. The budget includes funding for one Ph.D. student to travel to Harvard for non-degree training.

c) Indian Masters Students. At least two masters students will be recruited to assist with the curriculum development research. While this proposal does not include funding for these students to continue education abroad, it is hoped that the experience and mentoring will assist them in doing so. We will seek to identify exceptional students from institutions that may not be in the standard set of schools from which US and European universities recruit, and who are likely to return to India upon completion of their studies.

d) Academic Course on Evaluation In December 2007, the research team will deliver a course in Calcutta for Ph.D. students, covering recent methodological innovations, with a particular focus on field experiments. The course will accommodate thirty students from top universities. One goal of the program will be to identify suitable Ph.D. students for inclusion in this project.

e) Short Course on Evaluation The Center for Microfinance, in Chennai, runs a popular course on randomized control trials for policy makers in India and abroad. The budget includes funding for two SEWA employees to attend this training session. Because this session has relatively restrictive admissions, we will offer a similar course with open enrollment for NGOs and MFIs in Ahmedabad, in December 2007. The budget provides for up to 30 people to attend.

Program Capacity Building

a) SEWA and Other NGOs

An important component of the project is the transfer of expertise in research methodology, and financial markets from the research team to SEWA. The former includes guidance on survey design and analysis, as well as the benefits and limitations of randomized evaluations. The latter includes optimal product design, as well as working together to understand how to most effectively convey information to SEWA. Technical design findings, and practical limitations, could result in curriculum materials for

other organizations (throughout the developing world) that may be interested in offering their clients weather insurance or access to futures markets.

b) Short course on risk management

As part of the project, in January 2009 we will offer a short course on risk management in agriculture to 30 participants from micro-finance institutions, NGOs, etc. Participants will be recruited through the CMF network, and through SEWA contacts. Working together with SEWA, we will present lessons learned from the weather insurance and futures projects. The masters students will visit other organizations that have offered weather insurance and document their experiences as well. All materials produced will be made available on the internet free of charge. An emphasis will be on material of use to those who want to implement either the weather insurance or financial literacy programs. The course will take place in Ahmedabad.

c) Two courses on research methods

The research team will deliver two short courses in which they share their expertise with academics and practitioners. Both will be offered at the Center for Microfinance, and serve as complements to the evaluation course already offered.

The first, in July 2009, will focus on survey design, covering academic and practical themes, such as measuring consumption, trade-offs between length and quality of response, and incentives and supervision of enumerators. The target audience will be research officers of NGOs and MFIs in India, and will be identified through the CMF network.

The second, in July 2010, will focus on management issues in randomized evaluations. While the scientific aspects of randomized evaluation are well-understood, both researchers and practitioners could benefit from an opportunity to discuss the particular problems posed when implementing programs as part of a randomized evaluation. Participants will be managers of NGOs and MFIs conducting, or considering conducting, randomized evaluations, and identified through the CMF network.

VII. Connection with BASIS and USAID Goals

This project contributes directly to BASIS research objectives. The initiative is first and foremost, a risk management program for poor farmers, and thus primarily addresses the first BASIS priority. The impact assessment will enhance understanding of how rainfall insurance, PI/H, and their combination support asset protection and accumulation. The development of manuals on how to offer the products will support policy development in India and abroad.

These initiatives will enhance the creditworthiness of farmers, improving access to borrowing. Thus the project also supports BASIS' second goal.¹⁷ Finally, by stabilizing and increasing farmer income and reducing the "fire sale" of farmers' assets, the projects also support the third priority.¹⁸

The project also fits at least two of the USAID Foreign Assistance Framework's priority goals: economic growth, and investing in people (USAID, 2007a). Risk management has the potential to contribute significantly to economic growth, by improving the allocation of risk and increasing agricultural productivity. Directly the project will create product designs and training manuals that are public goods and can be utilized by Indian companies and NGOs. We will develop the capacity of NGOs and poor agricultural households, constituting significant investment in the rural population and agricultural economy of the areas in Gujarat where we will work.

