# BASIS
# Assets and Market Access Collaborative Research Support Program

## AMA CRSP

## *Final Report*

**March 2012**

**BASIS AMA CRSP**

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# Final Report

**October 2010-March 2012**


**AMA CRSP**

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**http://www.basis.wisc.edu**



**March 2012**

This publication was made possible in part through support provided by the
**US Agency for International Development (USAID)**
under the terms of Grant No. EDH-A-00-06-00003-00,
and by funding support from the AMA Collaborative Research Support Program
and the **Department of Agricultural and Applied Economics,**
**University of Wisconsin-Madison**, USA.



**Acknowledgements**
Our thanks go to all who participate in the AMA CRSP for helping make this
document possible. Comments on this report and AMA CRSP work are encouraged.
Please visit the website for more information about the projects, contact
information, and upcoming events: http://www.basis.wisc.edu

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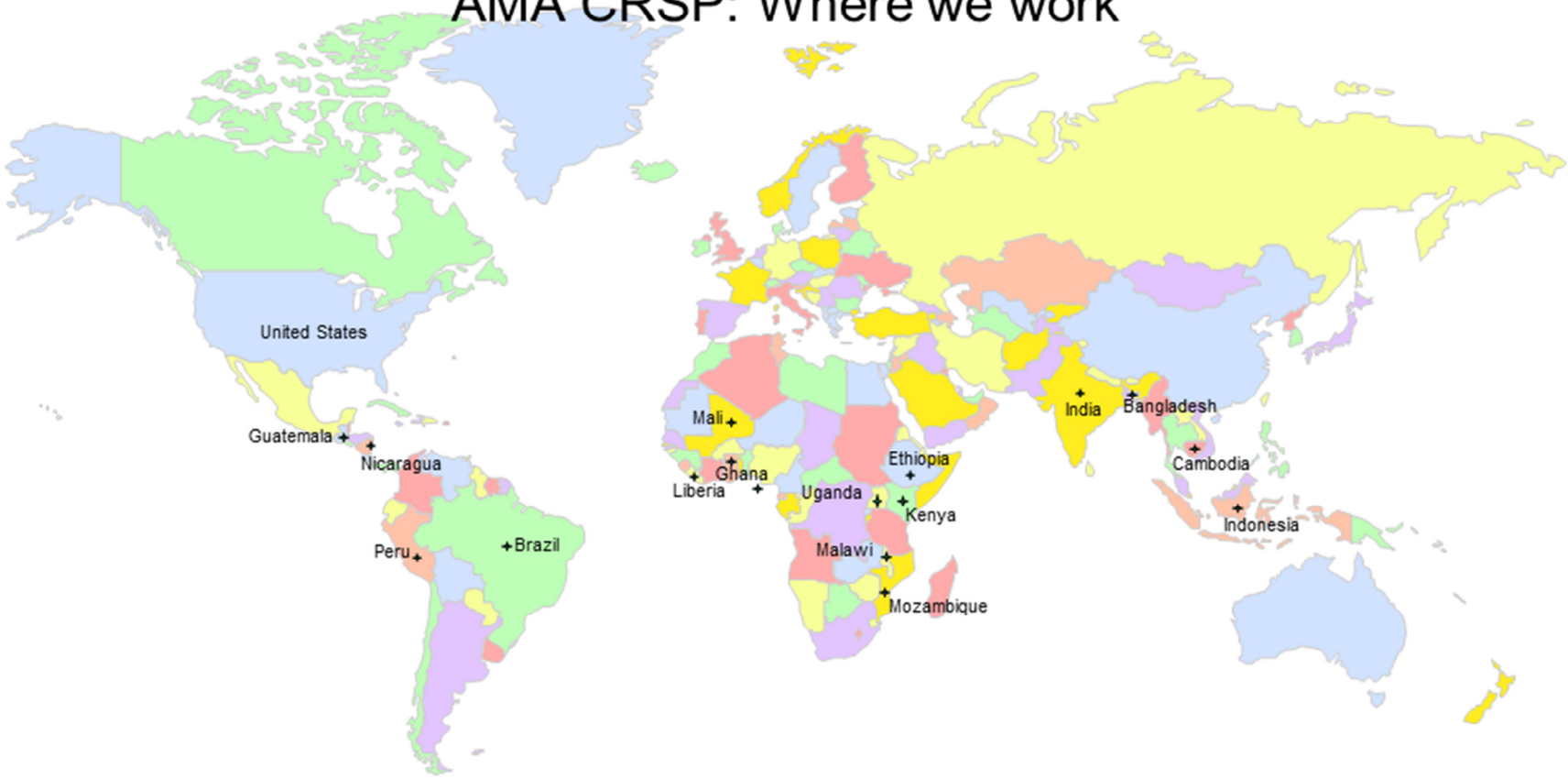


# THE DIRECTOR'S REVIEW OF THE BASIS ASSETS AND MARKET ACCESS COLLABORATIVE RESEARCH SUPPORT PROGRAM, 2006-2011

BEGINNING IN 2001, BASIS AMA CRSP BEGAN A series of basic research projects in eastern and southern Africa that probed the nature of chronic and persistent poverty. Much of this work had important conceptual elements and laid the groundwork for what some have come to recognize as the "BASIS approach to chronic poverty."

The BASIS approach is predicated on two theoretically grounded understandings. The first is that poverty dynamics and chronic poverty are best studied through the analysis of assets (the resources that people have to produce a livelihood) rather than through the analysis of income or other livelihood outcomes. The second is that a critical minimum asset threshold may exist, which we call the "Micawber Threshold."[1] Individuals whose assets fall below that level become mired in chronic poverty, unable to escape from that position over time. This theoretical work in turn led BASIS AMA CRSP researchers to undertake empirical analyses of various economies (Ethiopia, Kenya, Madagascar, Malawi, South Africa, and Zimbabwe) in an effort to identify the Micawber or dynamic asset poverty threshold.

From a policy and programming perspective, knowledge of the existence and location of such critical asset thresholds is vital. It can be used to identify those households where risk has its most deleterious consequences. It can inform the design of safety nets intended to offset those consequences. Finally, it provides a target at which asset-building programs can aim in order to achieve sustainable poverty reduction.

While any university-based research program needs to continue to push the frontiers by exploring basic, but sometimes abstract ideas about the nature and causes of poverty and rural development, with the initiation of the new BASIS AMA CRSP in 2006 it was also clear that the time had come to explore concrete and practical solutions to these development challenges. Accordingly, a fraction of the BASIS AMA CRSP budget was set aside to fund an ambitious agenda of pilot projects designed to relax the constraints and change the conditions that underlie chronic poverty and thwart rural development.

**Seeking to improve wellbeing and economic growth. BASIS AMA CRSP works closely with those most affected by development policies: rural agriculturalists like these farmers in Kenya learning about index-based livestock insurance.**

The February 2009 BASIS AMA CRSP "Escaping Poverty Traps" conference held in Washington presented some of these new pilot programs. One is an asset protection insurance program for pastoralists in northern Kenya. Inspired by prior work that not only indicated the presence of a poverty trap in the region, but also signaled large gains to a 'productive' safety net that would brake the slide of families into indigence, this program undertook the ambitious task of devising an implementable insurance contract for households in this isolated and infrastructure

[1] The "Micawber Threshold" label is due to a paper Michael Lipton who used it to denote a level of poverty so deep that it could not be extinguished even by the virtue of incremental savings espoused by Charles Dickens' character Wilkins Micawber who told young David Copperfield "Annual income twenty pounds, annual expenditure nineteen nineteen and six, result happiness. Annual income twenty pounds, annual expenditure twenty pounds nought and six, result misery."

deficient region. The result was *IBLI*, a commercially provided index-based livestock insurance scheme that met with buoyant demand in its first year. Demand dipped a bit in its second year (2011), but households in the *IBLI* pilot area suffered a severe drought, losing upwards of 30% of their livestock. Payouts were made to insured households in October. Analysis based on household reports on anticipated coping strategies in the wake of the payments indicates that the IBLI dramatically changes households' own abilities to cope with drought. Insured households intend to reduce their reliance on the most costly coping strategies relative to a control group of uninsured households. Insured households report that they expect to use IBLI payouts to purchase food and livestock. By using part of the payout to purchase food, most insured households expect to maintain their current consumption of food, rather than reduce meals like their uninsured counterpart. Moreover, far fewer insured households anticipate using livestock sales as a way of coping in the next 3 months, whereas an increasing number of uninsured households expect to resort to livestock sales in the upcoming months. This latter finding suggests that insurance will help prevent livestock prices from collapsing, providing spillover benefits even to the uninsured who need to rely on further sales to secure their survival.

**The goal of one project has been to systematically identify what the most appropriate response to a food insecure situation might be: local food aid, international food aid, or a cash response. So that farmers like this one pictured exiting his grain storage bin in Ghana could avoid the poverty trap.**

The second BASIS AMA CRSP pilot program is being undertaken in Mozambique and creates a mix of smart fertilizer subsidies and enhanced savings instruments that will allow poor, near-subsistence level farmers to reach the point at which they can sustain the financing and adoption of new technologies even after input subsidies are removed. Two complete cycles of this program have been completed. Unfortunately, maize yields were reduced by droughts both years, and returns to the subsidized fertilizer were nil the first year and modest the second. Analysis does show that the more experienced farmers did tend to benefit rather substantially from the fertilizer subsidy, suggesting that extension and outreach may have been lacking for the program. The savings program did lead to much greater use of formal banking accounts, and a modest increase in the total amounts saved. Research underway now will reveal whether or not these changes in savings behavior spill over and result in sustained fertilizer uptake now that the voucher subsidy scheme has come to an end.

A third BASIS AMA CRSP project is a novel effort to fine tune the delivery of food aid, choosing among food aid procurement modalities (local, regional and international) in order to both maximize impacts in source communities and guard the assets of those in recipient communities by assuring that food aid arrives before asset depletion places affected households in a trap from which they cannot escape. While there is much to recommend local and regional procurement of food aid supplies (leading WFP and its funding partners to experiment with it), such strategies can only be responsibly implemented when local markets have sufficient depth and supply to prevent prices from skyrocketing, worsening the straits for food-scarce households. In order to get a handle on this problem so that food aid modalities can be optimized, BASIS AMA CRSP researchers

have developed a diagnostic tool called the Market Information and Food Insecurity Response Analysis (MIFIRA). The goal has been to systematically identify what the most appropriate response to a food insecure situation might be: local food aid, international food aid, cash response, etc. The tool quickly assesses whether the food insecurity is driven by market failures or production failures, and base a response on that information. The BASIS AMA CRSP team has trained NGOs that implement food aid in the field in the use of the tool, so they can quickly design and implement food relief programs that will have the desired effect for food insecure populations without further disrupting local markets.

Like the first two pilot projects, the aim of the food aid procurement project is to eventually test its effectiveness with state-of-the-art impact evaluation methodology. All will be implemented with support from either USAID missions or USAID initiatives such as Food for Peace. Most importantly, all represent a new generation of programming intended to crowd-in private initiative and savings.

Using additional funding, generously provided by USAID and other donors, BASIS AMA CRSP launched a suite of six new pilot projects in the area of agricultural index insurance. These projects, implemented under the aegis of the BASIS $I_4$ Index Insurance Innovation Initiative, are described in more detail later in this report. All build on the Kenya IBLI project (as well as other work by BASIS AMA CRSP in this area) and reveal the synergies that can be created when concentrated resources are brought to bear on the important, yet vexing problem of household vulnerability and resilience. In keeping with its fundamental goal of informing the policy and programming decision making, BASIS AMA CRSP researchers have been at the forefront of the discussion within USAID on these issues.

In addition to these pilot projects, BASIS AMA CRSP continues to allocate most of its budget to competitively selected projects. These projects, which include impact evaluations of new interventions as well as more basic research into the fundamental causes of rural poverty and agricultural growth, include researchers from 35 US universities and overseas partners. Together with the pilot projects, these research projects come together to form the four-pronged BASIS AMA CRSP agenda:

- *Insurance and Risk Management Tools to Boost Smallholder Productivity*
- *Smallholder Access to Markets and Improved Technologies*
- *Access to Finance*
- *Asset Building and Pathways from Poverty*

Since this agenda was devised, USAID has renewed its emphasis on inclusive agricultural sector growth with the May 2010 release of the *Feed the Future Guide*. USAID's renewal is in keeping with the strong body of evidence that agricultural growth, especially when inclusive or broadly-based, helps reduce poverty. BASIS AMA CRSP researchers have been at the forefront of this discussion and were fundamental contributors to the landmark 2008 *World Development Report* on agriculture for development (BASIS AMA CRSP itself contributed not only intellectual, but also financial resources to the creation of that report). More recently, BASIS AMA CRSP researchers participated in USAID's 2011 evidence summit on the importance of inclusive economic growth.

To date, sound mechanisms to involve low-wealth rural households in the growth process have proven elusive. The BASIS AMA CRSP research agenda speaks directly to *Feed the Future's* call for innovations that will:

- Provide sound and affordable risk management services to small-scale producers and their communities;
- Increase and sustain smallholder access to savings, affordable inputs and improved technologies; and,
- Improve small farmer access to business development and financial services.

As detailed in the outreach section, BASIS AMA CRSP researchers have been active in the discussions, debates and planning sessions surrounding the Feed the Future Initiative.

**Insurance and Risk Management Tools to Boost Smallholder Productivity**

Shocks of various kinds can send households into poverty traps from which they cannot recover. For several years, BASIS AMA CRSP has been doing research on the deleterious effects of different shocks on household wellbeing, as well as on tools for helping prevent these negative outcomes.

*Gendered Coping with Health Shocks*

Our research has found that illness shocks, which are the most common type of shock in many countries, negatively affect assets, particularly for women.

Knowing the type of shock that affects men's and women's assets the most may help in designing appropriate social protection schemes. For example, in Bangladesh, weather-related shocks, such as floods or droughts, have a larger impact on men's assets, while illness shocks take their toll on women's assets. In Uganda, drought shocks affect wives' assets, but not husbands' assets. One could surmise that weather-based insurance could be marketed to husbands in Bangladesh and wives in Uganda, but that health insurance might be more readily taken up by wives in Bangladesh. Designing social protection schemes should also take into account the prevalence of shocks, the severity of their impact, and whose assets are used to cope with them. While the food price shock emerged as the most important shock from 2006–2010, in Bangladesh, illness was the most prevalent shock between 1996 and 2006, most severely affecting women's assets.

Based on these findings, there are three potential areas for policy intervention to protect assets and reduce the gender asset gap. The first is the provision some form of health insurance to protect against illness shocks. The recognition that illness shocks can be detrimental to poor people's well-being appears to receive less attention in Bangladesh than covariate shocks such as floods, precisely because illness is an idiosyncratic event, while widespread flooding easily attracts national and international attention. However, this should not lead policymakers to underestimate the detrimental impact of illness on people's livelihoods and ability to move out of poverty.

How then might protection against idiosyncratic health shocks be implemented? A BASIS AMA CRSP project in Cambodia has explored whether or not micro health insurance might serve this function. While the insurance does reach its target audience, price is a significant barrier for many households. However, it is worth investigating how to increase access to health insurance since evaluation of the product impact shows decreases in healthcare costs, decreases in the likelihood of going into debt due to a health shock, and cuts in half the number of households selling land (thereby protecting a critical asset). Unfortunately the use of insurance does not seem to improve health over time, did not increase the use of preventive care, and did not detectably improve accumulation of assets, which means further investigation is necessary to create health insurance products that can improve household wellbeing long-term.

*Managing Agricultural Risk—the BASIS $I_4$ Pilot Projects*

In keeping with a long tradition of research in agricultural research, early BASIS AMA CRSP research also indicated that agricultural risk could be leading to production decisions that were significantly decreasing outputs and incomes over time. An earlier project in Peru estimated that risk—operating through the demand and supply sides of the credit market—may reduce agricultural GDP by as much as 25% in the small farm sector found on the north coast of Peru. In response to this evidence, BASIS AMA CRSP launched two index insurance projects designed to transfer risk out of the agricultural system and thereby crowd-in productivity enhancing finance and investment.

The first of these projects was an area yield insurance contract for smallholder cotton farmers in the Pisco Valley along the south coast of Peru. The Pisco pilot has completed three years, and while the insurance partner plans to switch to a conventional, individual indemnity contract next year, many lessons were learned about contract design and marketing as demand for the contracts grew over the three years of the pilot.

Shortly after the initiation of the Pisco pilot, BASIS AMA CRSP also launched the Index-based Livestock Insurance (*IBLI*) in Northern Kenya, as described above. Based on the success and promise of these two initial efforts, BASIS AMA CRSP launched the BASIS $I_4$ Index Insurance Innovation Initiative housed at the University of California, Davis. Using primarily additional funds provided to BASIS AMA CRSP by USAID (as well as additional foundation grants), the BASIS $I_4$ was launched to create a critical mass of learning in this important, but still poorly understood area of agricultural index insurance. BASIS $I_4$ projects include both export and local food crops- specifically *Small-scale Export Agriculture* (Cotton in Mali and Peru; Coffee in Guatemala) and *Small-scale Food Agriculture* (Grains in Ethiopia; Rice and maize in Ecuador and Tanzania; Livestock in Ethiopia and Kenya).

These projects exploit the intuition that insurance offers farmers a win-win (higher mean income and reduced income variability) if it can be interlinked with finance for increased uptake of new technology (this point has been emphasized in both academic and outreach publications prepared by BASIS $I_4$ researchers). A number also offer new innovations,

including multi-index contracts and locally provisioned gap insurance (to reduce basis risk, while controlling moral hazard). The Ethiopia livestock insurance project is developing climate change adaptation mechanisms to complement insurance-based risk transfer. All of these projects are constructed around rigorous impact evaluation designs. Importantly, they are also achieving the economies of scale in learning that motivated the creation of the BASIS $I_4$. These include cross-project sharing of ideas on contract design and farmer education schemes, as well as educational events targeted at the local insurance industry (a workshop in Addis Ababa for the East African insurance industry, and a second learning workshop targeted at private and public sector actors in the Andean region of South America), as well as cross-border learning between pastoralists communities in northern Kenya and southern Ethiopia.

**BASIS $I_4$ projects exploit the intuition that insurance offers farmers a win-win if it can be interlinked with finance for increased uptake of new technology. The Ethiopian families pictured here with researcher Munenobu Ikegami should benefit from these efforts.**

In addition to this integrated set of projects, two BASIS AMA CRSP long-term research projects have offered different types of weather insurance for agriculture in India and Ghana. In India researchers have had good take-up rates at subsidized prices, but there are indications that many farmers are not willing to pay fair market rates. Providing loans that can cover insurance premiums are a promising way to increase use of the insurance.

Another frequently cited barrier to insurance uptake is client understanding. Building on simulation games originally developed for projects in Peru and Kenya, the India project showed that such games increased insurance uptake by eight percentage points.

In Ghana, researchers also found a high sensitivity to price, but were able to sell policies with a take-up rate of 8-42% for actuarially fair products. This confirms one of the key insights on interlinked credit and insurance underlying the BASIS $I_4$; that households offered capital along with insurance exhibited large changes in production practices. Farmers spent 47% more on fertilizer, increased revenue form bagged crops by 43%, cultivated 23% more acres and increased the proportion of hired labor from 12% to 17%.

While there is still much to learn—especially about intelligent design of contracts that reflect producers' understandings of risk—these findings indicate that the combination of insurance with other financial products may be a key to it being a successful tool for farmers to manage risk and change behavior. Ongoing $I_4$ work in Peru and Mali is exploiting insights from behavioral economics (how do real people, as opposed to economists, think about risk) to test out a variety of alternative contracts and gauge their market acceptance. With the BASIS $I_4$ currently scheduled to run through 2013, we expect to be quickly adding to these findings and building up a comprehensive understanding of the effectiveness of risk transfer mechanisms for small-scale agricultural and pastoral households.

**Smallholder Access to Markets and Technology**

Improved economic returns for smallholder producers are vital to food security and poverty reduction in all countries, and also vital for core economic growth in the agriculture-based economies of sub-Saharan Africa and South Asia (the 2008 *World Development Report* discusses this perspective in detail). Increased returns can be achieved either by enhancing the productivity of the smallholder sector in their traditional activities, or by integrating them into value chains and specialty crops that offer potentially higher returns. BASIS AMA CRSP projects have been exploring mechanisms of effectiveness of both strategies.

*Fertilizer and Input Subsidies for Food Crops*

The 2008 food price spikes refocused the world's attention on the need to sustain productivity growth in basic food crops. One response has been a resurgence of interest in fertilizer and seed subsidy programs intended to bolster smallholder uptake of improved technological packages. While such

programs have been around for some time, they remain controversial. Indeed, sharp words were exchanged about Malawi's starter pack fertilizer subsidy program at the 2004 BASIS AMA CRSP chronic poverty conference. Despite this issue's importance, there has been remarkably little careful evaluation about the impacts of such efforts, especially whether or not they create the learning and financial capacity to sustain the uptake of new technologies once subsidies are removed.

BASIS AMA CRSP researchers are currently involved in work on the impact of fertilizer subsidies in both Malawi and Mozambique. In Malawi, the maize subsidy program was intended to benefit both the most vulnerable farm households and those having sufficient land to make use of the subsidized seed and fertilizer. However, our results, which are consistent with other research regarding such subsidies, suggest that the most vulnerable people in the communities were not the main recipients of the coupons. Female heads were targeted, yet findings indicate they were less likely to benefit from the program compared to male-headed households. In addition, asset-poor households were less likely to participate in the FISP compared to non-poor households. These results raise questions about the targeting effectiveness of the program. Results show that the average increase in maize yields from accessing a standard subsidized package of maize seed and fertilizer was 178kg/acre, about twice the yield gain from receiving coupons for fertilizer only.

**BASIS AMA CRSP researchers are currently involved in work on the impact of fertilizer subsidies in both Malawi and Mozambique as there has been a resurgence of interest in fertilizer and seed subsidy programs since the 2008 spike in world food prices.**

The program design may place too much emphasis on fertilizer for maize. Farmers were able to choose 2kg of hybrid maize seed or 4kg of open pollinated seed, in addition to 100kg of fertilizer. Given the yield differentials between the two varieties, shifting emphasis to promoting the use of hybrid seed in the subsidy program would most likely help generate greater returns. In the long run, ensuring food security may rest on policies that seek to improve the delivery of improved seed to farming communities.

Because the Malawi program has a nationwide scope, evaluation of its impacts is difficult. In contrast, a pilot program implemented in neighboring Mozambique was established with the goal of reaching only 25,000 farmers, creating an opportunity to study both the short- and long-run effectiveness of subsidy voucher schemes. Similar to the Malawi program, the Mozambique scheme provides qualified farmers with 100 kilograms of fertilizer and hybrid seeds. Two important lessons have already been learned from this evaluation. First, as mentioned earlier, the program appears to be at best modestly effective for the typical farmer with little prior experience managing fertilizers. Second, as a drought during the first year of the program indicated, one time infusions of capital can be destroyed by natural events, leaving subsidized households no better or even worse off than they initially were. This experience drives home the importance of securing the modest working capital increments of smallholders with the sorts of risk transfer mechanisms described above.