In India USAID is committed to the economic growth program through three initiatives that promote agricultural productivity,¹⁹ and a project in income risk management directly complements these market-enhancing programs (USAID 2007b, USAID 2007c). The project also directly supports USAID India's first, third and fifth strategic objectives²⁰ (USAID 2007d). Regarding objective 1 (USAID 2007e), the project would benefit three of the five identified target groups: poor households not

¹⁷ "Leveling the Playing Field for Broadly Based Agricultural Growth."

¹⁸ "Asset Building for Growth and Poverty Reduction."

¹⁹ (1) Promoting the development and spread of new technology through the Agriculture Knowledge Initiative, (2) Encouraging progress towards an "internal common market" for food crops, and (3) Through developing links from small and marginal farmers to high value markets.

²⁰ Strategic Objective 1: "Increased Transparency and Efficiency in the Allocation and Mobilization of Resources in Selected States." Strategic Objective 3: "Reduced Vulnerability to Disasters in High Risk Areas." Strategic Objective 5: "Enhanced Opportunities for Vulnerable People."

currently part of mainstream financial services market; poor communities in rural areas; state government finance and planning departments (through reduced reliance on government agricultural price support and subsidy programs).

While the project will take place in Southern Asia, it also has relevance for other developing countries interested in these agricultural innovations. In particular, the financial products and PI/H programs could be delivered in Africa, and support the Presidential Initiative to End Hunger in Africa (IEHA), with relatively minor adjustments for local culture and levels of education.

Finally, we note that the project promotes economic opportunities for women. Almost all SEWA employees and members, whom most of the training will benefit, are women. SEWA's leadership has caused, and will continue to spur, product innovations. For example, because many women are landless laborers, a weather insurance product suitable for those whose income depends on agricultural labor is being developed.

VIII. Conclusion

Agricultural risk threatens the security of hundreds of millions of farmers around the world. Providing access to rainfall insurance and futures price information can assist in management of risks to agricultural output and agricultural prices, respectively. We propose to measure the impacts on asset accumulation and welfare of these two new, scalable, market-based initiatives, and to evaluate how best to introduce them to disadvantaged populations.

The lessons learned will assist development in India, but are much more broadly applicable. 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 how to ensure that households obtain the information and education necessary to make the informed financial decisions. This study will provide a solid framework to address both the challenges and opportunities of innovations in agricultural risk management.

Appendix A. Partners and Collaboration

Indian Institute of Management-Calcutta

The Indian Institute of Management (Calcutta) is one of the nation's premier management schools, with a focus on graduate education. While the quality of education afforded to students is truly exemplary, faculty have typically spent less time focused on conducting high-quality research. Formal presentations of the research, as well as informal interaction between local faculty and the research team will help foster a research environment. One goal will be to identify candidates suitable for participation in Harvard Business School's International Visiting Scholar program.

The Center for Microfinance

The Center for Microfinance is an entity based within the Institute for Financial Management and Research in Chennai, India. CMF was founded in 2003 by the ICICI Bank and is dedicated to producing, supporting, disseminating, and applying rigorous academic research results on microfinance in India. In collaboration with major Indian and Western universities like Harvard, Oxford, MIT, and Stanford, CMF has conducted many of the first rigorous evaluations of microfinance and related programs. By helping establish a core of knowledge on market based economic development interventions, CMF's mission contributes directly to the BASIS / USAID goals of designing and evaluating innovative development policies.

CMF funded the pilot stage of the project, but as part of its goal of financial self-sufficiency, is not able to provide further financial support. It will, however, continue to serve as a key partner in the research project. CMF will help hire, and supervise, a Research Assistant who will work full-time in Ahmedabad on the research program, coordinating interaction between the research team and the organization. CMF also provides assistance in designing surveys, and cleaning data once the data have been entered. In addition, CMF is intimately involved in the capacity building and policy integration aspects of its research, with a Strategy Unit that conducts activities like training microfinance institutions to apply best practices from research.