*Integrating Smallholder Farmers into Value Chains and Specialty Crop Production*

In Nicaragua and elsewhere in Central America, small-scale farmers are weighing the risks of entering into contracts with supermarket chains. One BASIS AMA CRSP project assembled unique data from cooperatives supplying supermarkets to study the effect of supply agreements on producers' mean output prices and price stability. The project finds that prices paid by the domestic retail chain approximate the traditional market in mean and variance while mean prices paid by Walmart are significantly lower than the traditional market. However, the Walmart contract is found to systematically reduce price volatility. While this reduced price volatility is surely valuable to producers, the study shows some evidence that farmers may be paying too much for this contractual insurance against price variation.

More generally, the BASIS AMA CRSP research on smallholder integration into supermarket chains validates both optimism and caution with respect to the potential of supermarket supply relationships to improve farmer welfare and stimulate productive investment. The evidence to date indicates that contracted farmers both experience significant positive effects on incomes and make significant investments in productive assets and irrigation. The data also show high exit rates from the supermarket supply chain, evidence that discontinued suppliers warrant considerable more attention in future analyses of participation in and welfare effects of modern agri-food markets. In addition, the location of supermarket procurement basins is strongly determined by community access to roads, markets, and year-round water, suggesting that modern agri-food marketing channels may exacerbate extant rural geographic inequalities or create new ones. Given the significant involvement of NGOs and the relatively early stage of the Nicaraguan supermarket sector, it remains to be seen what the regional equilibrium effects will be for the agricultural sector as more farmers enter these markets.

A second BASIS AMA CRSP project evaluates the impact of a Millennium Challenge Corporation (MCC) program in Nicaragua designed to enhance the productivity and improve the market access of smallholder farmers across a variety of local and export crops. Two important lessons have emerged so far from this long-term impact evaluation study based on a randomized rollout design. First, while the impacts appear to be quite positive—especially for the most skilled producers—there is evidence that the benefits are not sustained once the direct program intervention is withdrawn. This may reflect a lack of knowledge on the part of producers, or perhaps the fact that the program failed to adequately address the credit and, or savings constraints to continued farmer adoption of the improved methods offered by the intervention.[2] There is also evidence that once again weather risk blunted the impact of the intervention for many producers.

A second key finding from this project is that the program probably could have reached further down the wealth spectrum without diluting impacts. Like many of the programs discussed in this document, the MCC program declared a minimum farm size or wealth level below which smallholder farmers were ineligible for program benefits. While there may well be a logic for such a minimum threshold, the MCC data give no evidence that the smallest producers—those closest to the program threshold—benefitted less from the program. As USAID and others increase investments in smallholder agriculture, it is clear that consideration must be given to the systematic identification of minimum farm sizes as the cost of setting the bar too high is the exclusion of the neediest farmers, many of whom are women.

One reason that value chain operators may tend to exclude smaller scale farmers is because they find it costly to monitor contractual compliance by such farmers (e.g., if a firm finances inputs for a specialty crop, they want to be assured that the crop is delivered to them so that they can recoup their investment and that the crop is not side-sold on a local spot market). To address this issue, BASIS AMA CRSP researchers in Peru have used behavioral economics methods to design contract mechanisms that are create incentives for both sides of a farming contract to honor their commitments. As a result they aim to improve the welfare of small farmers and improve profits of the firm. Results from projects with mango farmers in Peru showed that many small farmers were entering into contracts so they could benefit from receiving credit and/or inputs, which can

[2] As originally conceived, the program was intended to enhance the tenure security and capital access of program beneficiaries. While it is yet to be known if the tenure program would have been sufficient to secure capital market access, macro-political considerations interrupted the implementation of this part of the MCC program.

have a large impact on their livelihood. Researchers then wondered if it would be more beneficial to farmers to offer these services separately, so they would not be subject to potentially lower prices and other downsides of being in contracts. They are currently working with a local bank to see if providing credit services separately can increase the price farmers receive for their products.

In addition to helping farmers participate in new value chains, BASIS AMA CRSP researchers are also looking at how to help smallholders participate in specialty value chains like fair trade and organics. In the case of fair trade coffee in Guatemala, research indicates that little to none of the perceived fair trade premium is actually reaching the producer. This somewhat distressing result shows the need for further investigation of the true cost of participating in specialty markets.

Finally, a BASIS AMA CRSP project explored the inter-relationship between farm productivity and household participation in an environmentally destructive activity in Uganda (charcoal production). Importantly, the research finds that local institutions may be as important households' agricultural options. For example, in the Hoima district, forestry institutions are relatively weak but the cost of activity is perceived to be high due to the cost of charcoal permits. Accordingly, the study find rates of participation in charcoal production to be somewhat lower than one would expect based on the underlying characteristics of the Hoima sample. This suggests the strength of forest institutions may be less important to producers than the cost of doing business: the permitting system may discourage activity and shift it to locations where producers can operate at lower cost. In the two districts with relatively strong forest institutions, but relatively low financial barriers to activity, they find higher rates of participation.

Given that demand for charcoal is likely to remain strong in the absence of policies aimed at reducing consumption, an appropriate policy response may be to develop spatially-differentiated economic incentives to divert activity away from areas of greatest environmental sensitivity, and at the same time use revenue from charcoal licensing to support tree planting efforts and agricultural outreach. However, to the extent the opportunity cost of labor remains low in most rural districts, producer prices for charcoal are likely to remain low as well. For this reason, policymakers should remain attentive to the risk of introducing policies that could jeopardize the incomes of rural households that rely on charcoal and wood fuel income. Ultimately, the solution to the charcoal dilemma in Uganda will have to focus on a constellation of measures: enforcement targeted in environmentally sensitive areas, fee collection along the value chain, investments in tree planting, and efforts to develop viable and affordable alternatives to wood-based fuels for consumers.

**Access to Savings and Credit Services**

Agricultural development efforts have often prioritized the creation of credit systems. While credit remains important, reliable savings instruments and self-finance systems also have an important role to play in underwriting and sustaining smallholder growth and development. BASIS AMA CRSP projects are currently investigating savings and credit mechanisms, with the longer-term goal of finding the complementary mix of financial instruments (savings, credit and insurance) that can best serve rural and agricultural development goals.

*Savings*

The BASIS AMA CRSP has three projects on savings. The first of these is the Mozambique fertilizer subsidy voucher program. As previously discussed, the goal is to see if voucher coupons have a lasting impact on smallholder productivity, at least when households are offered improved savings services. Operating in cooperation with Opportunity Bank of Mozambique, the BASIS AMA CRSP project is exploring two kinds of interventions intended to inform and incentivize increased use of formal savings instruments. The first is a matched savings programs in which farmers who met savings targets (calibrated on their working capital needs to finance hybrid seeds and fertilizers without subsidies) receive a bonus payment (equivalent to a 50% interest rate). Both matches conditional on individual saving and on the joint savings of a group are being explored. The idea behind both is to incentivize people to learn about the financial system as well as to give them some added liquidity to help get them over critical minimum financial thresholds. In addition such savings matches should be self-targeting as they are most attractive to those individuals who have the patience and skills to be successful savers and long-term investors.

In addition to savings matches, the BASIS AMA CRSP project in Mozambique has implemented a large-scale test of novel training materials, including

a maize farmer savings game (loosely modeled on the game Monopoly) in which participants traverse the years, experience good and bad luck, must provision for expected and unexpected family needs and have the opportunity to save for fertilizer purchases that improve their economic prospects. The game has been enthusiastically received. Its actual impacts on farmer behavior will soon be revealed.

Another hypothesized barrier to smallholder savings is that farmers (like everyone else) find it easy to procrastinate and hard to save. In order to see if it is possible to make it easier for farmers to save, BASIS AMA CRSP researchers in Guatemala worked with the country's largest public bank to see if they could offer a "commitment savings account" to customers at reasonable cost. Commitment accounts make it easy to save (a fraction of a paycheck or receipts from a crop sale are automatically deposited into a savings account) and hard to withdraw (transactions costs or interest penalties are charged for early withdrawals). Finding ways to make savings work is an important as savings have been identified as a key component for exiting poverty.

In the BASIS AMA CRSP Guatemala project, initial results showed that a widespread implementation of a 10% default savings product, where 10% of the loan was automatically put into a savings account for them, was likely to lead to large increases in savings balances in the organization. This did not appear to damage repayment, and if anything the opposite was true. Similar to the work on insurance and credit it again seems that it is the combination of multiple financial services that creates sustained economic improvements for low-wealth families.

A final BASIS AMA CRSP intervention in Ghana explored whether "labeled" savings account increase savings. "Christmas savings accounts," common in the US in the last century, are a classic example of a labeled account. While labeled accounts are not technically different from existing savings vehicles, they gave participants the ability to designate a savings account as being for a particular purpose and seem to better match with many individuals' tendency to keep separate mental accounts for different purposes. Results from the Ghana study indicate that these accounts did effectively increase savings rates. In a current follow up study, research is focusing on how the product may have changed customer consumption and saving habits.

*Access to Credit*

While BASIS AMA CRSP and other work has for years documented the importance of credit constraints, finding solutions that relax these constraints, especially for individuals with few collateral assets, is always a challenge. One asset that all borrowers can potentially put forward is their future, and of course many credit contracts use so-called termination incentives (if you do not repay this year, your future credit access is 'terminated'). Earlier BASIS AMA CRSP work on credit reporting bureaus for microfinance customers is one example of an innovation that can bring this asset to life for low wealth individuals.

**In Ghana, BASIS AMA CRSP researchers are working with a group of tailors to see whether access to capital, access to business consulting services, or a combination of the two make the most difference for growth.**

However, credit bureaus and other devices to use the future as a collateral asset can only work if borrowers (good and bad) can be unambiguously identified and appropriate rewarded or punished with future loan access. In countries with weak identification systems, such collateral may not work and credit supply may shrink. Malawi is one country without a strong personal identification system, and a BASIS AMA CRSP project conducted a field experiment that randomly selected a subset of potential loan applicants to be fingerprinted. Selected applicants were trained in how fingerprinting worked with the expectation that fingerprinting would create

strong dynamic repayment incentives for these individuals, hopefully opening the door to improved credit supply in the future. The study found that fingerprinting leads the "worst borrowers" (meaning those predicted to have trouble repaying their loans) to raise their repayment rates dramatically, partly as a result of voluntarily choosing lower loan sizes as well as devoting more agricultural inputs to the cash crop that the loan was intended to finance. The treatment-induced reduction in loan size represents a reduction in adverse selection, while the increased use of agricultural inputs on the cash crop represents a reduction in ex-ante moral hazard. These results also have implications for microlending practitioners, by quantifying the benefits from exploiting a commercially-available technology to raise repayment rates. Beyond improving the profitability and financial sustainability of microlenders, increased adoption of fingerprinting (or other identification technologies) can bring additional benefits if lenders are thereby encouraged to expand the supply of credit, and if this expansion of credit supply has positive effects on household well-being.

In Ghana, BASIS AMA CRSP researchers are working with a group of tailors to see whether access to capital, access to business consulting services, or a combination of the two make the most difference for growth. Researchers are currently analyzing data from follow up surveys to see what the impact has been on investments, expenditures, savings, lending history, financial and business knowledge, and profits. Especially in finance, the complementarity of services may be the key to unlocking growth. Also in Ghana, researchers are trying to figure out what lies beyond microfinance as part of the Targeting the Ultra Poor Graduation Model. This project is in an early phase, but the goal is to measure the model's ability to move chronically poor households from extreme poverty to self-sufficiency over a two year period by combining consumption support with an intensive period of training, financial education and savings in order to provide the strong push needed to get a household out of chronic poverty.

**Asset Building and Pathways from Poverty**

Chronic poverty and poverty that is transmitted across the generations is one of the fundamental challenges to economic development and to the realization of the goal of food security for all. Cash transfer programs, intended to break the intergenerational transmission of poverty by building up the health and educational assets of children, is a key policy instrument in this area. Asset transfer programs (such as land redistribution) and programs designed to secure and enhance the economic value of assets held by low wealth people is another such instrument. The BASIS AMA CRSP research agenda includes several projects looking at these important interventions.

*Cash Transfers, Asset Building and Aspirations*

Cash transfer programs that make regular payments to poor families, often conditional on school attendance by children and regular medical clinic visits, are now used in many parts of the world. While there is a large literature on the effects of these programs on schooling, health and nutrition, relatively little is known about impacts on child development. A BASIS AMA CRSP project analyzes the impact of a Nicaraguan cash transfer program—the Red de Protección Social (RPS)—on early childhood cognitive development. Households that benefited from transfers increased expenditures on critical inputs into child development. They spent more on nutrient-rich foods, provided more stimulation to their children, and made more use of preventive health care. Changes in the use of these inputs are larger than what one would expect to see if the program were simply moving children along the curves that relate inputs to overall expenditures. Thus, the program appears to have resulted in genuine behavioral changes that extend beyond the increase in cash available. Clear understanding of the impact of different transfer designs, as well as complementary programs, is crucial to designing policies that will have positive long term effects.

The Nicaraguan RPS program had an additional element designed to enhance the income-earning capacity of parents. The same BASIS AMA CRSP research team also explored the effectiveness of these program interventions, including vocational training grants and an asset grant that could be used to start a business. Interestingly, the asset grant treatment seemed to have important aspirational effects, inspiring its recipients to believe that they could better themselves, and to work towards that goal. Interestingly, evidence from the Mozambique project suggests that a similar effect is in play in the country. When individuals are given a grant or transfer that allows them to better themselves, they appear to respond in time with a change in attitudes towards thrift, planning and patience in ways that support long-term asset accumulation and growth. While this evidence is still thin, it suggests another aspect about

poverty traps, namely that they generate attitudes that further contribute to their perpetuation. Conversely, and more positively, this evidence suggests that a virtuous circle is possible which makes transfer programs more effective than they would be without the matching behavioral or preference change.

While governments are relatively new to child-oriented, conditional cash transfer programs, a number of NGOs have effectively been employing similar strategies for a long time with child sponsorship programs. A BASIS AMA CRSP grant compared the impacts of child sponsorship programs with public conditional cash transfer schemes. Researchers found that these programs had a higher impact than many of the CCT programs to which they were compared. While this may be attributable to the longer duration and focus on schooling, participation in sponsorship programs appears to have a positive effect on self-esteem, and perhaps more importantly, aspirations. These psychological aspects of change merit further exploration to determine how to improve the long-term path for children growing up in poor households.

*Land and Land Rights*

Land redistribution has been a traditional mechanism for building up the assets of low wealth, rural households. Surprisingly, the evidence on the effectiveness of asset transfers is somewhat thin. In cooperation with the World Bank, BASIS AMA CRSP helped fund analysis of a unique opportunity in South Africa to study the impact of land transfers in a relatively non-conflictual environment. The results are striking as they show an almost 50% increase in household living standards within 3 years of the land transfer. The implied rates of return swamp the estimates from such high profile cash transfer programs as Mexico's *Progresa* scheme.

While this research reveals the potential of land redistribution, a BASIS AMA CRSP project in Liberia and Uganda indicates that in some environments, it may be more important to look at land access rather than land ownership. In these two countries, this project reveals that patterns of ownership, inheritance and rights over assets are all embedded in relationships within the household and the community. Many women gain access to land through their marital relationships, making them particularly vulnerable when households dissolve due to divorce, desertion or death. Policies need to strengthen women's claims to the land they farm, and retain as security in the event of the dissolution of their marriage. In addition, all policies need to be developed taking local norms and customs into account. This is important for the ongoing discussion of tenure reform and its role in getting out of poverty.

**Outreach**

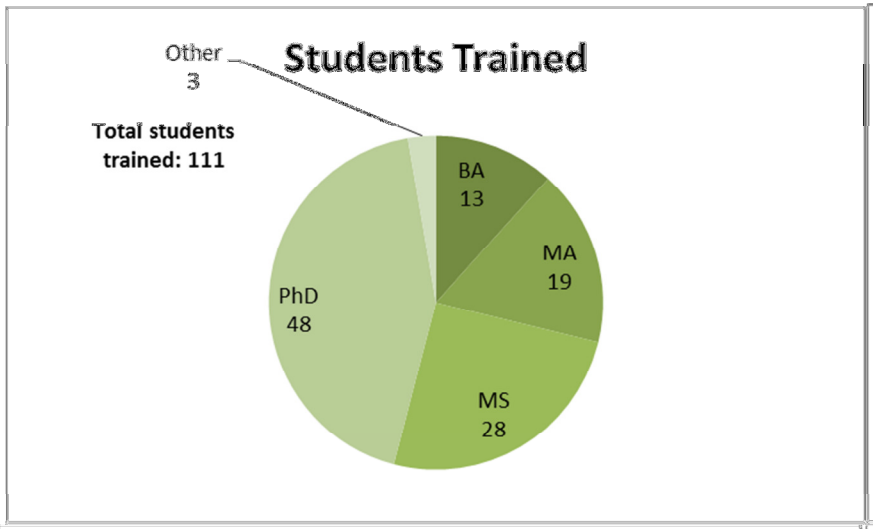
As USAID and other development assistance agencies have rediscovered the importance of agriculture for development, BASIS AMA CRSP and its affiliated researchers have had ample opportunities to participate in a wide variety of public fora and debates. While many of these events are described in greater detail in subsequent sections of this report (and, in a few instances, in earlier BASIS AMA CRSP annual reports), it is worth here enumerating the events organized or co-organized by BASIS AMA CRSP:

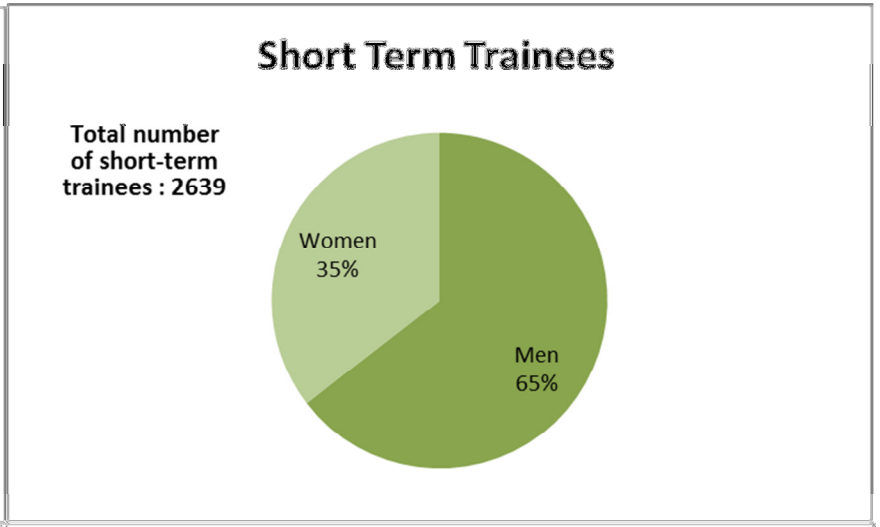
- *Escaping Poverty Traps* (Washington DC, February 2009)
- *East Africa Insurance (*Addis, September 2010)
- *Public-Private Partnerships for Agricultural Insurance* (Lima, July 2011)
- *Building Resilience and Assets for Food Security: Evidence and Implications for Feed the Future* (Washington DC, September 2011)
- *Gender and Assets (Washington DC October 2011)*
- *$I_4$-CCAFS Workshop: Index Insurance for Managing Climate-Related Agricultural Risk: Toward a Strategic Research Agenda* (Washington DC, October 2011)

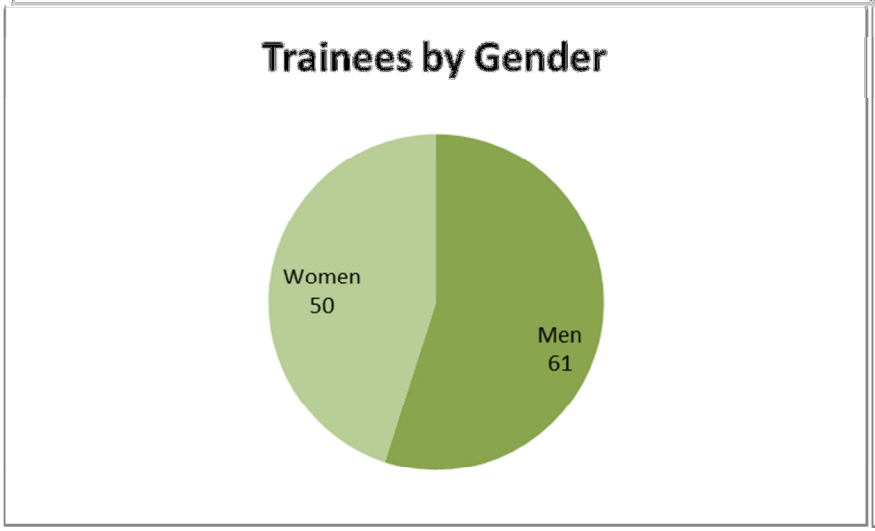
BASIS AMA CRSP researchers also played important roles in these events:

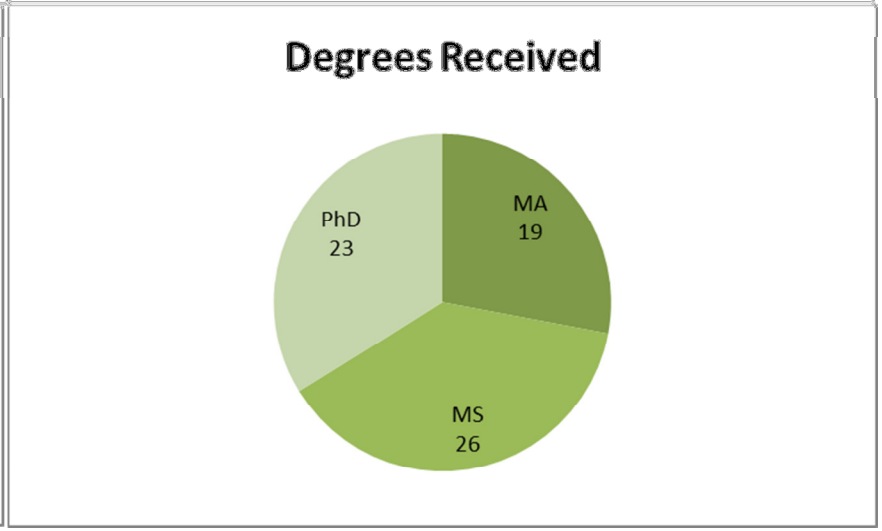
- *Launch of the Global Index Insurance Facility (GIIF)* (Nairobi, November 2010)
- *Promoting Broad-based Growth: Evidence Summit*, December 2010
- *Workshop on Feed the Future Research Strategy*, Purdue University, January 2011
- *USAID Ag Forum*, Washington, DC, May 2011
- *Congressional Research Service Forum on Food Aid*, May 2011
- *USAID-ATAI Agricultural Technology Evidence Summit*, Washington DC, June 2011
- *USAID-IFPRI Feed the Future Learning Agenda*, Washington, DC, June 2011
- *FERDI Workshop on Index-based Weather Insurance* (Cleremont-Ferrand, July 2011)

# AMA CRSP TRAINING



# AMA CRSP PARTNERSHIPS

**AMA CRSP U.S. Based Research Partners**

Cornell University

Duke University

Georgia State University

Georgia Institute of Technology

George Mason University

Harvard University

International Food Policy Research Institute

Johns Hopkins University

Massachusetts Institute of Technology

Michigan State University

Purdue University

Syracuse University

University of California-Berkeley

University of California-Davis

University of California-Riverside

University of California-San Diego

University of Colorado

University of Michigan

University of San Francisco

University of Wisconsin - Madison

World Bank

Yale University

**AMA CRSP International Research Partners**

BASIX Consulting and Training Services

Center for International Forestry Research (CIFOR)

Central American University

Centro de Investigación y Acción Educativa Social (CIASES)

Domrei Consulting

Food and Agriculture Organization

Grupo de Analisis para el Desarrollo

Indian Institute of Management-Calcutta

Institute of Statistical, Social and Economic Research (ISSER)

Instituto de Estudios Peruanos

International Food Policy Research Institute (IFPRI)

International Livestock Research Institute (ILRI)

Makerere University

Norwegian University of Life Sciences

Oxford University

Padjadjaran University

Royal University of Phnom Penh

Universidad Rafael Landivar

University of Athens

University of Ghana-Legon

University of Liberia

University of Malawi

University of Namur

# AMA Research Theme:
## *Insurance and Risk Management*

ALL OF US ARE SUBJECT TO DIFFERENT TYPES OF RISK, both personal, such as family illness, or community wide, such as natural disaster. Risk is especially prevalent in agriculture, where farming households are subject to many health risks and where a poor rainy season may destroy a harvest. The provision of agricultural finance is very low due to the high risk involved, and it is particularly difficult for smaller producers to get access to loans. Even if a loan were available, families with access to credit markets might be reluctant to take out a loan for fear of losing collateral in case they are unable to re-pay. Yet, if an expansion of access to finance is combined with the provision of insurance and other financial products and services, then the risks to both borrowers and lenders can be reduced, and participation in financial markets will increase.

In the projects and pilots described in this section, AMA researchers look at the impact of health insurance products to protect borrowers in the case of illness, and the creation of innovative new types of crop insurance to increase the availability of agricultural finance. With a greater ability both to manage risk and engage in new production strategies, farmers can realize a higher income trajectory and improve their long-term wellbeing.

## AMA PROJECTS

- I4 Index Insurance Innovation Initiative
- Micro Health Insurance in Rural Cambodia: An Evaluation of the Impact on the Stabilization of Incomes and Enhancement of Agricultural Productivity and Asset Accumulation
- Understanding the Impact of Idiosyncratic Shocks on Farm Productivity and Household Asset Building and Protection in Ethiopia, Ghana and Bangladesh
- Weather Insurance, Price Information and Hedging: Financial Initiatives to Help the Poor Manage Agricultural Risk (India)
- PILOT: A Productive Safety Net for Northern Kenya's Arid and Semi-Arid Lands: The HSNP+ Program
- PILOT: Area Based Yield Insurance for Peruvian Coastal Agriculture

## AMA BASIS BRIEFS

BASIS Brief no. 2012-05. *Insuring Health and Wealth: An Evaluation of Health Insurance in Cambodia*, by David I. Levine, Rachel Polimeni and Ian Ramage. March 2012.

BASIS Brief no. 2012-03. *Asset Accumulation in Bangladesh: Trapped by Poverty and Gender*. by Agnes R. Quisumbing. February 2012.

BASIS Brief no.2012-01. *How Do Shocks and Gender Impact Asset Accumulation in Different Cultures?* by Agnes R. Quisumbing, Neha Kumar and Julia A. Behrman. February 2012.

BASIS Brief no. 2011-03. *Insuring Health: The Impact of Adverse Selection on the Micro-Health Insurance Market in Cambodia*, by David I. Levine and Rachel Polimeni. December 2011.

BASIS Brief no. 2010-09. *Marketing Complex Financial Products in Emerging Markets: Evidence from Rainfall Insurance in India*, by Sarthak Gaurav, Shawn Cole and Jeremy Tobacman. October 2010.

BASIS Brief no. 2008-08. *Altering Poverty Dynamics with Index Insurance: Northern Kenya's HSNP+*, by Christopher B. Barrett, Michael R. Carter, Sommarat Chantarat, John McPeak, and Andrew Mude. November 2008.

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BASIS Brief no. 2008-01. *Weather Insurance, Price Information, and Hedging: Helping the Poor Manage Risk*, by Shawn Cole, Raghabendra Chattopadhyay, Stefan Hunt, Jeremy Tobacman, and Petia Topalova. January 2008.

BASIS Brief no. 2007-05. *Insuring Health: Testing the Effectiveness of Micro-health Insurance to Promote Economic Wellbeing for the Poor*, by David I. Levine, Nhong Hema, and Ian Ramage. July 2007.

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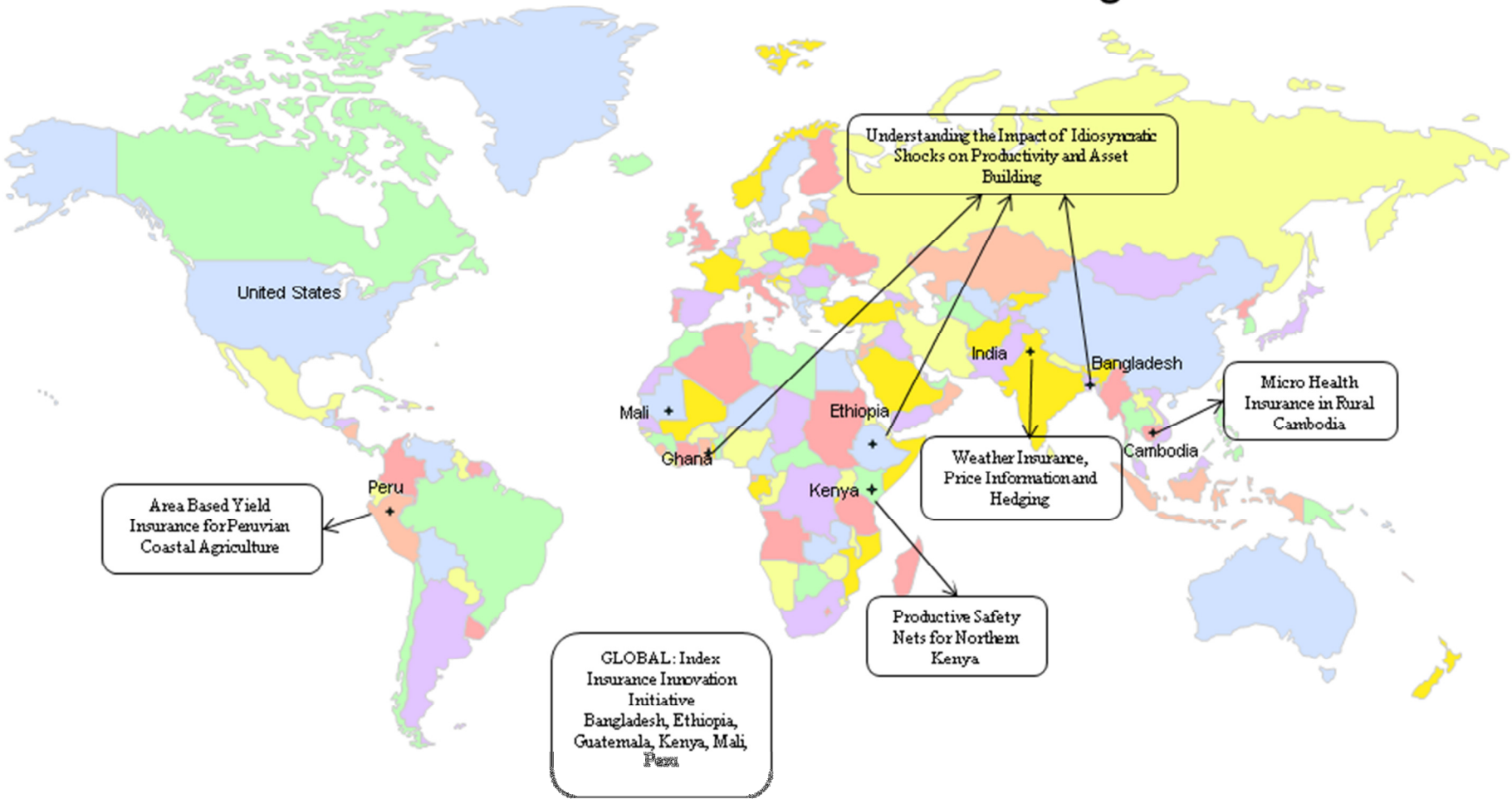
BASIS Brief No. 46. *Can Insurance Unlock Agricultural Credit and Promote Economic Growth?* by Carolina Trivelli, Michael Carter, Francisco Galarza, Alvaro Tarazona, and Johanna Yancari. May 2006.

# AMA CRSP: Insurance and Risk Management



## I4 Index Insurance Innovation Initiative

### Collaborating Partners

**International Labour Organization**

**Japan International Cooperation Agency Research Institute**

### Research Collaborators

**BASIX Consulting and Training Services Ltd.**: Rajeev Kumar Gupta

**Cornell University**: Chris Barrett

**Duke University**: Marc Bellemare

**Food and Agriculture Organization of the United Nations**: Shukri Ahmed, René Gommes

**International Food Policy Research Institute**: Alemayeho Seyoum Taffesse, Ruth Vargas Hill

**International Livestock Research Institute**: Andrew Mude

**Landivar University**: Tomas Rosada

**Oxford University**: Stefan Dercon

**University of Athens**: Alexander Sarris

**University of California, Berkeley**: Alain de Janvry, Elisabeth Sadoulet

**University of California, San Diego**: Craig McIntosh

**University of Colorado**: Carlos Martins-Filho

**University of Namur**: Catherine Guirkinger

### Additional Collaborators

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**Graduate Institute of International and Development Studies, Geneva**: Jean-Louis Arcand

**IFMR Centre for Insurance and Risk Management**: Rupalee Ruchismita

**International Labour Organization**: Michal Matul

**Japan International Cooperation Agency Research Institute**: Megumi Muto

**Katholieke Universiteit Leuven**: Jo Swinnen

**MicroEnsure**: Shadreck Mapfuma

**Nyala Insurance**: Eyob Meherette

**Oxfam**: Marjorie Victor

**United Nations University**: Luc Christiaensen

**University of California, Davis**: Steve Boucher, Travis Lybbert

**University of Michigan**: Dean Yang

**University of Montana**: Vincent Smith

**University of Namur**: Jean-Philippe Platteau

**World Bank**: Xavier Giné

http://i4.ucdavis.edu

## Outputs

Carter, M. R., C.B. Barrett, S. Boucher, S. Chantarat, F. Galarza, J. McPeak, A.G. Mude, and C. Trivelli. 2008. "Insuring the never before insured: Explaining index insurance through financial education games."

De Bock, O., M.R. Carter, C. Guirkinger, R. Laajaj. 2010. "Etude de faisabilité : Quels mécanismes de micro-assurance privilégier pour les producteurs de coton au Mali?" Centre de Recherche en Economie du Développement, Universitaires Notre-Dame de la Paix, Namur, Belgium.

(English version "Feasibility Study: Which micro-insurance mechanisms are most beneficial to cotton growers in Mali" also available)

Lybbert, T.J., F. Galarza, J. McPeak, C.B. Barrett, S. Boucher, M.R. Carter, S. Chantarat, A. Fadlaoui, and A.G. Mude. 2009. "Dynamic Field Experiments in Development Economics: Risk Valuation in Morocco, Kenya and Peru."

McPeak, J., S. Chantarat, A.G. Mude. 2010. "Explaining Index Based Livestock Insurance to Pastoralists."

Mude, A.G. 2010 "Development of the World's First Insurance for African Pastoralist Herders" Video can be viewed at http://blip.tv/file/3757148

## ACTIVITIES

Housed at the University of California, Davis, the I4 Index Insurance Innovation Initiative is a response to evidence indicating that variable and unpredictable negative shocks may critically hamper livelihood options and limit development among low-wealth agricultural and pastoralist households. The uninsured risk associated with negative shocks may cause households to avoid high-return activities, or engage in defensive savings strategies that cut-off sustained accumulation of productive assets. Moreover, risk restrains the development of a rural financial market in that banks are unlikely to lend to farmers if they believe that a negative shock, such as a drought, will cause widespread defaults. Index insurance appears to be an ideal remedial tool as it transfers correlated risk away from smallholder households, while promising low transaction costs and minimal problems of adverse selection and moral hazard.

Theory dictates that index insurance is an effective tool for managing risk and altering poverty dynamics. The I4 Index Insurance Innovation Initiative seeks to transfer theory to practice by rigorously testing the hypothesis that the removal of correlated risk from smallholder agricultural and pastoral households leads to a reduction in poverty and a deepening of financial markets in agricultural areas. The I4 team currently has six unique projects underway spanning the globe, from Guatemala to Ethiopia. Potential impacts include improving technology uptake by farmers, attracting lenders into rural markets, and breaking the "poverty trap", which in turn reduces the costs of direct aid programs. The goal of the I4 is to discover whether, when and how index insurance is a viable risk management product and whether the subsequent poverty reduction impacts will be realized and sustained.

### CURRENT ONGOING PROJECTS

1. **Index-Based Livestock Insurance: Adaption and Innovations for Ethiopia. Christopher Barrett: Cornell University.** *Satellite-based index for insuring livestock for pastoralists in Ethiopia.*

This project builds on lessons learned from a highly innovative pilot venture underway in Northern Kenya, adapting the Kenyan pilot (IBLI-Kenya) to the Ethiopian context. The project aims to design and introduce new group-based and/or credit-linked IBLI products, aimed to crowd-in productive investment opportunities. Furthermore, the project explicitly incorporates Intergovernmental Panel on Climate Change (IPCC) predictions of climate change and associated rangeland biomass dynamics to investigate linkages between conditional insurance transfer programs and climate change adaptive behavior. Because of the similarity of the IBLI product with the existing Kenya pilot, this project will allow for cross-border learning and comparative assessment of IBLI performance in varying institutional and economic contexts, laying the foundation for dissemination to other appropriate regions.

Since implementation, the four major activities that were achieved are (i) fielding of surveys to collect data relevant to the design of index-based livestock insurance for Ethiopia; (ii) finalization of IBLI-Ethiopia contract structures; (iii) coordination and training of local stakeholders and partners, including dissemination of product information; and (iv) investigation of alternative contract structures to those used in the IBLI-Kenya project. The first project year was primarily devoted to preliminary data collection and laying the foundation for future findings, from which the researchers have drawn several critical conclusions. Due to data collection issues, the researchers found that, as with its sister project in Kenya, an NDVI-based contract is feasible and more efficient. If successful, the NDVI-based contract may also ease the IBLI scale-up process in Kenya, Ethiopia and perhaps elsewhere. A second key finding is that cross-border learning between the Kenya and the Ethiopia projects is not only possible, but also critical to the success of both projects.

The researchers intend for the insurance product to be distributed in Ethiopia in early 2012. The contract was designed through a partnership between the insurance provider, Oromiya Insurance Company, and the IBLI team. Spatial coverage of the contract is at the woreda level, and the temporal coverage will be the same as for the IBLI-Kenya contract, with a long-rain long-dry season covering the seven-month period from March through September and the short-rain short-dry season covering the five-month period from October through February. Eligible payout periods will occur in March and October. Enthusiasm for the project remains high as several local and global organizations, such as the Indian microfinance firm BASIX and the Ethiopian firm, Maril Consulting, have joined the project to provide technical support.

The highlight of the stakeholder events was a cross-border peer-to-peer exchange trip in February 2011. The trip allowed for the opportunity for informal discussions among community leaders from either side of the Ethiopia-Kenya border, which in turn built a foundation for community support and active communication.

**The peer-to-peer meetings on the border of Ethiopia and Kenya, February 2011.**

Attendees to the workshop-trip include two members of the Oromiya Insurance Company (OIC), including their CEO, the chairman and executive director for the Oromiya Pastoral Association, senior members of the Oromiya Pastoral Area Development Council, and elders of the four key ethnic groups in the pilot target area of Borana. The trip proved invaluable for the project as it generated an awareness of and enthusiasm for the project amongst OIC and influential members of the Ethiopian Boran community.

**2. Group Insurance: The Case of Cotton Producers in Mali. Marc Bellemare: Duke University.** *Area-based yield index for cotton farmers in Mali.*

The aim of this project is to insure Mali cotton producers with an insurance product designed to reduce basis risk while minimizing the possibility for moral hazard and adverse selection. To do so, the insurance product relies on a double trigger system. The first trigger is the cooperative average yield, and the second trigger is the district average yield, where the cooperative is a subset of farmers within the district. An insurance payout occurs only if two conditions are fulfilled: the cooperative yield is below the coop strike point and the district yield is below the district strike point. This contract takes an advantage of the fact that a double trigger allows for a substantial increase in the district strike point.

In the first year of implementation, the researchers designed an area-yield contract using historical cooperative and district yield data, organized a subscription campaign with local partners, trained agents to sell the insurance product, and developed an impact assessment survey focused on cotton and maize production and household consumption. The contract is offered by Allianz, and reinsured by SwissRe.

The first subscription campaign was completed in May 2011. Eighty-six cooperatives were selected for the campaign, of which 28 cooperatives were in the control group and 58 cooperatives were in the treatment group. To encourage uptake, farmers were randomly offered discounts so that they were charged 50, 75, or 100 percent of the actuarially fair premium. To combat varying yields, the contract was offered at a single price within a given zone, though the strike points changed. Following the subscription campaign, 731 hectares were insured under the double strike point contract.

Following the first year, researchers ran experiments in 37 villages to collect data on risk and ambiguity aversion in the context of insurance. In the coming months, the researchers intend to redesign the contract using recent yield data and will continue to study the demand for insurance using impact assessment survey data and experiment results.

**3. Insuring against the Weather: Integrating generic weather index products with group-savings and loans. Carlos Martins-Filho: University of Colorado.** *Flood Insurance in Bangladesh and drought and frost insurance in Ethiopia.*

This research explores how weather index insurance combined with network-based savings, gifts and loans can insure some of the basis risk inherent in index-based risk management tools. The researchers are focusing on designing an index insurance product that is simple, flexible and inclusive and which is appropriately linked to savings and credit to reduce the impact of basis risk. Moreover, this project seeks to increase knowledge on how linking insurance and credit can strengthen credit markets in rural areas. In both Ethiopia and Bangladesh, the project partners with trusted microfinance groups working within the target community to design and deliver a feasible insurance product. The multiple country approach of this project allows for comparisons of implementation strategies, which in turn lays the groundwork for establishing best

practices for linking microfinance and index insurance across the globe.

During the first year implementation, the researchers focused their efforts in both Ethiopia and Bangladesh on contract design. This was done through surveys exploring how well the target population understands insurance products and their preferences, along with experimental games to assess the target group's demand for insurance. The researchers found that in order to increase uptake, the contract must be designed such that it focuses upon strengthening the group's ability to collectively self-insure against group basis risk. The contract must be sold as a combined package of insurance, contingent credit and group savings. Moreover, the group insurance contract must have explicit financial provisions for sharing basis risk. As a result, all group contracts in the final sales window had a group savings component for events affecting basis risk.

In addition to investigating the optimal insurance product for this environment, the researchers also looked into the feasibility of a group savings package for adoption. It was found that a contract between members of a community under which savings are pooled can increase welfare in that in the aftermath of an idiosyncratic shock in basis risk, the household is able depend upon the savings of the community rather than just relying upon their own savings. In the forthcoming year, the researchers will continue to improve upon the insurance product through activities including but not limited to, finishing the analysis of household survey data, presenting and revising findings on a willingness-to-pay experiment in Bangladesh, and refining the index selected through consultations with Ministry of Finance, the Ministry of Agriculture, and other participating organizations.

**An index-based livestock insurance (IBLI) training session in Ethiopia**

**4. Interlinking Weather Index Insurance with Credit to Alleviate Market Failures and Improve Agricultural Productivity in Rural Ethiopia. Craig McIntosh: University of California, San Diego.** *Rainfall-based index mapped to agro-ecological zones for crops in Ethiopia.*

This project aims to design an insurance product linking rural credit with weather index insurance. The simultaneous provision of credit and insurance is hypothesized to combat the interlocking set of market failures many farmers face, which in turn leads to low-investment equilibrium. With this product, the weather-based insurance will provide a collateral substitute, hopefully leading to investment in inputs such as fertilizer or seeds. Moreover, the product should also lessen the portfolio risk of the credit extending institution, rendering the loan feasible and more profitable. Highlights of the project include collaborations with local insurance groups, local financial institutions willing to extend credit to farmers, and local universities and research institutes, and the construction of an ideal weather-index for this area. The researchers seek to create a risk-management tool that is not only effective and comprehensive, but also able to be implemented and sustained elsewhere.

The first year of the project was dedicated to pre-campaign activities. The researchers selected their test group of villages (or Kebeles) for the implementation, constructed a weather index, designed an optimal credit and insurance contract, and conducted a baseline survey, covering 2,399 households in 120 villages. In the near future the researchers plan to determine an optimal structure of the index in time to market the insurance product for the 2012 short and long rain seasons.

**5. The Hunger Safety Net Program/Index Based Livestock Insurance Project in Kenya. John McPeak: Syracuse University.** *Index insurance of livestock for pastoralists in Kenya.*

This project was formerly funded through the University-Madison under the Assets and Market Access Collaborative Research Support Project (AMA CRSP) and will be housed at the University of California, Davis under I4 for 2012-2013. The Hunger Safety Net Program (HSNP) underway in Kenya provides reliable cash transfers to poor households. The cash transfer serves as a tool to meet immediate, essential needs as well as a means for investing in and improving future prospects. To complement the HSNP effort, the researchers seek to create an insurance product focused on protecting against asset loss, specifically livestock herds. To accomplish this objective, the researchers sought to (i) develop an appropriate insurance product and commercialize it through partners in Kenya, and (ii) develop an extension message that will explain to livestock keepers in the area what insurance is and how it works. The insurance product is now commercially available in Kenya, and recently faced its first major test in the recent severe drought.