CMF works with an extensive network of MFIs and NGOs, collecting data, sharing best practices, and providing technical and operational advice. Virtually every major MFI in India is part of this network. CMF will leverage this network for participants in the training courses.

Outside the research project, Shawn Cole has taught in two courses on randomized evaluation at the CMF, in 2006 and 2007. Stefan Hunt has developed a course on behavioral finance, to be taught at IFMR, the university at which CMF is located.

The CMF's parent institution, the Institute for Financial Management Research, is a degree-granting educational institute. It has received and administered grants from USAID. Aparna Krishnan, who holds a masters from University of California, San Diego, would be in charge of coordinating the project.

SEWA

The Self Employed Women's Association, or SEWA, was founded in 1972 to help promote the employment and self-reliance of women in India. With nearly one million women as members, it is one of the largest and most prominent NGO's in the country, and runs programs in health, education, microfinance, and agriculture. Headquartered in Ahmedabad, Gujarat, it works in dozens of districts in several states.

The research team was introduced to SEWA by CMF in January, 2006, and has worked closely with the research team in developing the pilot projects. Shawn Cole, Stefan Hunt, Jeremy Tobacman, and Petia Topalova have each spent from 2-8 weeks at SEWA, exploring the needs of the organization and assisting with design of the pilot product and survey.

NCDEX

The National Commodity & Derivatives Exchange Limited (NCDEX), located in Mumbai, is the premier commodity market in India, offering futures contracts on dozens of agricultural crops. NCDEX will assist in developing training sessions for farmers, and provide consultative support for educational programs.

Stefan Hunt is working with the NCDEX to analyze trading data, to study the role of price discovery of futures markets, their effect on agricultural markets, and limits to arbitrage.

Appendix B. Outputs

Academic Research At least five papers submitted to leading economics or finance journals. The following are planned:

- 1) The decision to “take-up” rainfall insurance, with an emphasis on the role of financial literacy and education
- 2) The effect of rainfall insurance on household well-being, including asset accumulation, consumption smoothing, and investment decisions
- 3) The decision to use information on futures prices, with an emphasis on the role of financial literacy and education
- 4) The effect of using futures markets on household well-being, including asset accumulation, consumption smoothing, and investment decisions
- 5) Framing Effects and Adoption of Financial Innovation

Policy Writing

In order to disseminate the findings as quickly as possible, policy briefs will be prepared each year, describing lessons learned. These briefs will be disseminated by CMF within India.

Each of the academic works will also be condensed into a 4-6 page policy brief, for practitioners and regulators. Within India, these reports will be disseminated by CMF.

Finally, a synthesis of the research will be prepared, and submitted to *Economic and Political Weekly*, perhaps India’s most widely read and influential social science journal.

Theses

1) Academic Research paper #4 will serve as a chapter of Stephan Hunt’s Ph.D. thesis at Harvard

At least four of the five Ph.D. students at Indian institutions collaborating on the project will write a research paper with guidance from the research team that will form part of the student’s thesis and be submitted to an academic journal:

2) Debdatta Saha, a Ph.D. candidate in economics at the Indian Statistical Institute, will write a paper on household demand for insurance, using district- or village-level sales data from all of India

3) A Ph.D. student will write a paper on measuring levels of financial literacy

4) A Ph.D. student will write a paper on how framing and delivery methods affect individuals understanding of complex financial products

5) A Ph.D. student will write a paper on how financial literacy, cognitive ability, and communication skills of SEWA employees affect customer understanding and demand for complex financial products

6) Finally, at least one of the masters students will be encouraged to develop her or his work into a thesis.

Datasets

Following completion of the project, cleaned datasets will be made available on the internet for free. The data will be unique: a multi-year panel with information on financial decision-making, asset accumulation, cognitive ability, and financial literacy, and serve as a valuable resource for further research.

Training

The project will include training one Ph.D. student at Harvard, one at ISI, and four to five at other Indian institutions.

Training Materials

1) A manual for organizations on how to offer rainfall insurance

2) A manual for organizations on how to link farmers to futures markets

3) Exemplary educational material

4) Exemplary marketing material

Educational Material

1) A Harvard Business School Case Study on the challenges and promise of linking small-stake holder farmers to futures markets

Presentations

- 1) Seminars at Harvard University, IIM-Calcutta, and the Institute of Financial Management
- 2) American Economics Associations and the American Agricultural Economics Association
- 3) Presentation at the Center for the Study of African Economics, Oxford University, and African Association of Agricultural Economics (or other similar organization operating in Africa)
- 4) World Bank; Consultative Group to Aid the Poor (CGAP); the International Food Policy Research Institute
- 5) Presentation and reports to the private sector: Swiss Reinsurance (Zurich), ICICI Lombard (Mumbai), and IFFCO-Tokio (Delhi) and NCDEX (Mumbai)
- 6) Presentations and reporting to the government authorities: the Insurance Development and Regulatory Authority, the Forwards Market Commission

Appendix C. Benchmarks

The goals of this project are two-fold: first, to develop the capacity, by working with SEWA to effectively and efficiently deliver the proposed interventions, and share this capacity with other organizations. Second, to assess the degree to which rainfall insurance and price information and hedging contribute to increased incomes and welfare for farmers.

The project will generate policy recommendations to the ITF, World Bank, other aid agencies, the Indian governments (central and state) and Indian NGOs such as SEWA. We describe the benchmarks in three categories: research implementation, capacity building, and reporting.

Program Impact

Weather insurance developed, and offered to thousands of households in 100 villages (Years 1-3).

Futures price interventions developed and offered to thousands of households in 50 villages (Years 1-3).

Delivery of significant amount of training to program households. (Years 1-3)

Develop the capacity of SEWA to scale up interventions to reach millions of households (By Year 3)

Rich panel dataset that can be used by SEWA and other NGOs to better develop and target other projects (by Year 4)

Policy Integration and Reporting

Annual Updates delivered to USAID (in person, if desired), in Delhi or Washington, D.C.

Presentations offered to Forwards Markets Commission in Years 1 and 4. Reports delivered in Years 2 and 3.

Presentations offered to Insurance Development and Regulatory Authority in Years 1 and 4. Reports delivered in Years 2 and 4.

Presentations offered at major Insurance and Futures Market conferences in India.

In final year, give ten presentations to academic, NGO, and practitioner audiences about lessons learned

Collaboration and Capacity Building

Short Courses (Years 1-4) Five short courses, approximately one per year, targeting approximately 30 students in each course:

- Evaluation Methods for Ph.D. students and junior faculty, offered at IIM-Calcutta
- Management issues when delivering programs as part of a Randomized Evaluation, offered at CMF
- Survey Design for Evaluation, offered at CMF
- Innovative Financial Products for the Poor, offered in Ahmedabad
- A short course on randomized evaluation, offered in Ahmedabad

Manual for NGOs/MFIs planning to offer Weather Insurance or Futures Markets Interventions (Year 3)

Training and Marketing Materials for Rainfall Insurance and Futures Market Interventions:

- Year 1: Production for SEWA use
- Year 2: Production for general use, distribution through CMF

Training of SEWA Employees

- Year 1: Course on interventions for at least 50 employees
- Year 2: Course on interventions for at least 50 employees

Development of local research capacity

- Years 1-4: Mentoring for five Ph.D. students
- Years 1-2: Mentoring for two masters students
- Year 1: Course on evaluation at IIM for Ph.D. students

Support of USAID activities and objectives

1) Promotion of Market Solutions to Risk and Vulnerability

2) Coverage by local media. Publish op-eds in national newspapers, and article(s) in *Economic and Political Weekly*.