**6. Index-Based Insurance for Coffee Cooperatives in Guatemala. Elisabeth Sadoulet: University of California, Berkeley**. *Weather-based index insurance for small coffee producers in Guatemala.*

This weather-based index insurance project seeks to offer improved risk management options to both individuals and cooperatives growing coffee in Guatemala. Interlinked transactions among members and ownership of collective assets suggest that group insurance can take advantage of economies of scale and provide benefits in excess of the sum of benefits from individual contracts. In this project, a standard individualized index product is offered alongside a group-based index product. Payout to the cooperative is index-based but payouts from the cooperative are based on observable yield shocks. This type of contract both increases participation by reducing basis risk, and increases the set of incentive compatible contracts the coops can sign. The relative merits of group and individual contracts are rigorously explored in this product, which in turn will allow policy-makers and insurance providers to optimally design future insurance contracts.

In the first year of implementation, the researchers focused their efforts on laying the groundwork for the design and sale of the insurance product. Significant achievements include the completion of a baseline survey, covering approximately 120 coffee cooperatives and 1,605 coffee producers, extensive field visits to assess interest for and preference of insurance products, the definition of an excess rain insurance product for one region in Guatemala, and a theoretical paper on the demand for group insurance in contrast to the demand for individual insurance. The researchers expect an initial sale of the insurance product in ten pilot cooperatives in March 2012.

## OUTREACH EVENTS

In December 2010, I4 researchers joined a World Bank team to host a workshop in Addis Ababa, Ethiopia focused on overcoming the challenges related to index insurance for agriculture in Ethiopia. The workshop brought together participants from the insurance, regulatory and financial services industry. The workshop was split into three sessions. The first session focused on the challenges of uninsured agricultural risk and the role of formal insurance products in meeting this challenge. The second session was a presentation by the I4 teams and Oxfam America on how to design and deliver agricultural index insurance, and how to build capacity for delivering insurance, while the closing session dealt with future implementation and monitoring plans.

In May 2011, I4 researchers Christopher Barrett (Cornell University), Michael Carter (University of California, Davis and Andrew Mude (International Livestock Research Institute) presented the monthly Ag Sector Council Seminar at USAID, speaking on "*Index Insurance to Enhance Productivity and Incomes for Small-scale Agricultural and Pastoral Households in Kenya & Mali.*" One hundred and fifty-fix people attended this well-received event, which spoke to USAID's growing interest in risk transfer instruments that enhance the resilience of target households in Feed the Future countries. The following day, Barrett and Carter joined USAID officials and others at a Congressional Research Service seminar at Capitol Hill on "*U.S. International Food Aid and Food Security Assistance Current Programs and New Approaches."*

In June 2011, I4 director Michael Carter participated in USAID's "*Agricultural Technology Adoption & Food Security in Africa Evidence Summit Agenda"* in Washington, presenting "*Using Savings, Credit and Insurance to Close Small Farm Yield and Income Gaps: Ideas and Evidence from Mozambique, Ethiopia and Mali."* Later that same month, Carter joined

USAID project officer, Lena Heron, at the annual conference of the Forum for Agricultural Risk Management in Development (FarmD) in Geneva. This high profile event, sponsored by the Swiss and Dutch governments, along with the World Bank, brought together the major private sector actors in the agricultural insurance industry, as well as development practitioners and researchers from a variety of countries and multi-lateral organizations. Carter and Heron presented the I4 research agenda and roster of pilot projects, as well as the USAID's emerging interest in this area.

In July, the I4 hosted the first of two major regional index insurance conferences. Held in Lima in the wake of Peru's presidential election, this meeting, "*Public-Private Partnerships for Agricultural Insurance"*, presented risk transfer innovations and their applications specific to the Pan-Andean region. The meeting allowed for a convening on the synergies between the public and private sectors for risk layering and elucidated roles for public and private actors in risk management and agricultural information systems Nearly 100 people attended this event, including representatives from across the Pan-Andean region, including Peru, Ecuador, Colombia, Chile and Bolivia. Side meetings included in-depth discussions with the agricultural transition team from Peru's new government, as well as a regional networking session that brought together insurance industry participants.

Finally, in addition to its own annual scientific committee meeting (held in May at IFPRI), the I4 joined in with the CG centers to help plan the USAID's Feed the Future development strategy, and a more general research agenda around risk and vulnerability. In June, I4 director Michael Carter spoke at the "*Feed the Future Learning Agenda Technical Meeting"* on expanding market access for small farmers. In October, I4 co-sponsored a meeting on "*Index Insurance for Managing Climate-Related Agricultural Risk: Toward a Strategic Research Agenda"* with the CCFAS program of the CG system. The just released report from this meeting lays out an agenda that I4 and its CG partners will sponsor over the next few years in this important area.

An upcoming technical meeting in June 2012 hosted by I4 will bring together the researchers and allow for the dissemination of critical insights from the first and second years of index insurance design and implementation.

# MICRO-HEALTH INSURANCE IN RURAL CAMBODIA:

## EVALUATION OF THE IMPACT ON THE STABILIZATION OF INCOMES AND ENHANCEMENT OF AGRICULTURAL PRODUCTIVITY AND ASSET ACCUMULATION


### Principal Investigators

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http://www.basis.wisc.edu/projects_ama/micro_health_insurance.html

The research carried out a randomized controlled trial of the GRET/SKY micro-health insurance program in rural Cambodia. The SKY program intends to insure households against health shocks, and hopes to be financially sustainable by attracting a diverse pool of members. At the same time, by partnering only with public health facilities, they wish to encourage use of these facilities.

Our project measured whether households used insurance as intended and visited facilities for necessary health care. In addition, our work highlights issues in the way SKY is marketed that may lead to unintended consequences in terms of selection into the program. The results can help inform policy-makers' decisions about the role of private health insurance. If our project shows that SKY does a good job in protecting health, increasing health care utilization among the ill, and facilitating asset accumulation, then there is more justification for policy-makers to address obstacles to the spread of health insurance.


### Additional support

Agence française de développement (AFD): $513,893

Fung Foundation (support ended 12/31/09): $ 98,000

Center on the Economics and Demography of Aging (support ended 12/31/07): $ 24,072

## Outputs

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BASIS Brief no. 2011-03. *Insuring Health: The Impact of Adverse Selection on the Micro-Health Insurance Market in Cambodia*, by David I. Levine and Rachel Polimeni. December 2011.

BASIS Brief no. 2007-05. *Insuring Health: Testing the Effectiveness of Micro-health Insurance to Promote Economic Wellbeing for the Poor*, by David I. Levine, Nhong Hema, and Ian Ramage. July 2007.

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We also disseminated five research briefs in English and Khmer based on the 2008 household survey published by Domeni Consulting and available at http://www.skyie.org/briefings. These briefings describe lives in rural Cambodia and cover the following topics: Household Debt, Household Savings, Health Shocks, Coping Strategies after Health Shocks and Livelihoods and Assets.

## ACTIVITIES

In April and May 2011 Domrei Consulting ran two Impact Evaluation training workshops for 32 local NGO staff and academic Social Science researchers. The course covered the theoretical underpinnings of designing and implementing rigorous impact evaluations. The topics included:

- Types of evaluation
- Measuring Impacts and Impact Evaluation
- Results chain, main indicators, research questions
- Impact evaluation designs
- Building impact evaluations into operations

All participants designed their own evaluation and were required to bring an example of a recent project from their organization to work on during the training. At the end of the course, participants presented their own project impact evaluation design to the group.

We also conducted a second survey of SKY Member Facilitators to report on the health center where they work. In October 2011 we ran a two-day conference in Phnom Penh on the SKY impact evaluation. It was well attended by donors, Ministry of Health officials, NGO staff, and researchers based in Cambodia. Finally, we set up a website http://www.skyie.org/ to host the reports, datasets, and supporting materials.

## FINDINGS

We evaluated the SKY micro-health insurance program in order to:

- determine what characteristics of health insurance are appealing to potential buyers
- determine who benefits from health insurance, and whether or not the targeted population benefits
- determine whether the current SKY insurance methodology is working as intended
- understand how families cope with negative health shocks, and how insurance changes that behavior
- understand whether voluntary health insurance is a viable option in a development setting given the risk of adverse selection.

Our main result is that SKY does a good job in reaching the rural poor, its target audience, who have a high need for insurance because health care costs are frequent and often devastating.

While SKY targets the poor, it wants to avoid financial losses. SKY would have difficulty being financially sustainable if it suffered adverse selection. Thus, the policy includes several terms that limit adverse selection. For example, SKY does not cover chronic conditions such as high blood pressure. In addition, SKY does not pay for the delivery of babies within the first few months of membership. A government policy also reduces adverse selection: separate government programs pay for 100% of the cost of drugs for HIV/AIDS and tuberculosis.

We examined a number of dimensions of adverse selection. On some dimensions, SKY had no disadvantage. For example, in Cambodia (as in most of the world) both the very young and the elderly use more health services than others. SKY households do not have a particularly high share of either young children or the elderly. However, on other dimensions, SKY faces substantial adverse selection. In the year prior to our survey about 19% of SKY household had someone who was disabled more than six days due to health problems. This was almost twice the rate of non-SKY households (11%). At the same time, SKY members and non-members reported similar rates of health care utilization during serious health problems in the three months prior to joining SKY.

Economic theory suggests that adverse selection should be more severe at higher prices. At low prices, even the healthy find insurance attractive; in the extreme case of no cost everyone is covered and there is no adverse selection. We offered randomly chosen households a coupon to purchase SKY insurance at a steep discount. Consistent with theory, the adverse selection in terms of higher rates of disability lasting over six days only

**A Lucky Draw Lottery was used to offer households health insurance at a significantly reduced price in order to encourage take-up in Cambodia.**

appeared for households paying the normal price.

If adverse selection is more severe at higher prices, then purchasers at the regular price will have higher health care use than purchasers at a discounted price. We found this to be supported by the data when comparing purchasers with similar baseline characteristics. These results imply that consumers can predict their future health care needs, and those who anticipate greater need will be more likely to join SKY at a high price.

SKY also faces adverse selection in retaining members. Those who use health care (especially recently) are much more likely to remain SKY members than households that never or rarely used health care.

SKY would have an easier time being financially sustainable if it enjoyed positive selection, where good risks purchased insurance more often. In fact, SKY members and non-members have similar education levels. This result is surprising, as health insurance is a novel product in this region. Potential customers have a difficult time understanding the complex SKY contract, thus we expected SKY buyers to be above-average in education.

SKY members also show no positive selection in terms of risk aversion. SKY members and non-members have similar levels of risk aversion on both of our measures of risk.


**In Cambodia SKY health insurance helps increase use of public facilities, but the public clinics continue to be poorly equipped.**

Our experimental manipulation of prices from the randomized Lucky Draw coupons shows that, at the regular price, less than 10% of households join SKY. At both regular and low prices, most households drop out within the first year of joining. Furthermore, SKY membership:

- does not increase preventative care,
- increases use of public facilities after serious health shocks shifting rural Cambodians away from unregulated providers and drug sellers,
- cuts in half the number of those who forego care due to lack of money,
- does not speed time until receiving care,
- does not improve health (as measured by self-reported health and by the share of children who are stunted or wasted),
- cuts in half the share of households paying over $100 for care of serious incidents,
- cuts in half the share of households taking on new debt when ill,
- cuts in half the share of households selling assets to pay for a health shock,
- and does not detectably improve accumulation of assets or human capital (school enrollment).

In short, SKY helps protect the financial status of insured households, but has smaller effects (if any) on access to health care or on short-term health.

Health centers that partner with SKY have modest improvements in most measures of quality such as share of all mandated drugs in stock, hours of operation, and share of equipment present.

At the same time, there are glaring problems with nearly all clinics missing equipment, drugs, and so forth. Most obviously, soap was present in only a minority of health centers.

# UNDERSTANDING THE IMPACT OF IDIOSYNCRATIC SHOCKS ON FARM PRODUCTIVITY AND HOUSEHOLD ASSETS IN ETHIOPIA, GHANA AND BANGLADESH


## Principal Investigators

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**Christopher B. Barrett**, Cornell University, USA

**Agnes Quisumbing**, International Food Policy Research Institute


http://www.basis.wisc.edu/projects_ama/idiosyncratic_shock_risk.html

New evidence that idiosyncratic risk dominates covariate risk in rural Africa and Asia indicates the potential contribution of improved local risk management to household asset accumulation, productivity growth and poverty reduction in developing countries. This research aims to clarify what existing mechanisms help households through episodes of negative shocks, what gaps exist in coverage, and how different interventions affect productivity in Bangladesh, Ethiopia and Ghana.

Risk and poverty are key, inextricable concerns in these countries. Our research focuses on the impact of idiosyncratic risk on asset poverty and the mechanisms available to redress it. Each county has an existing dataset that pays significant attention to risk issues, social networks and gender. These data allow us to examine the impact of idiosyncratic risk on asset accumulation and welfare dynamics.

Better understanding of idiosyncratic risk and how it affects the long-term wellbeing of households will inform policies that help individuals, households and communities manage risk without being overly interventionist. The research will help inform public health debates about assisting households and small producers to manage illness and disease, a key are of interest in Africa and beyond.

## Additional support


World Bank World Development Report: $25,000 to support the Bangladesh work.

NSF Doctoral Dissertation Improvement Grant: $29,000.

International Growth Centre: $28,000 to support the Ghana work.

NSF Doctoral Dissertation Improvement Grant: $29,000.

UK Economic and Social Research Council: $500,000 to analyze the long-term impact of anti-poverty interventions, using the same Bangladesh dataset.


## Collaborations

This project builds on the earlier BASIS CRSP project, "Conceptual and Statistical Foundations for the Estimation of Poverty Traps," which developed the concepts and methods employed in this project.

In Bangladesh, the project builds on data collected as part of a longitudinal study funded by the Chronic Poverty Research Centre, HarvestPlus, the University of Waikato, and the Systemwide Initiative on Collective Action and Property Rights (CAPRi) of the CGIAR. Additional funding was secured from the Department for International Development (UK) and the Economic and Social Research Council.

In Ethiopia, this project linked with the World Bank capacity building project, "Pathways from poverty in Ethiopia: Strengthening Ethiopia's PRSP through the analysis of longitudinal household data." We work with IFPRI's ESSP program, funded by a consortium of donors and linked to high-level policy-makers in Ethiopia.

In Ghana the project builds on the USAID SAGA cooperative agreement, which funded closely related policy research and outreach in Ghana and helped ISSER found the highly successful Economy of Ghana Network (http://www.egnghana.org/).

## Outputs


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## Press coverage in Ghana

http://www.modernghana.com/news/212143/1/g8-call-for-tighter-investment-controls-in-africa.html

## ACTIVITIES

*Bangladesh*: Original data collection was completed in 2008. In 2010, new data was collected, funded by the Swiss Development Corporation, HarvestPlus, and the International Finance Corporation. Although the analysis supported by this grant was primarily undertaken using earlier rounds of data, we decided to perform a similar analysis linking the 2006/2007 round with the 2010 round, so we could focus on the impact of the food price crisis.

The paper on determinants of group membership and social relations was released as a CAPRi working paper. The 10-year panel data was analyzed and released as two IFPRI discussion papers on the gendered differences of asset accumulation. Dissemination activities for the AMA-CRSP funded portion of this research were completed in 2009. Additional dissemination activities were undertaken in October 2011 in Washington DC as part of an AMA-CRSP funded workshop on gender and assets.

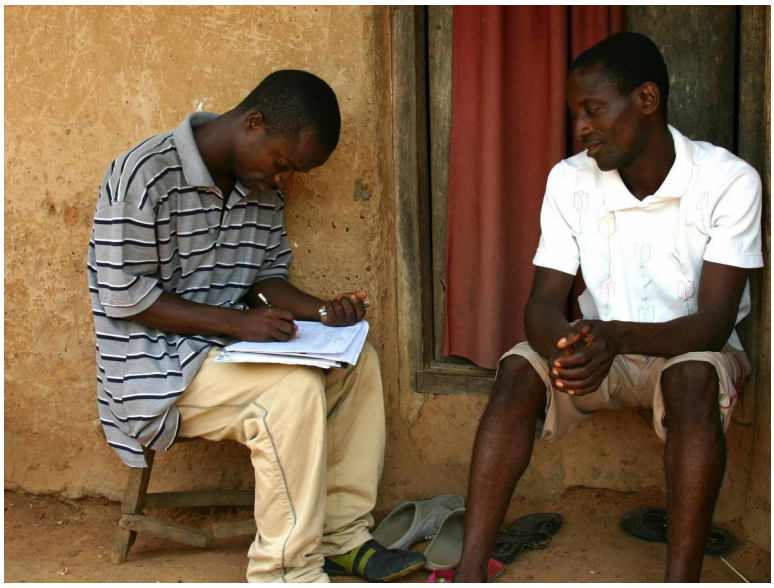
*Ethiopia*: Data collection is complete; no new data was collected. We created a preliminary data set and comparable variables on shocks, consumption, and assets using the panel data from Bangladesh and Ethiopia.

A paper documenting the role of illness shocks in the context of poverty dynamics was revised and accepted for publication. A paper on the potential of index-based insurance was revised, has been published as an IFPRI discussion paper and also submitted to a refereed journal. Relatedly, the 2009 round of the Ethiopian Rural Household Survey (ERHS) was publicly released during the 2011 meetings of the Ethiopian Economics Association in Addis Ababa in July. Revised results on the insurance work were presented at the Centre for the Study of African Economies annual conference held in Oxford UK in March 2011.

*Ghana*: Data collection on the Akuapem South panel was completed. The 2009 survey comprised five rounds of bimonthly panel data on household income, consumption expenditure, farming activity and transfers, plus additional modules on social networks, shocks and risk perceptions, housing, membership of organizations and co-operatives, family background, marital attitudes and education.

These data are supplemented by two experiments. The first tests the effect of unanticipated positive income shocks on consumption and transfers. The second tests the effectiveness, among villagers, of different incentives to contribute to public goods. We supplemented these quantitative data with focus group discussions with farmer organizations in July 2010 intended to understand patterns of pineapple market participation and management of major covariate market shocks.

We prepared a technical summary of the 2009 survey data, with summary statistics, plot and social network maps, and analysis of the wealth dynamics since the previous survey waves (in 1997/98 and 2004). This report was disseminated in abridged form to the survey villages as part of our outreach efforts.



**Interview in Oboadaka, Ghana. Photo by Thomas Walker.**

Qualitative and quantitative data from the project have contributed to a multi-country comparative

paper on smallholder market participation that has recently been accepted for publication in *World Development*. In August 2011, Thomas Walker published his doctoral dissertation, two chapters of which use data from the survey and field experiments conducted in 2009. Finally, there are two papers still in progress. The first makes use of the 1997/98 panel to analyze welfare transitions in the survey communities between 1997 and 2009, looking specifically at the mechanisms used by households to cope with major household-specific shocks. The second addresses the major structural changes in the export pineapple market over the past decade, which have seen producers consolidate and many small farmers leave the industry, and identifies the effect of membership in farmer organizations in mitigating the welfare impact of those changes.

**In Bangladesh women typically own small livestock that are easily sold or slaughtered to help mitigate a shock.**

Thomas Walker presented seminars on the public goods paper at the NEUDC conference in Boston, MA in November 2010 and at the Centre for the Study of African Economies (CSAE) conference at Oxford, UK in March 2011. Felix Naschold presented the draft paper on idiosyncratic shocks, risk management and welfare dynamics at the Agricultural and Applied Economics Association annual meetings in Pittsburgh, PA in July 2011.

## FINDINGS

*Bangladesh*. The results from the study on gender-differentiated asset dynamics were updated to account for attrition bias without qualitative differences. The results continued to show that asset dynamics for husband-owned, wife-owned, and jointly-owned land and assets are different, with the finding that wives are less able to accumulate assets—particularly land—than men. Husbands' and wives' asset stocks are drawn down for different kinds of shocks, with husbands' assets being liquidated in response to dowry and wedding expenses, and wives' assets being negatively affected by illness shocks. Given that illness shocks are the most frequently-reported idiosyncratic shock in Bangladesh, health insurance may be an important way to protect assets, in particular women's assets. Using the data collected to study the impact of the food price crisis we completed a cross cultural comparison. In Bangladesh, weather-related shocks, such as floods or droughts, have a larger impact on men's assets, while illness shocks take their toll on women's assets. In Uganda, drought shocks affect wives' assets, but not husbands'. Thus, one could surmise that weather-based insurance could be marketed to husbands in Bangladesh and wives in Uganda, but that health insurance might be more readily taken up by wives in Bangladesh. Differences in the institution of marriage and cultural concepts of joint and individual ownership may affect the extent to which joint or individually owned assets are used to cope with shocks. In Bangladesh, the results showing generally insignificant impacts on aggregate land and asset holdings—while individual assets are sacrificed at the margins—indicates that husbands and wives try to preserve the economic base of the household unit. In contrast, in Uganda, husbands' assets appear better insured than wives' or even joint assets. Policy interventions that enable households to manage risk need to take into account both individual and joint asset ownership, and ensure that social protection schemes do not—intentionally or unintentionally—widen the gender asset gap.

*Ethiopia*. In a revised paper, we examined which farmers would be early entrants into weather-index insurance markets, were such markets to develop on a large scale. Educated, rich and proactive individuals are more likely to purchase insurance. Risk aversion is associated with low insurance take-up suggesting that models of technology adoption can inform the purchase and spread of weather index insurance. We assessed willingness to pay and found that basis risk reduces demand for insurance when the benefits to insurance are lower, and provision of insurance through groups is preferred by female-headed households and individuals with lower education.

Using the newly collected ERHS data, we explored what keeps some people persistently poor, even in the context of relative high growth. We explore this using a 15-year longitudinal data set from Ethiopia to compare the findings of an empirical growth model with those derived from a model of the determinants of chronic poverty. We asked whether the chronically poor are simply not benefiting in the same way from the same factors that allowed others to escape poverty, or whether there are latent factors that leave them behind? We find that chronic poverty is associated with several initial characteristics: lack of physical assets, education, and 'remoteness' in terms of distance to towns or poor roads. The chronically poor appear to benefit from some of the drivers of growth, such as better roads or extension services in much the same way that the non-chronically poor benefit. However, death and illness shocks are a significant drag on growth as they contribute eleven percentage point losses in growth in per capita consumption.

*Ghana*. Social insurance has the potential to fill the gap left by formal financial markets. However, access to these social insurance mechanisms is not uniform. Risk management in rural Ghana varies with the extent to which people are integrated into the social fabric of the village. We identified a subpopulation of villagers (8%), who are socially invisible as they were not known by any other villager in random matching. These socially invisible individuals tend to be younger, poorer, engaged in farming, recent arrivals, fostered, and not members of a major clan. There was evidence of considerable risk pooling among the socially visible to the extent that individual shocks don't seem to cause large changes in consumption. In contrast, we rejected risk pooling for the socially invisible subpopulation. These findings suggest that social safety nets should be responsive primarily to covariate risk and to idiosyncratic risk of the socially invisible.