3) Development of local research capacity

- Mentoring for five Ph.D. students
- Mentoring for two masters students
- Course on evaluation at IIM for Ph.D. students

4) Creation and dissemination of research

- Doctoral dissertation at Harvard
- Contribution to at least four dissertations in India
- At least five academic papers, and five policy briefs
- Final report disseminated to policy makers and relevant government ministries

Appendix D: Timeline

Notes: This project timeline is described in narrative fashion on page 15. For conciseness, U.S.-based activities that are part of the BASIS program (e.g., annual meetings and presentation at USAID brownbag) are omitted.

Year 1	
2007	
Oct	Development of data entry software for survey
Nov	Baseline round of household survey. Survey instrument is available upon request.
Nov-Dec	Discussions with SEWA and NCDEX to develop detailed multi-year plan to link farmers to futures market
Nov-Dec	Discussions with SEWA and insurance companies to develop improved insurance product, which provides protection against deficit and excess rainfall.
Dec	Short course in program evaluation and empirical methods targeted at Ph.D. students in Kolkata
Dec	Identification of first Indian Ph.D. student. She or he will work (ideally as a co-author) on the research component: methods to evaluate levels of financial literacy.
Dec	Identification of suitable Masters students at an Indian institution to assist with curriculum development. Student and research team begin to develop curriculum, in close collaboration with SEWA and NCDEX.
Dec-Jan	First site visit by research team, to assist in developing training curriculum, product design, and discuss specifics of program and evaluation plan with SEWA. Informal presentations at the Security and Exchange Board of India (SEBI), NCDEX, and Forwards Markets Commission.
Dec	Short course on randomized evaluation in Ahmedabad, in cooperation with SEWA
2008	
Feb	Finalize curricula for training SEWA employees, who will implement the interventions
Mar	Second site visit by research team. Train SEWA employees, and evaluate the curricula. Select additional villages for inclusion in project.
Apr-May	Begin to offer weather insurance in program villages. Begin to offer futures information training in program villages. Educational programs will be randomly assigned
Apr-Sep	Provide futures treatment villages with futures prices
Aug	Reinforce futures/spot market training to households
Sep	Identification of a second Ph.D. student. She or he will work as a co-author on the research component: evaluating the efficacy of different methods of conveying information about futures markets to households.

Year 2	
2008	
Nov	Second round of household survey
Dec	Identify masters student to develop instructions and operating manual for institutions seeking to offer insurance or PI/H
Dec-Jan	Third site visit by research team. Further refine insurance product and delivery mechanisms. Work with NCDEX and SEWA to directly link farmers to futures markets, ideally by offering farmers put options.
	Discussions with SEWA and NCDEX to develop detailed multi-year plan to link farmers to futures market
2009	
Jan	Workshop in Ahmedabad for NGOs/MFIs interested in connecting farmers to futures markets and weather insurance.
Apr-May	Fourth site visit by research team. Offer weather insurance in program villages. Offer futures information in all villages, and put options (or potentially futures contracts) in villages which received futures market information in the pilot phase.
July	Short course on survey design at CMF
Aug	Reinforce futures/spot market training to households
Sep	Identification of third Indian Ph.D. student. She or he will work (ideally as a co-author) on the research component: studying aggregate factors that affect demand for rainfall insurance using sales data on the products in India.

Year 3	
2009	
Nov	Second round of household survey
Dec-Jan	Fifth site visit by research team. Refine futures delivery mechanism based on lessons learned. Offer formal presentations to SEBI, NCDEX, and the Forwards Market Commission.
2010	
Jan	Workshop in Ahmedabad for NGOs/MFIs interested in connecting farmers to futures markets and weather insurance.
Apr-May	Sixth site visit by research team. Offer weather insurance in program villages. Offer futures information in all villages, and put options (or potentially futures contracts) in villages which received futures market information in the pilot phase
July	Short course on management issues in program evaluation, at CMF
Aug	Reinforce futures/spot market training to households
Aug-Dec	Identification of fourth Ph.D. student. She or he will visit Harvard University for fall term, attending courses on finance and econometric methods