Our first field experiment in Ghana measured the willingness of individuals in the study communities to contribute to the financing of local public projects. Individuals were asked five times during 2009 to donate to a public good for their community. The experiment employed two commonly used techniques to encourage contributions: a matching grant and a provision point mechanism. Both were found to increase contributions, though the provision point mechanism was substantially more effective.

Using detailed survey data on participants and their social networks, we examined the characteristics that explain individuals' contribution decisions. Controlling for wealth and other characteristics, individuals who are better trusted by their peers contribute significantly more, but this result is not explained by their status alone. Indeed, we found that the contributions of community leaders were not significantly higher, but that new migrants to the community donate more than individuals with a family history in the community.

Our second field experiment tested how social obligations to share resources affect the savings and investment behavior of individuals in rural Ghana. We developed a theoretical model linking the characteristics of a household's social network, and its position within that network, to its decisions about investment and consumption. We tested the model's hypotheses using the results of a field experiment, in which large prizes of cash and animals were allocated by lottery to randomly selected respondents in a longitudinal household survey. Wealthier individuals were significantly less likely to invest their prize winnings. We attribute this result to a greater 'social rate of taxation' – erosion of income through transfers to others – faced by relatively wealthier individuals. The effect is more pronounced for those with larger village social networks, who are likely to have more coinsurance partners. The results suggest the presence of an 'investment trap', whereby richer individuals are discouraged from making profitable investments because of the likely social taxation of gains from those investments.

*Synthesis*

We created an original and extensive overview of evidence on community-based risk management arrangements (CBRMAs) observed across the developing world. These include traditional, indigenous, informal credit, savings and insurance arrangements as well as newer, semi-formal community-based microfinance, storage and insurance arrangements typically introduced by the government or an NGO. Our analysis underscores the fact that risk management and poverty are often intrinsically linked. If income is endogenous, asset risk can have a more permanent impact than one-off income risk. While CBRMAs can overcome some of the information asymmetries and enforcement costs that plague more formal mechanisms, to date there are no careful evaluations of the efficacy or the rate of return of CBRMAs. Such evidence, however, would be needed before commencing large scale financing of CBRMAs as part of social protection programs.

**In Bangladesh, wives are less able to accumulate assets—particularly land—compared to their husbands.**

Empirical work on the effects of risk inevitably must rely on panel data. Much of the existing literature on risk and on welfare dynamics relies on panel data that cover only relatively short intervals between observations. We, however, found that (even when controlling for measurement error) the magnitude of welfare variability and, hence, of estimated risk, is systematically and inversely correlated to the time interval between panel observations. This highlights the importance of collecting long-run panel datasets to properly identify the extent of structural economic mobility and risk faced by households.

# WEATHER INSURANCE, PRICE INFORMATION AND HEDGING: FINANCIAL INITIATIVES TO HELP THE POOR MANAGE AGRICULTURAL RISK (INDIA)


## Principal Investigators

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http://www.basis.wisc.edu/projects_ama/Weather_Insurance_India.html

Among approximately 150 million rural households in India, roughly 60% are engaged in agriculture. Within this group, almost 80% of all operational landholdings are accounted for by small and marginal farmers. Such individuals are predominantly subsistence farmers earning thin margins after each harvest. These farmers own few assets, are usually dependent on rainfall for irrigation, and have limited or no access to formal means of risk management. One of the most significant barriers to asset accumulation for poor households in India has been the risk of 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 household level shocks such as death or illness, may break down when aggregate shocks occur. Poor households can be driven to near bankruptcy, obliging members to borrow at high interest rates, migrate, or reduce investment in children's education. Selling assets is a common coping mechanism. Yet during an aggregate shock, everyone in the area is affected, so demand for assets is very low while supply is high, reducing the value of assets and thereby reducing the ability to pay off debt or finance future consumption.

Traditional crop insurance schemes such as the National Agricultural Insurance Scheme (NAIS) are thought to cover roughly 15% of farmers, leaving a large majority of farmers without adequate means to manage household risk. This project, involving hundreds of rural villages across six districts in Gujarat, India, is developing a complementary pair of initiatives to address risk, and evaluate their efficacy with a series of a randomized field experiments. The first initiative, rainfall insurance, is an index-based financial product that provides policy holders a cash payout in the event of excess and deficit rainfall during the summer growing season, or *kharif*. Rainfall insurance mitigates risk relating to the quantity of agricultural output.

The second initiative, price information and hedging, provides farmers with commodity futures prices so as to aid them in making sowing and storage decisions, as well as in signaling when optimal selling decisions could be made. By disseminating spot prices at harvest time, the chance farmers receive a poor price should be reduced, either by informing farmers about which markets to travel to for sales, or aiding in price negotiations.


## Additional support

AusAID for Price Information Hedging through 2012

International Initiative for Impact Evaluation-3ie for Weather Insurance Evaluation through 2014

## Collaborations

We worked with the World Bank and the Federal Reserve Bank of New York on a closely related project that provided particularly large rainfall insurance policies to 50% of a sample of approximately 1,500 farming households in Andhra Pradesh, India. The rains in Andhra Pradesh were particularly poor, and the payouts are expected to be quite large (up to ¼ of the value of a farmer's typical income). We therefore expect to detect substantial consumption smoothing and investment effects. We are continuing collaboration with Xavier Gine (World Bank), Robert Townsend ( MIT), and James Vickery (Federal Reserve Bank of New York and NYU Stern) for the paper entitled "Barriers to Household Risk Management: Evidence from India"**.**

With the Institute for Financial Management and Research, we explored a project using mobile phone technology to assist farmers with marketing their output, and solving research bottlenecks. A separate ground staff in Ahmadabad has been hired for this project, funded by AusAID, but there will be significant complementarities and spillovers between the futures price information project and our AMA project. We also collaborate closely with an AUSAid funded project that extends the work started in the Price Information and Hedging project by providing futures price information to individual farmers via SMS.

## Outputs


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Mukherjee, Anita. 2011. "Insurance against Correlated Agricultural Shocks: A Numerical Solution to the Farmer's Problem". Working paper, contact Anita Mukerjee at amukh@wharton.upenn.edu for the latest version.

Stein, Daniel and Jeremy Tobacman. 2011. "Weather Insurance Savings Accounts". Working paper available at http://personal.lse.ac.uk/stein/WISA9-21.pdf


Also available are operations manuals on the futures price information and weather insurance and an instructional video on futures markets.

## ACTIVITIES

*Weather insurance.*

In November 2010 SEWA (the Self-Employed Women's Association) teams distributed payouts from the Kharif 2010 policy. Immediately after the conclusion of payouts, the CMF research team conducted the follow-up household survey in which 1900 households from the original sample were surveyed along with 165 additional households who purchased a policy in 2009 and received a payout. These additional households were subsequently added to the sample.

In collaboration with our NGO partner organization, SEWA, and feedback from past insurance clients we developed a new weather insurance product and marketed it to households in the 108 villages covered by our project in the districts of Ahmedabad, Anand and Patan in Gujarat. The two changes to the policy offered in 2011 were: (1) the policy offered five phases of coverage rather than three, and (2) each phase had excess and deficit rainfall triggers with associated payouts. Agricultural Insurance Company of India (AICI) continued to underwrite the policy. Baseline marketing materials did not change from the previous year. In coordination with our research team, SEWA started marketing the product in April 2010 to households in the treatment group. Our team concurrently commenced the seventh site visit.

**SEWA workers marketing weather insurance policies to village households.** We found that families were willing to pay for insurance but generally at prices substantially below the current market price. This suggests that subsidies or improved efficiencies in pricing may be needed to facilitate dramatic increases in risk coverage. Photo by Prashant Parmar.

Discounts were again randomly assigned on individual policies in order to elicit willingness to pay for coverage. Additionally, a discounted package of four policies for the price of one was offered in 50% of the randomly selected sub-districts. These treatments allowed us to evaluate the impact of insurance adoption as well as the dynamics of demand and take-up, i.e., how willingness to pay for insurance varies over time and with respect to past coverage level and payouts.

Some households were randomly assigned a loan for the premium to be paid back at payout. This was supposed to address liquidity constraints. A more rigorous monitoring structure was implemented during the marketing season to ensure the accurate delivery of treatments and the game used to elicit willingness to pay.

*Price information and hedging.*

We conducted a fifth round of household surveying in villages in the districts of Ahmedabad, Mehsana, Surendranagar, and Vadodara. Analysis of this data has shown that our intervention is having an impact on farmers' price expectations. Additional training in futures prices and improvements to our price information delivery mechanisms took place in the spring, accompanied by a third round of surveying. Since put options for agricultural commodities continue to be illegal in India we continued to provide price information and futures market education, and worked with the commodities exchange to communicate the value of options to the regulatory authorities.

*Additional Activities.*

Using additional support from BASIS/CRSP we were able to add *a financial literacy module* during the marketing. Half of the villages in our treatment group were randomly selected to be administered this module in addition to the usual discussions about product design and payouts. This financial literacy module was administered in an interactive session in which farmers were asked about what they felt would cause them the most damage during production. They were then walked through the concepts of covariate and idiosyncratic risks in context of the production risks they mentioned.

Farmers were subsequently divided into groups and a game using cards for money and various risks farmers faced were used to simulate how rainfall insurance could be useful. The sessions were led by CMF facilitators with helpful interjections from SEWA's marketing teams. Two village level meetings were held in every village, and the response was generally positive.

In a preliminary analysis of the demand for *a product that combined weather insurance with savings* (inspired by the highly successful Whole Life Insurance products available in India) we conducted twenty-one qualitative individual surveys in three villages. The sample included individuals with varying levels of financial literacy and socio-economic status. Based on initial results suggesting the existence of demand for such a product we are actively seeking additional funding to help conduct lab experiments to identify feasible formulations of this product to be tested in the field.

**Viewing a price board.** Farmers who received financial and futures training from a module designed by the AMA project in collaboration with NCDEX show greater understanding and, importantly, *trust in* the futures and financial markets. These farmers are more likely to use future prices to form their agricultural decisions.

We conducted focus-group discussions with salt farmers with the aim of exploring whether there was a market for *Weather Swaps* (i.e. Mutual insurance products between salt farmers and other farmers with inversely correlated rainfall shocks) and *Mini-Catastrophic Bonds*. Due to the poor response for these ideas in the focus groups and from our partners, we decided not to carry on with the project at this time.

We also conducted a pilot study on *revenue guarantees* which combine rainfall insurance with a cash guarantee conditional on farmers shifting to a more rainfall-sensitive but also more potentially profitable crop. For the purposes of this experiment, we selected *mung* (i.e. green gram). The sample of forty-six households was selected in Patan district of Gujarat. Half the households were offered the treatment of receiving a revenue guarantee and expert agricultural advice if they agreed to switch to *mung*, while the other half were offered a choice between receiving Rs. 710 in cash or receiving expert agricultural advice conditional on buying rainfall insurance. Eleven of twenty-three people accepted the treatment, however due to high attrition only six farmers eventually grew *mung*. Twenty of twenty-three people accepted the control offer. We took soil samples; regularly monitored the land attached to the guarantee and provided regular advice on growing *mung* to the treatment group. Due to delayed and unusually excessive rainfall, almost all crops failed, thus making those who planted *mung* eligible for the guarantee. The objective was to encourage farmers to shift to a riskier but highly productive cost even without the guarantee in the next year, however considering the high sensitivity of *mung* to animal attacks and crop failure this year, we decided to shelve the project.

Finally, we undertook an extensive project led by a full-time consultant and two PhD students *to construct the panel dataset* for the entire project. This was completed.

## FINDINGS

Our sales method, novel for a financial product, revealed household willingness to pay in an incentive-compatible manner. Preliminary results suggest that many households were willing to pay prices that are substantially below current market price of insurance. This suggests that either subsidies, or improved efficiencies in pricing, may be necessary to facilitate dramatic increases in risk coverage. Households' willingness to pay for insurance also increased substantially when offered a loan to cover the premium, albeit for the larger four policy bundle, and

not for single policies. In previous years the good rains led to no payouts. However, over 60% of 2009 purchasers received a payout from the policy. This helped build trust in the policy and in SEWA.

Perhaps as a result of these factors, sales in 2010 were the highest so far, with a total of 1,775 of 3,943 eligible households purchasing 6,384 policies. In spite of the complexity of the product, it may be that a great deal of learning has occurred over the years.

In the price information and hedging project, the main findings suggest that farmers in the treatment group have a better understanding and trust of futures and financial markets, and are more likely to use future prices to form price expectations than the control group. Farmers have now received three rounds of futures training using the comprehensive module and training video designed in collaboration with NCDEX. We hope to see the effects of this annual training on the extent to which farmers incorporate futures price information into their agricultural decisions.

# A PRODUCTIVE SAFETY NET FOR NORTHERN KENYA'S ARID AND SEMI-ARID LANDS:

## THE HSNP+ PROGRAM


### Principal Investigators

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http://www.basis.wisc.edu/projects_ama/HSNP_Kenya.html

The Hunger Safety Net Program (HSNP) launched in Northern Kenya provides reliable cash transfers to poor households. Given the considerable risk faced by households in the arid and semi-arid lands (ASAL) of Kenya, theory and empirical evidence both suggest that there may be considerable value added from augmenting HSNP with a productive safety net (PSN). The addition of the PSN can have three key effects:

1. stem the downward spiral of vulnerable households into poverty,
2. stabilize pathways from poverty through asset accumulation and
3. crowd-in finance for ancillary investment and growth.

To achieve these impacts, a PSN needs to reliably and predictably compensate ASAL households for asset losses. Conventional insurance is not feasible. Researchers are working on an Index Based Livestock Insurance (IBLI) scheme that can be used as a foundation for the PSN program.

The project evaluates the impact of both the HSNP and the PSN programs. The goal is to design interventions that not only serve the immediate needs of vulnerable households, but also put them on a long-term path to asset protection and improved productivity. The evaluation looks at households receiving both the HSNP and PSN interventions, those receiving only one, and those households that are not involved in either program. This will help inform the design of future cash transfer programs, and assess the utility of including PSN programs with them. The project looks at standard headcount/poverty gap measures, as well as asset accumulation, child education and health, and income and consumption to assess the household benefits of program participation.


### Additional support

USAID Borlaug LEAP program: $19,997

DfID: $436,535

World Bank: $238,446

International Labor Organization (ILO): $205,000

Global Index insurance Facility (GIIF): $153,673 as a 40% premium subsidy

DfID and EU: $3,060,238

## Collaborations

This project builds on the USAID Global Livestock CRSP project on Pastoral Risk Management (PARIMA), which collected and analyzed household data from northern Kenya 1999-2005, and the Arid Lands Resource Management Project (ALRMP) based in the Ministry for the Development of Northern Kenya and other Arid Lands. Livestock mortality data from ALRMP was used to model the insurance contract and ALRMP staff facilitated field work associated with the development of IBLI.

The project is involved in a joint program involving a collaboration of ILRI with the Financial Sector Deepening Trust in Kenya, the Rockefeller Foundation and the World Bank's Commodity Risk Management Group. The goal of the collaboration is to help develop a broad range of index-insurance pilots for agriculture in Kenya.

In an effort to investigate other products similar to IBLI but in a different scale and context, we are investigating the feasibility of introducing index-based famine insurance in Kenya targeted to meso and macro level clients. We secured a multi-year grant from the Index Insurance Innovations Initiative (I4) to adapt IBLI for pastoralists in southern Ethiopia. In addition, we obtained a seed grant from Cornell University to start working on environmental impact assessment of IBLI in southern Ethiopia and a small grant from the CGIAR Climate Change, Agriculture and Food Security program to do a short field study on climate risk management and climate change adaptation in southern Ethiopia.

## Outputs


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## Media Coverage

Articles in *The Economist, New Agriculturalist, Christian Science Monitor, Cornell Chronicle, Daily Africa*, BBC World Service and many others. For full details and transcripts see the IBLI project web site at http://livestockinsurance.wordpress.com/.

Additional and ongoing information on our project can be found at http://livestockinsurance.wordpress.com

## ACTIVITIES

The team completed all of its planned activities. Major activities involved:

- finalization of the index-based livestock insurance (IBLI) product design, as well as liaison with a Kenyan commercial underwriter (UAP Insurance), a retail financial institution (Equity Insurance Agency, EIA) and an international reinsurer (Swiss Re) to pilot IBLI
- coordination with the DfID-sponsored Hunger Safety Nets Program (HSNP) around monitoring and evaluation issues
- fielding a baseline survey in advance of the launch of IBLI so as to enable rigorous evaluation of IBLI's behavioral and welfare impacts over time
- write-up of results from the analytical work done in designing IBLI and from the financial education games our team ran in summer 2008 and fall 2009, as well as from the surveys in summer 2008.
- obtaining regulatory approval from the Insurance Regulatory Agency (IRA) of Kenya. IRA's was concerned that the insured party's covered risk was very clear. IRA agreed to review the issue should the success of the pilot result in more comprehensive scale-out across the country.

**A livestock carcass in Marsabit, in Northern Kenya, which has suffered prolonged drought. Photo by Neil Palmer (CIAT).**

The Marsabit Pilot IBLI is an annual contract spanning March to February of each year, with prospective payoffs in both October and March. The first half of the 2010-2011 year was a good season, so no indemnity payments were due in October 2010. The short rains were very weak, so herds and rangelands began to exhibit stress in early 2011, although not enough to trigger payouts in March 2011. However, the situation worsened over the ensuing long rains/long dry season portion of the 2011-2012 contract. When it closed on September 30, indemnity payments were due to all policyholders in each subcontract area. The payments began with a ceremony in Marsabit in October 2011.

**A village meeting in Dirib Gombo for farmers who took out livestock insurance to receive their first payout.**

**Photo by Neil Palmer (CIAT).**

IBLI contracts were marketed for six weeks in January and February 2010. In spite of some significant complications in the sales and marketing period our expectations were exceeded. In the six weeks after the launch a total of 1,979 individuals purchased insurance contracts to cover a total of 3,908 cattle, 15,826 sheep and goats, and 339 camels, for a total of 5,375 tropical livestock units (TLU). Premiums collected totaled US$46,597, with another roughly US$30,000 in subsidies provided by donors to make up the full premiums paid to the underwriter and reinsurer. Unfortunately, the commercial partners failed to effectively mount the August-September 2010 marketing campaign and also struggled with the January-February 2011 marketing campaign, for which ILRI provided considerable administrative and logistical assistance. The January-February 2011 marketing campaign brought sharply lower contract sales. Just 599 people bought contracts on 1,231 TLU (see table below).

| | March 2010_ February 2011 | March 2011_ February 2012 |
|---|---|---|
| People buying contracts | 1,979 | 599 |
| TLU Insured | 5,375 TLU | 1,231 TLU |
| Value insured in USD | $1,193,080 | $221,049 |
| Insurance company received | $77,636 | $8,121 |
| Subsidy | $31,039 | $5,414 |
| Herders Paid | $46,597 | $8,121 |
| Subsidy as % of value insured | 2.60% | 2.45% |
| Herder paid as % of value insured | 3.90% | 3.67% |
| Insurance c. rec as % of value | 6.50% | 6.10% |
| TLU insured per person average | 2.8 TLU | 2.1 TLU |

It is unclear what explains the drop in purchases. Perhaps (i) reduced demand due to tighter financial liquidity constraints made it hard to afford premium payments as the drought began in late 2010-early 2011, (ii) a weaker marketing effort by partners, (iii) reduced demand due to increased scepticism about the product after no pay out in the first indemnity period (October 2010). (iv) less "over-selling" of the product by VIPs relative to the first marketing campaign, or potentially other reasons.

In addition to launching the pilot and outreach activities, the team designed and fielded a baseline survey of 924 households in Marsabit District, stratified based on locations that were receiving HSNP cash transfers or not and whether the team would randomly distribute IBLI discount coupons to encourage uptake or not. Ultimately, coupons were distributed to 551 households or 60% of the sample. Recipients were randomly selected and received discounts of 10%, 20%, 30%, 40%, 50%, or 60% of the premium for the first 15 Tropical Livestock Units covered. Of these, 223 coupons were redeemed for a total value of discounts of Ksh 217,819 (US$2,900). Based on results from the baseline survey, the team revised the questionnaire and added new modules to track household self-reported uptake of IBLI. The data were entered, a codebook developed, and the survey instruments revised further for a October-November 2011 resurvey of the same households.

Given how time-consuming we found the data entry and cleaning in the baseline and 2010 repeat rounds, we decided to move to electronic survey data collection using surveybe software for the third repeat survey. There are a several challenges related to this, including acclimating enumerators to using handheld computers, the logistics of maintaining working computers and adequate power sources in the field, software glitches, etc., but overall we think this switch is a good idea that will pay off handsomely over the coming months.

The 2009-2010 game play data became available in October 2010, the baseline 2009 data became available for analysis in March 2011 and the repeated 2010 data became available in May 2011. Preliminary analysis of this data was conducted throughout the year.

Updating the index proved quite time consuming over the initial year of the pilot. Thus we engaged a Cornell computer science student to work with Dr. Ikegami to automate the index, downloading data from the public site where the satellite-based NDVI measures are released, computing the index and then posting it using a color-based legend we developed to report the present status of the index by contract area. The color coding was intended to convey the essential message of the prediction and to keep people from focusing on small differences over time in the predicted mortality levels that did not have any meaning in terms of insurance payments. This was the format adopted for the release of the September 2011 predictions.

## FINDINGS


**The launching ceremony at Equity Bank in Marsabit, Northern Kenya**
**Photo by Neil Palmer (CIAT).**

It appears feasible to design index-based livestock insurance contracts that are both attractive to pastoralists who might individually purchase the contracts and to commercial financial institutions that must market, sell and underwrite the products. Statistical evaluation of the product through a range of different techniques clearly confirms the appeal of the product to stakeholders in the target locations and financial institutions.

It appears that financial education games can be successfully developed and fielded to capture the essence of complex IBLI products and that pastoralist and agro-pastoralist populations with little or no education can rapidly grasp these ideas so as to be able to make informed decisions as to whether or not they should purchase IBLI products as they come on the market. Refinements of the game protocol and development of a software platform should substantially enhance the generalizability and replicability of these tools.

There appears to be considerable demand for IBLI, as manifested by the relatively robust uptake of nearly 2,000 individual purchasers of contracts during a brief, six-week marketing campaign in which the commercial delivery agents encountered many unexpected problems with their sales strategies. Interest in the product is tremendous, both within the region and among private sector, government and civil society actors in other Kenyan pastoral areas.

The loss of the satellite platform from which the NDVI data was to be obtained highlighted the need to develop back-up data systems in the design of these contracts. The team was able to backfit an alternative statistical series, but it was a great deal of work under intense time pressure and was not the optimal way to address such problems. In the future we will use either a more general indicator or develop built-in backup systems.

It is essential to work out detailed operational guidelines so that all partners know and accept their roles. The transition to full ownership of the product and all of its support activities by the private sector partners has been somewhat rockier than anticipated. Part of this is likely attributable to the fact that everyone is learning about the product as we go and thus there was no good operational manual in place. It would be desirable to prepare a detailed operational manual clearly outlining in detail the activities that each party must undertake, when, and how so that miscommunication and the considerable transactions costs of product delivery and management can be reduced. This will be essential for any scale up of IBLI.

During 2011 several important innovations in the delivery of micro-index insurance were developed. In addition to developing the color legend to improve the communication and comprehension of index predictions,,we expanded the sales platform to include a telephone-based scanner that is much cheaper than the original point-of-sale (POS) device; the new platform accounted for the bulk of the 2011 IBLI sales.

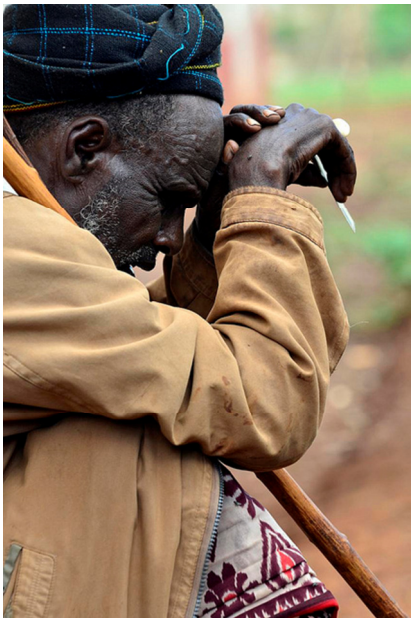
**The telephone-based scanner used for livestock insurance sales.**
**Photo by Neil Palmer (CIAT).**

In addition, we developed code to automate the computation and publication of the index based on near-real-time release of NDVI data series. We also developed new extension programming tools, including a reference guide for village insurance promoters (VIPs), cartoon, a skit recorded in video for broad-based dissemination, and radio messaging.


**ILRI director general Jimmy Smith speaks to residents of Marsabit during the launching ceremony.**

**Photo by Neil Palmer (CIAT).**

Finally, IBLI is attracting considerable attention and garnering awards as an innovative development effort. The IBLI project won a best-practice award from the Poverty Reduction, Equity and Growth Network in recognition of the project's innovative approach of combining scientific research and practice which was awarded to Dr. Mude at the 2-3 September PEGNET annual conference, held in Midrand, South Africa. In April 2011, IBLI won a V2030 ICT Innovation Award from the Kenya ICT Board. The announcement said that the "Index-based Livestock Insurance (IBLI) is a promising and exciting innovation in insurance design that allows the risk-management benefits of insurance to be made available to poor and remote clients. The IBLI product being piloted in Marsabit District aims to provide compensation to insured pastoralists in the event of livestock losses due to severe forage scarcity. Incorporating remotely-sensed vegetation data in its design, delivered via mobile ICT-based transactions platforms, and with experimental extension methods used to educate the remote pastoral herders, the IBLI product boasts many firsts in product development."



**A farmer awaits a livestock insurance payout following a village meeting in Dirib Gombo, near the northern Kenyan town of Marsabit.**

**Photo by Neil Palmer (CIAT).**

# AREA BASED YIELD INSURANCE FOR PERUVIAN COASTAL AGRICULTURE


## Principal Investigators

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**Michael R. Carter**: University of Wisconsin, USA

**Carolina Trivelli**: Instituto de Estudios Peruanos, Peru


http://www.basis.wisc.edu/projects_ama/Area_Based_Yield_Insurance_Peru.html

The potential benefits of agricultural insurance include greater willingness on the part of farmers to carry risk and engage in production strategies with higher returns, as well as increasing the provision of lending to agriculture. However, the design of sustainable insurance products for agriculture is very complicated. This project tests an area-based yield (ARBY) insurance scheme for small and medium sized producers in selected valleys of the Peruvian coast. This ARBY insurance product should give farmers a lower base risk than other types of index-based insurance programs.

The Peruvian government approved $30 million to strengthen rural financial markets, with the provision of index-based insurance as a top priority. We work with government officials, financial market providers, and the private insurance sector to help develop a product that can be offered to farmers in the market. By assessing the uptake and impact of this pilot project, researchers will be able to inform future activity of the Ministry of Agriculture in Peru.


## Additional support

Giannini Foundation Faculty Research grant: $20,000

Blum Center for Developing Economies Research Support grant: $20,000

## Outputs

BASIS Brief no. 2008-07. "Insuring the Never before Insured: Explaining Index Insurance through Financial Education Games," by Michael R. Carter, Christopher B. Barrett, Stephen Boucher, Sommarat Chantarat, Francisco Galarza, John McPeak, Andrew Mude and Carolina Trivelli. Available in Spanish. October 2008.

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## ACTIVITIES

For this final report, we discuss the two primary research activities carried out over three years: the impact evaluation of the area-yield insurance contract and the experimental/behavioral economic research to better understand demand patterns.

*Background.* This project began over six years ago when Boucher, Carter and Trivelli introduced the idea of index insurance to APESEG, the Peruvian Insurance Association. After many months of conversations with APESEG, and the associated individual insurance companies, we found a pro-active partner, the Peruvian insurance company La Positiva Seguros y Reaseguros. Lourdes del Carpio, sub-director of agricultural insurance for La Positiva, was instrumental in those discussions and in ultimately convincing La Positiva to agree to the pilot program. We also acknowledge the innovative attitude of Gustavo Cerdeño, an upper manager in La Positiva, without whom the project would not have been undertaken.

Once La Positiva agreed to participate as the insurance provider, the next step was to identify a local institution with sufficient experience in agriculture and a respected reputation among small farmers to be the day-to-day face of the insurance. After exploring a range of institutions in many regions, we identified La Caja Rural Señor de Luren, which has its headquarters in Ica. Based on conversations with Señor de Luren, we identified the Pisco Valley as an ideal site for the pilot.

Pisco is a valley of approximately 30,000 irrigated hecatares on Peru's southern coast. Cotton is the most important crop in the valley. Over the last ten years, the total area planted in cotton has ranged between 15,000 – 20,000 hectares, thus accounting for one-half to two-thirds of the total valley area. Approximately 3,200 farmers plant cotton each year, with an average planted area of approximately 5 hectares.

*Contract Structure.* We determined that an area-yield index contract would be most appropriate for several reasons. First, in theory, compared to weather indices such as temperature or rainfall, area yield should minimize basis risk. Second, as Pisco is a desert with virtually no rainfall (except in El Niño years), rainfall was simply not an option. Third, relatively high quality average yield data from the Ministry of Agriculture were available for a 22 year period. The quality and length of the data series were sufficient for both La Positiva and its re-insurer, HanoverRe. Finally, we believed that an average yield index would be straightforward to explain because farmers are used to receiving information about average yields.

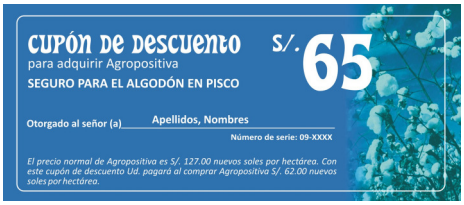
The initial contract defined a strikepoint of 31 quintales (3,100 lbs.) of cotton per hectare. If the average valley yield was above 31 quintales, no payout was made. If the average valley yield was below 31 quintales, an indemnity was paid. The indemnity was linearly increasing in the amount by which the average valley yield fell below the strikepoint. The per-hectare premium for this contract was 146 Soles ($45). This price includes a 30% premium subsidy provided by the Peruvian government.

The research project also developed an institutional mechanism to measure area yield for purposes of determining the level of indemnization each year. An area-based random sample of 600 cotton parcels was drawn. The survey company Cuanto was hired to implement a yield survey of these farmers. The yield estimate was reported on July 1 of each year.

*Impact Evaluation Research Design*. After getting the pilot project off the ground, the first objective of the research was to measure the causal impact of the area yield insurance on a range of production and welfare variables, including intensity of input use, access to credit, and farm income. In order to detect the causal impact of the insurance, we utilized a Randomized Encouragement Design.

**Insurance Training Session: a farmer plays an experimental game in which drawing a chip signifies the covariate weather shock for the "valley".**

In this encouragement design, we created two instruments that exogenously (randomly) affect insurance demand, but do not directly affect (other than through their impact on demand) our outcome variables of interest (production, yield, credit access, income, etc.). The two instruments were coupons that lowered the price of the insurance and information sessions that provided information and training about the insurance. We randomly selected a subset of cotton farmers in the valley to receive coupons, others to receive an invitation to the training sessions (which included experimental economic games to teach about insurance), and others that received neither a coupon nor an invitation. Further, in order to measure the price elasticity of demand for insurance, we offered coupons of three different levels: 90, 65, 30 and, 15 Soles.




**The 65 Sol coupon used to measure the price elasticity of demand for insurance.**

We then carried out detailed household surveys with 800 of these farmers, including those receiving different combinations of incentives and those receiving none. The basic idea behind the research design was that the random distribution of the instruments would create a valid control in which the insurance take-up rates of those receiving stronger incentives would be significantly higher than those receiving less or no incentives. Assuming that the take-up rates would be significantly different, we could then compare average outcomes across the different groups. With this strategy in mind, we carried out a baseline survey during Fall 2008 (to capture recall of the 2007-2008 agricultural season, the year prior to the introduction of the insurance contract) and follow up surveys in Fall 2009 and 2010.

## FINDINGS

*Pisco Sour: Low Takeup* Rates. Unfortunately, our research strategy did not work out as planned. The instruments were not sufficiently strong to generate large differences in take-up across groups. Indeed, overall take-up rates were surprisingly low. Table 1 provides an overview of the contract structure and numbers of insurance purchasers for the 2008-09, 2009-10 and 2010-11 agricultural years.

First, note that the number of insured farmers increased each year, from 56 to 120 to 204 by year three. Thus the steep trend upwards raised hopes that a sufficient market size could be established to maintain market sustainability. Unfortunately, while the trend was steep, the levels were low. Ultimately, La Positiva decided to discontinue the index contract for the 2011-2012 year in favor of a conventional, named-peril contract. While this is disappointing from our research point of view, it was precisely the experience that La Positiva gained in providing insurance to small-holders that allowed them to ultimately offer the conventional insurance contract. In other words, even though we were disappointed that the index insurance contract was discontinued, we are thrilled that crop insurance is now being offered to small-holders where none was previously offered.

Second, note that the contract structure evolved over time. In year two, we decided to move to a dual-strikepoint contract in order to increase the probability that the contract would make a payout. Specifically, we raised the first strikepoint from 33 to 36 qq/ha. In order to avoid a significant increase in premium price, we decreased the indemnity per qq of "lost cotton" over the range 30 – 36 qq/ha (where the loss is not

**Table 1. Contract Terms, Take-up and Realized Area Yield during Pilot**

| Characteristic | 2008-09 | 2009-10 | 2010 - 11 | |
|---|---|---|---|---|
| | | | Agropositiva Total | Agropositiva |
| Strikepoint 1 (qq/ha) | 33 | 36 | 39 | 33 |
| Strikepoint 2 (qq/ha) | NA | 32 | 33 | 26 |
| Strikepoint 3 (qq/ha) | NA | NA | 26 | NA |
| Premium | 146 | 127 | 154 | 107 |
| Insured Farmers | 56 | 120 | 204 | |
| Insured Area (ha.) | 196 | 314 | 670 | |
| Realized average yield (qq/ha) | 38.6 | 45.2 | 58.3 | |

catastrophic) and then raised the indemnity per qq of "lost cotton" over the range below 30 qq/ha.

Finally, given the relatively low take-up rates even after this contractual change, in February 2010 we held a series of focus groups to understand the reason for low take-up. The focus groups revealed several key insights including:

- *Farmers are sensitive to low indemnity payment*: Farmers were upset that they would receive a very low indemnity payment that did not even cover the premium cost, if the area yield was slightly below the strikepoint. In other words, a farmer with two hectares that had a relatively bad year might receive a $60 indemnity payment that dis not even cover the $100 that he paid in insurance premium.
- *Farmers anchor expectations around installation costs*: Farmers wanted to make sure that if they had a poor year, they would still be able to plant cotton again the following season. This is not a trivial issue in Pisco as formal lenders require that cotton farmers self-finance the initial costs of land preparation and planting. The lender then makes the loan to cover the remaining production costs. Farmers thus wanted to make sure that the insurance contract paid enough to allow them to cover these costs in the following year.

These observations led to a significant change in the contract structure for the third year. We moved to a more simple "step contract" in which the indemnity payment is constant over a wide range of area yield outcomes. Indeed, La Positiva offered two separate step contracts. The first, just called "Agropositiva", paid out about $430/ha when the area yield fell anywhere below the "catastrophic" level of 26 qq/ha. It paid about $240 when area yield fell between 26 and 33 qq/ha. The cost of this policy was $33/ha (107 S/.). The second contract offered additional coverage at higher area yield; again paying $430/ha when area yields fell below 26 qq/ha and $240/ha when area yields fell between 26 – 33 qq/ha; but also paying $47/ha when area yield fell between 33 – 39 qq/ha. The cost of this "Agropositiva Total" contract was $48/ha (154 S/.).

Given that the cost of installation for cotton was about $150 - $200/ha, this contract was both simpler and addressed the concern about re-installation the following year. Both the farmers and the loan officers who sold the insurance appeared to have a strong preference for these step contracts compared to the previous contracts.

Again, the final results were encouraging – demand significantly increased and the loan officers clearly bought into the product – but ultimately La Positiva decided that the total volume of policies sold was too low to justify continuation. Part of La Positiva's concern was that the BASIS research project would no longer cover the cost and logistics of the area yield measurement survey moving forward.

*Behavioral explanations of low take-up.* The second main component of the research was added towards the end of the project; after it became apparent that take-up rates would likely be too low to carry out impact evaluation econometrics. The goal of this second component was to examine two specific behavioral hypothesis:

- Hypothesis 1: Farmers have systematically biased beliefs about the probability distribution of area yield;
- Hypothesis 2: Farmers' attitudes toward risk are better described by Cumulative Prospect Theory instead of the Expected Utility Hypothesis and, as such, they may systematically under-weight low probability, catastrophic crop losses.

In order to explore these hypotheses, we designed a set of experimental games and exercises that we played with 440 cotton farmers in Pisco in November and December 2011. In order to explore farmers' subjective beliefs about the area yield distribution, we asked them to distribute 30 kernels of corn across different ranges of average yield with the idea that a greater number of kernels represented a higher relative probability of that range of yields.

**The "corn game": a farmer estimating the probability distribution of area cotton yields in Pisco.**

In order to test the second hypothesis, we used modified versions of two standard games in the experimental economic literature. The first are games

to elicit risk aversion and probability weighting parameters. The second, and more innovative, game was to simulate the choice across the following three options: 1) No insurance, 2) Insurance with linear payout and, 3) Insurance with step payout. The innovation was to play the games once over gains (in which the worst possible outcome still provided a positive monetary payoff to the farmer) and once over losses. We created a feeling of loss by giving farmers an "endowment" of money at the beginning of the session which they could lose if they had negative payoffs in this second "loss" game.

**The "corn game": used to elicit beliefs about the probability distribution of area yields in Pisco.**

Economic theory suggests that, if Cumulative Prospect Theory better describes farmers' attitudes to risk and insurance purchases, then farmers may make different choices when a gamble is cast as a gain instead of a loss. Examining the patterns of choice in the two different insurance games will thus allow us evaluate if either Cumulative Prospect or Expected Utility Theory are more consistent with, and thus provide better models for, farmers' decision-making processes.

As data collection was completed in December 2011, we will be carrying out this analysis and present results in late Spring 2012.

# AMA RESEARCH THEME:

## *SMALLHOLDER ACCESS TO MARKETS AND IMPROVED TECHNOLOGIES*

WITH THE GLOBALIZATION OF MARKETS, THE ROLE OF SMALL PRODUCERS has changed dramatically. While there are new opportunities in the spread of high value exports and specialty cash crops, many small and medium-sized farmers have trouble meeting new quality standards, integrating into new distribution systems, and finding ways to enter global markets. They are missing out on higher return crops and are excluded from growth sectors.

AMA researchers are looking for ways to help small farmers be a part of the increasingly global marketplace by investigating new contracting mechanisms, the role of producer organizations, the impact of participating in modernizing value chains, and opportunities in specialty markets, including fair trade products. In order for globalization to have a positive effect on households at all levels, traditional small producers need to find ways to integrate themselves into new markets. The AMA projects generate practical business and policy strategies to help make this possible.

### AMA PROJECTS

- Access to Modernizing Value Chains by Small Farmers in Indonesia and Nicaragua
- Contracting Out of Poverty in Peru: Experimental Approaches
- Enhancing Smallholder Competitiveness in the Face of Globalization
- Savings, Subsidies, and Sustainable Food Security in Mozambique
- Impact of Business Services on the Economic Wellbeing of Farmers in Nicaragua

### AMA BASIS BRIEFS

BASIS Brief no. 2011-02. *Tradeoffs of Supplying Small Farmers in Nicaragua,* by Hope Michelson, Thomas Reardon and Francisco J. Perez. December 2011.

BASIS Brief no. 2010-10. *Creating Incentives to Save among Microfinance Borrowers: A Behavioral Experiment from Guatemala*, by Jesse Atkinson, Alain de Janvry, Craig McIntosh, and Elisabeth Sadoulet. November 2010.

BASIS Brief no. 2010-08. *Fair Trade and Free Entry: Examining Producer Benefits*, by Alain de Janvry, CraigMcIntosh, and Elisabeth Sadoulet. September 2010.

BASIS Brief no. 2010-04. *Subsidies and the Consequences of Drought: A Field Report*, by Rachid Laajaj and Aniceto Da Fonseca Matias. July 2010.

BASIS Brief no. 2010-02. *Savings, Subsidies and Sustainable Food Security in Mozambique*, by Michael R. Carter, Rachid Laajaj and Dean Yang. May 2010.

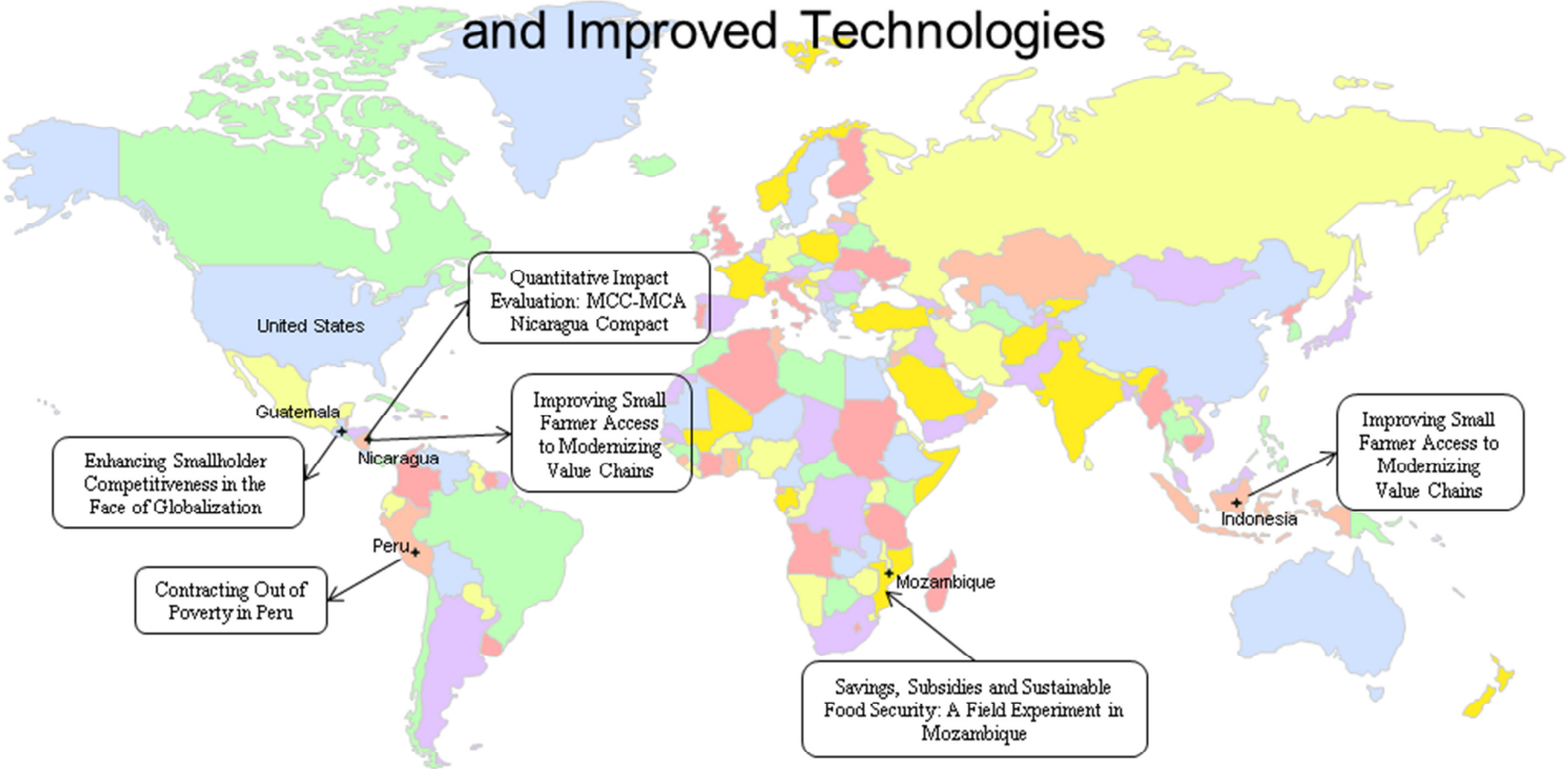
BASIS Brief no. 2010-01. *Impact of Business Services on the Economic Wellbeing of Small Farmers in Nicaragua*, by Patricia E. Toledo and Michael R. Carter. March 2010.

BASIS Brief no. 2010-01-S. *Impacto de servicios para el desarrollo de negocios rurales en el bienestar económico de productores en Nicaragua*, by Patricia E. Toledo and Michael R. Carter. March 2010.

BASIS Brief no. 2007-06. *Improving Smallfarmer Access to Modernizing Value Chains in Indonesia and Nicaragua*, by Thomas Reardon, Ronnie S. Natawidjaja, and Francisco J. Perez. July 2007.

BASIS Brief no. 2007-04. *Enhancing Smallholder Competitiveness in the Face of Globalization*, by Alain de Janvry, Elisabeth Sadoulet, Craig McIntosh and Tomas Rosada. July 2007.