Year 4	
2010	
Nov	Fourth round of household survey
Sep-Dec	Raghabendra Chattopadhyay visits Harvard Business School
Dec-Jan	Seventh site visit by research team. Refine futures delivery mechanism based on lessons learned. Offer formal presentations to SEBI, NCDEX, and the Forwards Market Commission.
Sep-March	Preparation of research manuscripts. Preparation of op-ed pieces for Indian press describing results, and lessons learned.
2011	
Jan-Sep	Presentation of research manuscripts at conferences, seminars, etc. Submit articles to journals

Appendix E: Research Qualifications

Principal Research Team

Principal Investigator

Shawn Cole, an American citizen from Iowa, is an Assistant Professor of Finance at the Harvard Business School. He holds a Ph.D. in Economics from the Massachusetts Institute of Technology. His research focuses on education, banking, and financial services, both in India and in other developing countries. He has extensive experience designing and implementing large-scale randomized field experiments. He has developed an expertise on weather insurance, and developed and taught material on the topic to MBA students and CEOs of microfinance organizations. He has also taught courses on Randomized Evaluation with the Poverty Action Lab (Chennai, India), and for the Millennium Challenge Corporation (Washington, D.C.)

Co-Principal Investigator

Raghabendra Chattopadhyay, an Indian citizen, is a professor of Business Environment at the Indian Institute of Management, Calcutta, an internationally recognized institution. He holds a Masters in Economics from Calcutta University, and a Ph.D. in Economics from Australian National University. He has served as a visiting professor at Boston University and MIT. He has served as a consultant to state, local and federal government, including the Ministry of Agriculture (Government of India). Dr. Chattopadhyay has led numerous household surveys in India, for national and international organizations. A specialist in evaluation, his work has been published in US and Indian academic journals, as well as the popular press.

Petia Topalova, a Bulgarian citizen, is an Economist at the International Monetary Fund. She holds a Ph.D. in Economics from the Massachusetts Institute of Technology. She has worked extensively on India, in the fields of trade, political economy, and financial services and is currently an economist on the India desk at the IMF. She has experience with household surveys, including analysis, design, and field supervision. She is currently collaborating with Raghabendra Chattopadhyay and co-authors on a multi-year project on the efficacy and evaluation of women leaders in India involving a survey of 7,000 households. Prior to joining MIT, she worked as a research associate at Lexecon, Inc., an economic consulting firm.

Jeremy Tobacman, a U.S. citizen, is a Postdoctoral Research Fellow at the Department of Economics and Nuffield College, University of Oxford. He holds a Ph.D. in Economics from Harvard University. His research focuses on household financial decision-making. In the US, he has studied credit cards behavior, payday loans, and credit unions. In Indonesia he has worked with the World Bank, microfinance institutions, and small farmers. These projects investigate the impact of access to financial instruments, and the degree to which psychologically-informed models of decision-making help to explain observed patterns.

Stefan Hunt, a British citizen, is a Ph.D. Candidate in Economics at Harvard University, with concentrations in Development Economics and Corporate Finance. His dissertation work focuses on the development of futures markets in India since 2003; on the impact of futures markets on spot markets and agricultural supply chains; and on the effects of spot market frictions on limits to arbitrage and efficient futures markets pricing. Stefan previously worked in the private sector in financial services, including the insurance sector. He worked in strategy development and planning for Prudential plc and as a strategy consultant for Marakon Associates. He holds Masters degrees in Economics from London School of Economics and in Experimental Psychology from the University of Cambridge.

Other

Debdatta Saha, is an Indian national and Ph.D. student in Economics at the Indian Statistical Unit, New Delhi. Her research interest lies in how the reach of the formal financial sector can be extended to include poor households, including subsistence farmers and agricultural laborers.

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