# AMA CRSP: Smallholder Access to Markets and Improved Technologies



# ACCESS TO MODERNIZING VALUE CHAINS BY SMALL FARMERS IN INDONESIA AND NICARAGUA


## Principal Investigators

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http://www.basis.wisc.edu/projects_ama/modernizing_value_chains.html

The agri-food industry has transformed extremely quickly and profoundly over the past decade in developing regions, with rapid diffusion of supermarkets, fast food chains, and large-scale processors. This project examined the asset-related determinants and impacts of participation of small farmers and farmer organizations in modern versus traditional market channels in Indonesia and Nicaragua. The research goals were to:

1. identify the specific extent, nature and determinants of the restructuring of the product value chains,
2. examine the determinants of inclusion or exclusion of small farmers in the restructured market channels and
3. look at the asset and income effects of this participation, with the goal of informing organizational, policy and institutional design to have maximum benefits of new markets to small farmers.

In Indonesia, supply chain mapping studies are underway for mangoes and mangosteen, both of which are priority products in the Ministry of Agriculture's long-term development plan and have domestic and export market potential. The research will help inform the work of the Ministry of Agriculture in the development of the horticulture division and the creation of policy that encourages value chains that serve cities and exports.

In Nicaragua, researchers focused on the role of "second floor cooperatives" to help producers to access new markets, and inform the role of government in this process. The research will inform the new government focus on investments in small and medium rural enterprises and farmers.


## Additional support

CIAT: $27,000.

Michigan State University: approximately $26,000 per year for the four years of the project.

## Outputs


BASIS Brief no. 2011-02. *Tradeoffs of Supplying Small Farmers in Nicaragua,* by Hope Michelson, Thomas Reardon and Francisco J. Perez. December 2011.

BASIS Brief no. 2007-06. *Improving Smallfarmer Access to Modernizing Value Chains in Indonesia and Nicaragua*, by Thomas Reardon, Ronnie S. Natawidjaja, and Francisco J. Perez. July 2007.

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## ACTIVITIES

### NICARAGUA

*Horticultural product trader study*. A total of 91 lettuce, tomato, and sweet pepper traders were surveyed at 11 markets. A report and a policy brief were finalized in the last quarter of 2010.

*Horticultural producer modern channel participation survey.* The student leading this effort wrote and defended her dissertation and contributed to the project findings. BASIS brief no. 2011-02 was completed in Fall 2011.

*Horticultural (tomato, sweet pepper, lettuce) producer modern channel participation second survey.* A plan was created to link research questions, a conceptual model, an implementation method, and the operational steps before field research took place. The plan identified the research issues and gaps in knowledge, research questions/objectives and hypotheses, the main context of the value chains of lettuce, tomato and sweet peppers and the general methodology.

Data collection began in March 2010. Two rounds of data collection were completed in May. Data was entered and cleaned. We ended up with 905 survey interviews, 794 household interviews and 111 village/community interviews. Analysis is ongoing. Several papers have been submitted to journals.

**Hoophouse tomato production used to supply the modern market value chain in Nicaragua.**

### INDONESIA

We planned studies on mango and mangosteen traders and producers, and a survey of households and sprayer traders. The farm survey was completed in August 2010. During data entry we found that 25% of the data were unusable. After careful enquiry we determined that the supervision of the farm survey was faulty, important parts of the sprayer-trader survey were not done, and data entry was very poorly supervised.

After long delays and faulty work, MSU terminated with cause the arrangement with CAPAS. We then contracted with ICASEPS, a well-known institution in Indonesia with a much better track record of survey implementation. This means we will be unable to help build capacity in CAPAS, but their severe internal management problems made this impossible. ICASEPS implemented the farm survey and entered the data in the second, third, and fourth quarters of 2011. In the fourth quarter of 2011 and first part of quarter of 2012 we rushed analysis and produced the report.

The master's student at MSU delayed her work while the difficulties unfolded. She is now on target to complete her thesis in May 2012. We had a second master's student from CAPAS, but the student failed his courses and was terminated after one semester. The failure to provide an adequate second student was another reason we concluded that CAPAS was not competent.

After the project we will do additional work that will lead to a submission of an article from the data.

## FINDINGS

### NICARAGUA

*Horticultural product trader study.* The survey of tomato, lettuce, and sweet pepper traders used a base of 91 interviews in 11 wholesale markets about five different products: roma and salad tomatoes, fancy bell and chiltoma sweet peppers and iceberg lettuce.

The share of wholesale markets over the total volume intermediated shrunk over the last five years. This is a striking result as tomatoes in general have reduced their sold volumes by 26%, and lettuce has reduced its sold volumes by 25%. These results perhaps confirm the information obtained through our key informant interviews. Retailers used to source through specialized wholesalers, who in turn sourced from wholesale

markets. Increasingly, however, retailers source directly from farmers or farmers' cooperatives.

Another reason the volumes at wholesale markets are shrinking was gleaned from the value chain key informant interviews. Exports to other Central American countries have increased considerably in the last five years, reducing the volumes present in the wholesale markets, and increasing trade from wholesale markets in Nicaragua to other wholesale markets in El Salvador, Honduras and Guatemala.

The transition from niche to commodity is evident for fancy bell peppers and salad tomatoes at wholesale markets. The volumes of fancy bell pepper and salad tomatoes have increased 220% and 165% respectively over the past five years. Shares of the overall volume of other niche products during the same period increased from 5% to 27% for sweet peppers and 6% to 18% for tomatoes, demonstrating that these so-called niche products are becoming staple products intermediated at wholesale markets.

**Share of top five traders among all traders in wholesale markets in Nicaragua**

| Product | 2009 | 2004 |
|---|---|---|
| Chiltoma pepper | 57% | 48% |
| Fancy sweet pepper | 89% | 95% |
| Roma tomato | 40% | 48% |
| Salad tomato | 60% | 75% |
| Iceberg lettuce | 54% | 77% |

As shown in the table, all products are highly concentrated. Yet, wholesale of most products de-concentrated during the past five years. Product deconcentration can be explained by two main reasons. For niche products (fancy sweet pepper and salad tomato) five years ago only a few wholesalers traded this type of product; now the number of wholesalers trading niche products has increased. Secondly, since modern retailers stopped sourcing from wholesale markets, the overall volume traded in the wholesale market of commodities (Roma tomatoes and iceberg lettuce) has decreased. Retailers used to source from the top five traders. The reduction of the overall pie, induced by the reduction of the volume traded by the top five traders caused this de-concentration.

Chiltoma peppers are the only product that increased its wholesale concentration over the five years, and is the only commodity product that increased its traded volume (11%) during this time. Finally, it is the only product that is significantly sourced by modern retailers from wholesale markets with 35% of the volume traded in wholesale markets bought by supermarkets or dedicated wholesalers.

Most products in our study suffer clear seasonal effects with winter volumes considerably smaller than summer volumes by 10-20% depending on the product. With the exception of fancy bell peppers, volumes have been very stable across seasons in the same year. This might signal production system changes of fancy bell peppers that allow for a steady volume throughout the year.

Our results contradict the hypothesis that traditional value chains are long and have many intermediaries. Sixty percent of traditional wholesalers source their produce directly from farmers, especially in commodity products such as chiltoma peppers and Roma tomatoes.

Traders do not rely on their own production. With the exception of lettuce, only 22 % of traded volume is grown by the trader. In the remaining analyzed products wholesalers tend to have very low shares of own-production (around 6% of total volume).

Results show the existence of implicit contracting schemes between farmers and traditional wholesalers. About 60% of farmers have formal verbal agreements with traditional wholesalers, implying the existence of contract schemes.

*Horticultural producer modern channel participation survey.* We analyzed the payoff and risk of contracting with Wal-Mart versus selling to the traditional market. Mean per unit farm gate revenues in the supermarket chain are not significantly higher than in the traditional market. A lack of a real output price premium in the supermarket chain is unexpected, given that the supermarket buys only the high quality share of producers' production and given the costly transaction and post-harvest production standards required under the agreement.

Instead of an increase in mean price, we find that the Wal-Mart supply agreement represents a significant reduction in price risk to farmers used to selling in the traditional market system. Preliminary evidence, however, suggests that farmers may be overvaluing this decrease in downside risk. Estimates of relative risk coefficients using farmers' observed income, annual transaction quantities, and traditional and supermarket price series are extremely high, suggesting that the decrease in mean price in exchange for a decrease in price volatility is too high.

We also focused on the effects of a farm household's supply relationship with supermarkets and found that geographic characteristics and natural resource endowments are significant predictors of a community's inclusion in a procurement basin.

Conditional on supply chain placement and instrumenting for supplier status, it is possible estimate the impact of supplying a supermarket on participant farmer incomes, land accumulation, credit use, and assets. Estimates are of significant high positive impacts (a three to four fold increase in income) on farmer outcomes, significant to a number of robustness checks. We did not find that the income impacts of participation increase with the tenure of the supply relationship. Nor does our preliminary analysis find significant impacts on land holdings, asset accumulation, or credit.

We used a lifecycle model to explain supermarket supply chain participation and exit patterns supply communities. The hypothesis was that farmers learn about the profitability of a new marketing channel relative to the traditional market both from their neighbors' accumulating experience and from their neighbors' exit. The research incorporated own experience, own exit, neighbors' experience, and neighbors' exit from supermarket supply chains into a conditional model to test whether a farmer's observation of these events influence the decision to participate in subsequent periods. We also used this model to estimate whether some farmers pay a price for experimentation with the new market opportunity.

Results estimating the likelihood of participation in supermarket supply chains suggest that the neighbors' exits from the supply chain are significant negative influences on a farmer's own decision to participate in the new market. The neighbors' accumulating experience in the supply chain is also a significant positive determinant of farmer's participation. However, observing a neighbor's exit is a significantly more powerful signal than observing another year of a neighbor's experience; this signal is significantly more powerful still for farmers who are in the channel themselves rather than those that have not yet entered. Finally, evidence of strategic delay by farmers suggests the influence of a social process rather than a firm-level roll out of new contracts within a given village.

*Horticultural (tomato, sweet pepper, lettuce) producer modern channel participation second survey.*

Our analysis suggests that significant entry costs exist for farmers' participation in the supermarket supply channel. This is inferred from the following:

- although farmers began adopting the supermarket market channel soon after being exposed to the possibility of adoption, the speed of adoption was somewhat slow. If they did not adopt the new market channel within six years of being exposed to the possibility of adoption, then they are less likely to adopt in the following years;
- after adopting the new market channel farmers usually remained steady suppliers. The first signs of desertion do not occur until at least four years after adoption. By the seventh year, 75% of the adopters remained as suppliers, and at the end of the observation period, around a quarter of adopters supplied the supermarket channel without interruption.

Key informant interviews with supermarket chains revealed different types of farm households and their relation to modern market participation. The segregation of early and late adopters indicate two very different types of farm households: early adopters have the "ideal" characteristics desired by supermarket procurement agents, relative to late adopters. Early adopters have:

- 2.5 years more education,
- 7% more off-farm employment,
- 43% more total household income,
- 97% higher yields,
- Greater use of "modern" technologies (22% more use drip irrigation, and 27% more use purchased tray seedlings,
- No overuse of pesticides (similar levels of pesticide use compared to non-adopters, and lower levels compared to late adopters).

However, participation in modern markets seems to be linked to a high probability of participation in a production cooperative, which appears to help late adopters overcome thresholds of modern market participation. Adopters have a higher share of households participating in production cooperatives. Interviews with supermarket procurement officers revealed that they like to work with farm cooperatives to reduce their transaction costs. When interviewed, small farmers noted that they like to work in cooperatives in order to gain access to resources such as packing and sorting facilities. Moreover, the share of late adopters participating in cooperatives is three to four times higher than among non-adopters which may imply that cooperatives are an important facilitator and incentive for small farmers to participate in modern channels. Similar descriptive results have been

observed by segregating adopters into short versus long duration suppliers; long duration households have more education, more land, more off-farm employment, higher yields, and tend to have greater use of modern technologies, compared to short duration households. There is evidence of a link between off-farm employment and modern market participation, as participation in off-farm employment shortens the time-to-adoption. Our results suggest that income diversification into nonfarm activities might bolster participation in supermarkets.

Our results also show that indeed small farmers are included in the modern market channel. This is supported because there is no statistical difference between cropped land (2.8 Ha) between adopters and non-adopters and total owned land has no significant effect on time-to-adoption and duration as supermarket supplier econometric models.

Although we find land is not an excluding factor, we do find that non-land assets appear to be entry thresholds. Our results show that consistent suppliers have more capital (in particular irrigation, but also education) and use modern technologies that allow them to supply all year and position themselves to achieve greater production, and uniform and consistent quality, characteristics desired by supermarkets.

Production of highly perishable products and niche crops are competitive advantages to enter modern markets. Supermarkets noted they are searching for suppliers of these products, as it is difficult to find growers who can supply on a consistent basis. However, production of highly perishable products and niche varieties require conditions such as drip irrigation, education, and experience that can become adoption thresholds.

Given these results policymakers working to help small farmers access modern supply channels should promote access to non-land assets, in particular the education and farm capital most needed to participate in these channels. Policy should also promote and assist the formation of production cooperatives.

## INDONESIA

*Sequence of Adopters***.**

Mango farming started in the early 1990's and arose mainly from a rice farming base as 68% of farmers grew rice before starting mango production (63% of marginal growers, 73% of small, and 70% of medium growers). Twenty-two percent of the sample grew vegetables and 12% grew other types of fruit. Eight percent were mango traders or sprayer-traders before beginning mango production – in particular among the medium farmers (20%).

*Role of Government Programs.*

Government extension played a minor role in farmers learning to produce mango: only 17% of growers (8% marginal, 24% small, and 21% medium growers) learned mango farming from government extension agents while 8% did so from input companies. Most (79%) learned from other farmers.

Government seedling programs had only a small role in mango production start-up: only 12% of growers received free government mango seedlings at start-up. This was slightly farm size biased as 15% of medium growers got government seedlings, versus 12% of small growers and 10% of marginal. Even so getting government seedlings only accounted for about 60% of their total seedlings.

Thus, "government seedling impact" on mango startup is only 7% of trees. This contrasts strongly with the major role in mango farming startup of government programs asserted by key informants. Moreover, the government seedling program was very small in West Java (only 3% of growers) versus 20% in East Java.

*Non-Land Assets Heterogeneity*

There is substantial heterogeneity in non-land assets. A key asset is the sprayer as it affects productivity and quality. We found that spraying technology is still unevenly adopted and there is a farm size bias. In 2009, 49% of medium growers had a manual sprayer, and 18% a power sprayer. These shares were 49% and 9% for small growers, and 38% and 4% for marginal growers. A tiny sprayer rental market does exist.

There is a "modern market channel" bias for sprayer use: 90% of growers participating in the modern market have manual sprayers and 50% a power sprayer. In the intermediate market channel 46% have a manual sprayer and 18% a power sprayer. For the traditional channel, the shares are 42% and 6%.

*Technology and Variety Use.*

External input use was widespread among all farm sizes.

- 69% of mango farmers used chemical fertilizer in 2009 (64% of marginal growers, 73% of small growers, and 76% of medium growers).
- Growth hormone (to extend the season) was used by 28%, with some farm size bias as 20% of marginal growers, 33% of small growers, and 38% of medium growers used it.

- 39% used pesticides, with some farm size bias, but less than expected: 27% of marginal, 47% of small growers, and 51% of medium growers.

External input use is somewhat correlated with modern market channel participation. All growers participating in the modern market channel used fertilizer, 80% used growth hormones, and 90% used pesticides. Contrast that with 82%, 46%, and 56% for the three inputs for those in the intermediate market channel, and 67%, 24%, and 35% in the traditional market channel. While these findings show an increase of external input use with modernity of market channel, which we expected – we did not expect that so many traditional market farmers would also be using these inputs.

West Java growers are slightly more apt to use external inputs compared with East Java mango growers. In West Java, 73% of the growers used fertilizer, 30%, growth hormones, and 41%, pesticides. In East Java, 66% used fertilizer, 25%, growth hormones, and 37%, pesticides.

Government extension agents had a very small role in farmers' input adoption decisions. In West Java, only 4% of growers who used fertilizer, 10% who used growth hormones, and 7% who used pesticides said that advice from government extension agents was used to make the choice to use these inputs. In East Java, the government role was slightly higher, but still minor: 12% for fertilizer, 15% for growth hormones, and 14% for pesticides.

We categorize mango varieties into three types or product cycles: "traditional varieties" (varieties that were "earliest" and tended to be for local or home consumption, such as Podang and Kweni), "commodity" varieties (those widely planted and traded, such as Harumanis), and "commercial-niche" varieties (that are new or were prior local niche varieties the have become commercial such as Gedong gincu, Gadung, Cengkir, and Manalagi). One can think of a "product cycle" as going from traditional, to commodity, to a diversification into niche-commercial varieties. The data shows the existence of product cycle in mango variety adoption at start-up, in 2005, and in 2009. Here we just show shares of farms growing different varieties; in later analysis we will do shares of trees for 2005 versus 2009 and expect that product cycle and diversification will be sharper.

- Traditional varieties, at start-up (in early 1990s) were planted by 34% of growers; by 2005 21%, and by 2009 25%; there is little difference over farm size strata in these share changes. The shifts occurred somewhat differently over provinces. At start-up in West Java, 41% of farmers grew traditional varieties, dropping to 30% by 2005 and 33% by 2009; in East Java the shares were 28% dropping to 12% to 17%.
- Commodity variety (harumanis), showed a mild inverted U curve with 69% of growers growing it at start-up, by 2005 73%, and by 2009 65%. At start-up, in West Java it was 75%, rising to 79%, then dropping to 71%; in East Java, it was 62% at start-up, rising to 67%, then dropping to 58%.
- For niche-commercial varieties, the tendency was a sharp U curve: 72% grew these at start-up (74% in West Java and 71% in East Java); by 2005, this had dropped to 61% overall (61% in West and 60% in East Java); by 2009, 70% of all farmers, with 75% in West Java and 66% in East Java.

This partly supports a product cycle in that we find that the traditional varieties decline overtime. Moreover, there are shifts among the more specific varieties in the third set that we have lumped. Finally, some of the latter also had their own product cycle, such as the case of gedong and cengkir and gadung. For gedong, the change is in the sold-form ripeness from a green bulk product to a ripened red product; for cengkir and gadung, there was a shift toward a larger size and a sweeter taste.

Mango farmers are investing in more trees, as there is a high share of trees less than five years old. (45% of marginal, 52% of small, and 39% of medium growers added trees in the past five years). This recent addition of trees was a path of diversification, with some 69% adding non-harumanis varieties.

Current-modern channel farmers have invested in their orchards more than the other farmer strata. From start-up in the early 1990s to 2009, 22% of growers in the traditional market channel added trees, compared with 38% in the intermediate market channel, and 100% of growers in the modern market channel. However, in the past five years growers in the traditional and intermediate market channels were more active in adding trees than the modern market farmers.

Government extension agents had only a small role in the variety adoption decision as only 14% of growers reported choosing their varieties per the advice of government extension agents; there was a sharp farm size bias, with shares varying from 27% of medium growers, to 11% of small, and 9% of marginal growers. None of the modern market channel farmers consulted extension agents for their variety choices. Moreover,

the share of farmers using extension is somewhat higher in East Java (21%) than West Java (11%).

*Use of "Sprayer Traders"*

"Sprayer-Traders" is our term (borrowed from the Philippines) for mango farming and trading service enterprises. These are typically small (an owner and a work team), and the mango farm owner who "outsources" to and/or undertakes jointly with these enterprises farming activities such as pruning and spraying and harvesting and marketing. The payment made by the farmer to the sprayer-trader can be a split of the sale proceeds or a fixed amount.

Sprayer Traders are newly emerging**.** In 2009, 6% of growers use sprayer-traders This is somewhat more developed in West Java (8%). Contrast this with the Philippines where some 30% use this service.

Farmers using sprayer-traders reported using them because they have better market access, knowledge, and equipment; nearly all the growers who use sprayer-traders do not own a power sprayer. Marginal farmers in particular note that they use sprayer-traders because they have other occupations.

**Interviewing mango farmers about access to and use of modern marketing channels in Indonesia.**

*Output Market Participation*

Those in the "traditional market channel" sell to village traders, local wholesale markets and traditional retailers); in the "intermediate/transitional channel" farmers sell to wholesalers in Jakarta and Surabaya by-passing the local traders; in the "modern market channel" farmers sell to specialized/dedicated wholesalers who sell to supermarkets, mango processors, hotels, restaurants, and exporters.

The traditional market channel is still dominant with 85% of growers participated in traditional market with some bias toward smaller growers: 88% of marginal growers, 85% of small growers, and 69% of medium growers participated in the traditional market in 2009. 12% of growers participated in the intermediate market channel, with a marked farm size bias: 8% of marginal growers, 11% of small growers, and 24% of medium growers.

The modern market channel in terms of direct sales by farmers is newly emerging. Only 3% of growers participated: 2% of marginal growers, 3% of small growers, and 4% of modern. The share of growers who participated in modern market channel is slightly higher in East than West Java (3% vs 1%).

Farmers capture very little of the quality differentiation in the market. Instead it is captured at the trader and retail levels. A very high share (83%) sell ungraded; only 17% sell graded, and are more likely to be medium farmers in the modern and intermediate channels, and are twice as common in West Java than in East Java.

Ninety percent of farmers who sell to the modern market had to deliver the mangoes to the buyer (and thus have the means to do so); whereas only 52% did so in the intermediate channel, and 17% in the traditional channel.

Only 5% of growers received advances (input credit) from the mango buyers/traders. Rather than "trader credit to farmers" or "tied output-credit" markets being common – it is rare. In fact, the farmers most likely to get this "value chain finance" credit are medium growers (11%) and those participating in the modern market (80%). By contrast, only 5% of small and 3% of marginal growers received input credit from a buyer.

Only 6% of growers in the intermediate market channel and 3% of growers in traditional market received input credit from buyer.

Prices vary with mango quality. In 2009, for harumanis, the farm gate price for grade 1 (the best quality) was 0.83 USD/kg, for grade 2, 0.66 USD/kg; ungraded mango was only 0.61 USD/kg. As expected a modern market channel bias to output price does exist. The price in the modern market was USD $1/kg for grade 1, USD 0.8/kg for grade 2, and USD 0.79/kg for ungraded harumanis. In the traditional channel, grade 1 fetched only USD 0.88/kg, grade 2, 0.68/kg, and ungraded, only USD 0.41/kg.

*Organization/Cooperative Membership*

Only 17% of farmers participate in cooperatives or other farmer organizations. However, all growers in the modern market channel are members of farmer organizations or cooperatives and all report receiving inputs and irrigation services from the cooperatives yet their coops are not specific to mangoes. Twenty-six percent of intermediate market channel growers were members of farmer organizations/cooperatives and reported accessing inputs, government extension, and government subsidies from the cooperatives. Again, these coops are not specific to mangoes. Only 16% of growers who participated in traditional markets were members. Coop participation rates declined with mango farm scale: 23% of medium growers, 16% of small growers, and 16% of marginal growers. Marginal farmers said they got irrigation and some government training from coops; small farmers said they also accessed inputs, some equipment and government subsidies for inputs and equipment via the coops. Medium growers said that they received capital loans, access to government training, and some collective marketing as their main member privilege. Use of cooperatives is somewhat farm-sized biased: 24% of medium, 19% of small, and 14% of marginal farmers used cooperatives for marketing.

*Conclusions*

The transformation of mango farming in Indonesia is important evidence of domestic market (rather than export market) modernization that can be encouraged and facilitated by policy. A main message of this study to policymakers is that a substantial amount of transformation has occurred with very little help from government, either in seedling programs and extension or promotion of marketing cooperatives – and no help in terms of grades and standards (to help farmers capture quality differentiation premiums). Moreover, we found that farmers mainly self-fund, with very little "value chain financing" from traders, except in the modern channel. All the above are areas in which government could invest and further promote modernization. Finally, we found varietal change toward higher quality fruit is in progress, and agricultural research and extension could further promote

# CONTRACTING OUT OF POVERTY IN PERU: EXPERIMENTAL APPROACHES


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http://www.basis.wisc.edu/projects_ama/contract_farming.html

Poor, rural farmers are often left out of the market. They may not be able to compete with larger farmers who can provide exporters with volume and a consistently high quality product. While some of these problems stem from scale, their inability to commit to a contract is also problematic. The proposed research will test contract designs in the field to show which structures work, and will measure improvements to overall farmer welfare based on their participation in a contract.

The research aims to help in the design of new institutional mechanisms that will favor the inclusion of smallholders and link them to dynamic markets through efficient contract farming arrangements. By working on refining these mechanisms, researchers will help integrate small farmers into higher value export markets and rapidly changing value chains. Participating in these markets will improve the welfare of the poor, and increase their income generating options. We propose to integrate small farmers into markets by designing contract mechanisms that are incentive-compatible. As a result we expect to improve the welfare of small farmers and improve profits of the firm. The results are expected to be applicable to contract farming in other developing countries.


## Additional support

International Food Policy Research Institute: $43,266 per year.

## Collaborations

IFPRI has an extensive research program on contract farming, which will benefit from our project results. Another IFPRI research team is implementing and evaluating existing contract designs in high-value crops in Indonesia, India and China, and with milk producers in Tanzania and Vietnam. The goal is to identify existing bottlenecks in existing contract designs with small holders. Results from our project in Peru will provide useful inputs for future contract recommendations and possible new contract designs.

Through IFPRI, we worked with the Multilateral Investment Fund of the Inter-American Development Bank (IADB) to launch a US$2 million technical assistance grant in support of private sector initiatives to reduce rural poverty and promote development. This grant fund will increase economic opportunities for the rural poor through the development of innovative cost-effective and private sector initiatives linking smallholder farmers to dynamic markets using contract farming arrangements. This initiative is being implemented in Guatemala, El Salvador, and Nicaragua. IFPRI will be involved in the impact evaluation of the selected interventions and in proposing innovative ways for improved contract arrangements. This opens a significant opportunity to use what we learn from our AMA-funded project to include in the criteria of the competitive grant process.

## Outputs

*Contracting Out of Poverty in Peru: Some Experimental Approaches: Report on First Year Activities, 2008-2009*. by Marco Castillo, Ragan Petrie and Maximo Torero.

*Three Case Study Analyses of Commodity Production (Coffee, Banana and Mango) in the District of Piura, Northern Peru: A report prepared to assess the feasibility of doing experimental research on contract farming in these sectors.*by Marco Castillo, Ragan Petrie and Maximo Torero. November 2008. Originally written in Spanish and prepared by Victor Agreda y Claudia Mendieta and entitled "ANÁLISIS DE CASOS"

Contact Ragan Petrie at the Interdisciplinary Center for Economic Science (ICES) at George Mason University for copies of these reports.

## ACTIVITIES

Our baseline survey of more than 400 farmers in Piura and Lambayeque included information on production activities, household characteristics, and experimental data on risk preferences. A follow-up survey with the farmers from our baseline collected detailed information on input use during the mango growing season, details of the contract that the household was offered and selected into, how the contract was executed, harvesting information, prices of transactions, problems faced, the evolution of production of the different qualities of mangoes, and mango sales. In-depth interviews with producers helped identify major problems during the mango-growing season and with the mango company. We Information from interviews with the staff of the mango firm allowed us to test the impact of the contract design on input use and farmer profit.

The mango firm gave us data on the firm's purchased production and purchase prices for the four recent growing seasons. We cross checked these data with data collected from farmers. This allowed us to analyze the distribution of contracts across the population of farmers, giving us a better understanding of the incentives behind the firm's behavior.

*Data Analysis.* We continue to examine, using all the data collected (baseline survey, end-of-season surveys, and mango firm's previous years of production and prices paid), the following issues. First, we are examining the determinants of selection into the contracts that were offered, second, the effect of the contract structure on farmer profit and input use, and third, the impact of contract changes induced by incentives and access to credit. Finally, we are examining what determines which contracts the firm offers the farmer by looking at the previous season data and the baseline and follow-up survey data.

*Designed New Contracts.* In consultation with the firm, we designed new contracts that the firm implemented in the field with farmers during the 2008-2009 season. The contracts used price incentives to increase production of high-quality mango and offered credit to help farmers buy inputs to increase quantity of production. We did not implement new contracts during the 2010-2011 season. Rather, we worked with a credit agency to randomly offer credit to farmers in our sample. This activity was designed to examine the effect of relaxing a farmer's credit constraint on contract terms and prices he ultimately receives for his mango.

**The mango harvest in Peru.**
**Can direct incentive contracts with a mango firm improve farmer welfare while also proving profitable for the firm?**

*Partnered with a local credit union to study the link between access to credit and realized contracts.* Since August 2010, in cooperation with IDESI-Region Grau and IDESI- Lambayeque (Instituto de Desarrollo del Sector Informal) we implemented two large field experiments on credit. The experiments were designed to test a finding from our 2008 field experiment- whether realized contracts are an expression of a failure in the credit market. Theory predicts that participation in informal contracts and the conditions of contracts themselves should respond to the ability of participants to secure alternative sources of financing and insurance. Since IDESI is a NGO that provides financing to the informal sector, they are able to lend to people that formal institutions might ignore. In the field experiment, we invited a large random sample of producers to apply for credit with market level or lower interest rates and market credit conditions. We then randomly chose the amount of credit (either more or less) they received if they applied for and were approved for credit. The study took place in October-November 2010 and May-July 2011. On both occasions, detailed data on financial records were obtained. A total of 62 producers in Piura and 11 in Lambayeque eventually received credit. The

study provides information on selection into credit, and it is being currently linked to our survey data.

*Research on long-term relationships.* In September 2011 we began investigating the long-term relationships between farmers and firms through real auctions. The goal is to first understand the value of such relationships to farmers through a simple auction procedure. Once we quantify this value, we can better understand why farmers remain in these seemingly inefficient relationships and give up higher profits to maintain them. This will also allow us to better understand what changes need to occur to increase market efficiency.

*Willingness to Accept Exercise.* We also implemented a willingness to accept exercise to see at what price farmers would be willing to sell their produce under specific quality conditions similar to what the company would have paid. This will allow us to estimate the expected willingness to accept and then to compare it to the actual offers being made by the company.

*Data Collection and Processing.* We have detailed survey designs for mango production, and our survey has an innovative technique to include differences in gender in reporting information. Specifically, we have developed surveys that have a questionnaire answered by the household head (male/female) and by spouse (male/female). We tested this in previous surveys implemented in Peru using pairs of survey takers (male-female) and we concluded there was a significant improvement in data quality by using two questionnaires (one for males and one for females) and by using interviewers of the same gender (i.e. male interviewer with male household member and female interviewer with female household member).

*Typology of Contracts.* We have now implemented two contract designs. Our new work offering credit through IDESI will allow us to see how relaxing the credit constraint effects farmer welfare. We are still waiting for final reports from IDESI as to who paid back credit or not. We have received the report from IDESI-Region Grau but not from IDESI-Lambayeque. Firms often offer credit to farmers that is tied to the contract. The approach we are now taking allows us to examine the importance of credit to the ability of farmers to get better prices for their product, without having to include credit in the contract itself.

## FINDINGS

Our two rounds of surveys revealed that the farms are all located with reasonable access to roads and markets. They are small (average 5.5 ha) and poor but not in extreme poverty (average of 6,591 soles per year). Most households engage in livestock production in addition to agricultural production, but livestock only comprises a small portion (6%) of overall production. The majority of households are headed by men, and the average age of the household head is 57 years old.

The farmers in our baseline survey sample sell frequently to the mango firm with which we work. About half the farmers sold at least twice to the firm in the past three years. Even so, distribution of production among suppliers is highly skewed, with the ten largest farmers providing roughly 40% of purchased production. Because of weather risk and large fluctuations in international prices, farmers in our sample face a high degree of price variation across years and producers. Average prices were 50% higher from 2006 to 2007 and then 33% lower the following year. Mango farming is very risky.

**Sorting mangoes for the international market.**

A top-quality mango could be sold to European markets for roughly £4/mango, but a low-quality mango is typically cut up, frozen and used for fruit drinks. Higher-quality mangos typically receive higher prices, but with the price variability, the same mango may receive high-quality prices one year and low-quality prices the next. There is no quality standard that remains constant across seasons. Quality determination is dependent on the supply of mangos in the market. Due to unstable international prices, the firm adjusts the prices it offers by quality and the quality standard.

Farmers do not know from year to year what will be considered high quality and what prices they will get.

A long-term relationship with the firm has a monetary return to the farmer. Farmers who have traded with the firm for a longer period of time tend to get higher prices Farmers in a long-term relationship are also able to sell a larger portion of their production, even controlling for potential production. Benefits, therefore, are due to differences in prices paid and quantities sold.

Our research suggests that contracts *in the field* follow what we originally called a double- ransom. Firms advance inputs to be paid at the end of the season and farmers sell on credit to the firm to be paid at the end of the season. At each moment in time, one side of the contractual agreement holds some resource from the other party in ransom, i.e. incentive- compatibility might require the advancement of inputs even in the absence of credit constraints.

We teamed up with a credit union, IDESI, to randomly offer credit to the 440 households in our panel. We randomized who was offered credit and the size of the loan. Almost half of the households applied for credit, impacting 30% of the women in our sample and half of the men. Only 20% completed the requirements to formalize their application. Those that got credit did not rely on the firm for purchased inputs and have, therefore, increased the probability of being able to negotiate a better contract. Farmers who are in a committed relationship with a firm or a middleman were more interested in finding out about the credit when it was offered to them than those not in a committed relationship. However, those in a committed relationship are less likely to actually take up credit.

We did two rounds of credit offers. Credit conditions and amounts were randomly assigned to farmers, and the credit agency explicitly stated that there was a possibility of a second loan if the farmer maintained good standing with the agency. In the first round, we offered credit to 430 farmers, and 10 took the credit and therefore we only randomized the amounts. In the second round, 60 took up the credit. We attribute the lower take-up rate to the timing of the offer and the need for credit during that time of the season.

As of December 2011, all but two farmers have paid back the credit, and 10 farmers paid back early. This suggests that farmers understand the importance a good reputation. Having access to credit was beneficial, especially in a year where mango production was low and prices were high. Farmers who were approved and received a loan increased production of export quality mango by 50% over those that did not receive a loan.

It appears that the increase in production can primarily be attributed to a farmer's good credit standing rather than to getting the loan itself. Farmers with a good reputation may have been able to obtain additional funds from other sources if the size of the loan was insufficient. We are currently collecting credit reports to evaluate if the credit experiment caused a substitution in the source of credit.

Numerous formal and informal arrangements exist in the mango market. It is common to see farmers receiving loans or inputs upon signing a contract.. Many farmers and firms commit to contracts and lower prices. Often the price at which farmers could sell their production in the open market is higher than the price they get from a firm with whom they have a commitment to sell. This implies that there is an added value to these relationships that extends beyond the mango price. Firms and farmers may commit because the agreements provide risk sharing across good and bad seasons. This is something that an open market will not incorporate into its prices. Thus, we tested whether farmers were interested in selling their mango to others after they had reached an agreement with someone else. Most farmers in a committed relationship refused to consider alternative offers. Preliminary results suggest that those who had previously committed to sell their mangos to a firm or a middleman would need to be compensated about 25% more than those not in a commitment to break the contract and sell to someone else. This suggests that firms and middlemen provide substantial benefits to the farmers, especially in the form of production insurance. Any intervention that tries to increase market efficiency and get higher prices for producers would also need to create some sort of futures market to help the farmer smooth consumption across good and bad years. This work on long-term relationships is ongoing.

# ENHANCING SMALLHOLDER COMPETITIVENESS IN THE FACE OF GLOBALIZATION (GUATEMALA)


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http://www.basis.wisc.edu/projects_ama/enhancing_smallholder_competitiveness.htm

Smallholder farming has been the institutional structure for some of the most effective historical contributions of agriculture to economic development. Yet, this very social structure is under threat as globalization, trade liberalization, and the development of integrated value chains for food progresses.

This project analyzes three institutional innovations with potential to increase the competitiveness of the smallholder sector: fair trade, the linking of insurance to credit, and the use of credit bureaus in microfinance lending. Guatemala has an unusually large smallholder sector with a strong indigenous base engaged in labor intensive non-traditional exports. Coffee is in many ways a bellwether for smallholder farmers, because it already features the steep price/quality gradient that is emerging in other micro-vegetable production. Guatemala is an excellent natural laboratory since it combines widespread smallholder farming with a rapidly-growing high value export sector.

In all cases, the project combines sound identification strategies with the use of administrative data, and collaboration with the private sector. Results provide an unusual combination of benefits: opportunities for collaborating institutions (including fair trade agencies, producer cooperatives and microfinance lenders) to improve their products and provide information for policymakers to improve policy design, and training opportunities for students in Guatemala and the United States.

## Outputs

BASIS Brief no. 2010-10. "Creating Incentives to Save among Microfinance Borrowers: A Behavioral Experiment from Guatemala," by Jesse Atkinson, Alain de Janvry, Craig McIntosh, and Elisabeth Sadoulet. November 2010.

BASIS Brief no. 2010-08. "Fair Trade and Free Entry: Examining Producer Benefits," by Alain de Janvry, Craig McIntosh, and Elisabeth Sadoulet. September 2010.

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Luna, Kira. 2008. Selling on the Side: A Look at Selling Practices within Guatemalan Fair Trade Coffee Cooperatives."

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Ozier, Owen. 2008. "The structure of Fair Trade Coffee Production in Guatemala and Price Transmission to Farmers."

Sanborn, Rebecca. "Fair Trade Coffee Production in Guatemala." Report produced for the University of California, San Diego.

In collaboration with CHN, we produced material that explains to clients the principle of savings and the different products.

## ACTIVITIES

*Cooperative Survey.*

The goal of the survey was to conduct a census of all cooperatives that marketed coffee, obtaining information about the member farmers as well as the coop itself. In order to accomplish this, we needed to create a comprehensive list of all coffee cooperatives in Guatemala. To do this we coordinated with the second-level coffee cooperative Fedecocagua to obtain the names of their member coops and basic facts about them. Then, we made contact with Fedecovera, a second-level coop that operates mostly in Alta Verapaz. From them, we obtained a list of their member coops. The next step was, to create a list of coffee coops unaffiliated with these two largest second-level organizations, using lists obtained from Anacafé and the Instituto Nacional de Cooperativas. Finally, we contacted each of the cooperatives to confirm their existence and current operation. With the final list of 138 coops in hand, we scheduled interviews. This was an arduous process, including the need to coordinate closely with the second-level coops and the need to make in-person visits to the non-affiliated coops to introduce the project and gain their consent for a future visit. In the end, we were able to schedule interviews with most of the coops and completed 120 interviews.


**Small coffee producer carrying his day harvest to the cooperative.**

For each coop, we completed three types of interviews. The cooperative survey, a group interview with board members, includes its history, governance, economic activities, financial situation, and five-year history of coffee deliveries. The member survey combined a standard household survey of demographics, income, and landholdings with more specific modules on agricultural production and shocks in the past five years and the relationship that the farmer has with the coop. While for most coops we completed interviews with 7 members (2 board members and 5 non-board members), we randomly targeted 40 coops for 19 interviews (4 board members and 15 non-board members). Using the full sample, we will be able to obtain an overview of the coffee cooperative sector in Guatemala and compare characteristics across coops, while for the 19-interview sample, we will be able to better analyze *within-coop* variation between members of the same coop. Finally, for each coop we found two nearby coffee farmers who were not coop members, in order to understand what options exist for farmers who do not join the coop.

Despite the logistical difficulties that arise in such a large and detailed survey effort, the fieldwork was completed and will allow us to explore a number of important aspects of the cooperatives and their membership. The coop survey will allow for a broad diagnostic of these institutions, including their methods of governance, their financial structure and health, the breadth and depth of their various economic activities, and other key characteristics. The member survey, particularly the retrospective history of production and shocks, allows us to learn the extent to which farmers rely on coffee production for their livelihood and their level of vulnerability to adverse events, as well as the intimacy of the relationship between member and coop. The 19-member surveys will allow us to see how members with different characteristics (e.g., land size or board membership) are treated differentially within the coop, for example who is required to continue delivering coffee to the coop even when the price being paid to the coop is lower than the price being paid by intermediaries. The richness of the surveys will allow us to analyze both high-level regularities and trends in the coop sector as well as farmer-level relationships with the coop.

*New research proposed*

Andrew Dustan developed a research proposal called, "Leadership, Side-Selling, and Credit Allocation in Guatemalan Cooperatives". Cooperatives can provide a variety of useful services to their members, such as marketing and credit provision. But these services may be used to benefit elite members disproportionately. This paper will examine the possibility that leaders in the coffee cooperatives use side-selling rights and credit allocation to benefit themselves at the expense of other members. A dynamic limited commitment model of the coop is shown to deliver ambiguous predictions on the effects of a leadership position. Tests for the effect of board membership on side-selling and credit allocation are proposed.

*Consumer demand for Fair Trade coffee*

The purpose of this research was to verify and quantify the demand for Fair Trade coffee by designing a set of consumer experiments in which the benefit to producers is labeled explicitly. The main experiments were to measure how the demand for Fair Trade coffee is affected by varying information, and what would be the demand for a higher direct transfer to the farmers.

Over the first year, we tried to implement the experiment in a wide variety of stores, from high-end supermarkets to smaller stores, without success. We then approached coffee shops that sell brewed coffee in cups, with no success either. During Fall 2010, we attempted yet another set of experimental setups. One was on the sales of bags, with an experiment over several months at a high-end roaster that has a direct trade program. This experiment lasted for more than three months, but provided no evidence of any sensitivity to price differences or any particular Fair Trade products, beyond the initial effect of the first two months. We also tried a completely different setup in two self-service cafeterias on the Berkeley campus. Demand never picked up despite important efforts at presenting the Fair Trade product. We ended the experiment after four weeks.

After much effort, we have to accept that we cannot run the experiment now. Coffee prices are at an all-time high, and it seems impossible to motivate customers for a Fair Trade label that promises a price that is in effect lower than the market price.

*Savings innovations*. In order to expand access to formal financial services among rural populations, we worked with the microfinance sector of the largest public bank, Credito Hypotecario Nacional, in Guatemala to provide its clients an opportunity to commit to save following a plan they set for themselves. We received a second wave of data from CHN in November 2010, which allowed us to complete our analysis of savings over the full cycle of more than half of the 1,700 loans under observation, as they came to term by that date. We are in the process of receiving a third wave of the same data that will allow for an analysis of savings over three years. The paper using two years of data has been submitted for publication and is in a revised-resubmit phase.


**Display of two identical coffees from the Guatemalan Highlands- one with the Fair Trade label and one without. The experiment consisted in varying the price differential between these two coffees to infer the willingness to pay for Fair Trade.**

## FINDINGS

*Estimating the effective Fair Trade premium received by producers.* We completed this project, which analyzed the Fair Trade (FT) premium effectively received by coffee producers and concluded that the price premium that Fair Trade has been able to generate for coffee producers appears to be very close to zero. Detailed results were reported in the 2009-2010 annual report.

*Savings innovations* at Credito Hypotecario Nacional (CHN). The research project with CHN, the country's largest public bank, on alternative ways to build liquidity among Guatemala's poor entrepreneurs, was successfully implemented for three months. However, as the financial crisis hit Guatemala in October 2008, all lending activities were frozen. Consequently, we modified the research strategy.

The experiment utilized recent insights from behavioral economics to design products that foster the rapid and sustainable formation of savings among CHN's microfinance portfolio. This question is of policy interest because of the long-understood importance of savings balances as a vehicle out of poverty for entrepreneurial households. Also, the need has gained greater impetus within the last year because of the collapse of external financing for the microfinance sector, leading lenders to focus on internal savings as a source of loan liquidity.

The research design had a control group and two treatment arms. In the control, called Basic Savings, borrowers taking new microfinance loans were given promotional material on the value of savings, and then the chance to open a new savings account.

In "Open Treatment," new borrowers were given the same promotion material but were also offered the opportunity to make a "commitment savings" every month, a deposit that they would be prompted to make when their loan payment was made (although there are no repercussions for not doing so).

In "Default Treatment," new borrowers were given the promotion material and told that by default they would have a new account opened for them with a savings contribution totaling 10% of the loan, although they were free to opt out of the program.

The treatments were randomized across the 32 branches of CHN, with more than 2,000 borrowers taking new loans within the experimental window. The results were striking. As the figure shows, encouraging borrowers to save an amount that they chose (Open Treatment) induced a very large increase in their savings accumulation. Furthermore, the simple suggestion that a possible saving rate could be 10% of monthly loan payment induced an even higher savings accumulation. The savings promotion was powerful in inducing clients to open a savings account—40% of them did so in the Basic Savings and Open Treatment. The Default Treatment raised that number to almost 80%. Conditional on having opened an account, the commitment with reminders induced 75% of the clients to use their account at least once, compared to only 33% in the control group.

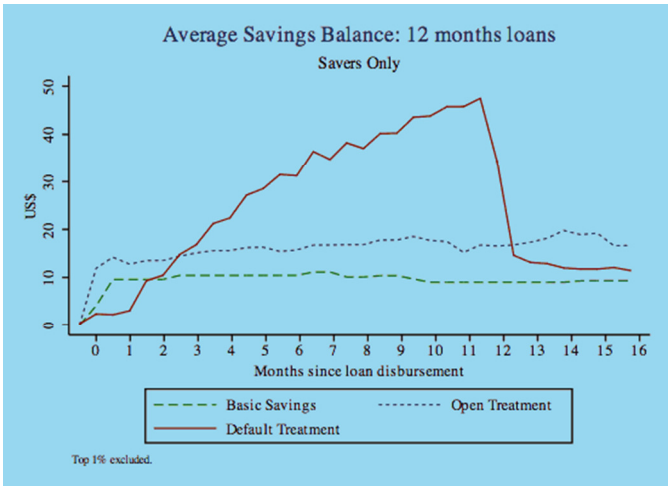


**Figure showing the fast accumulation of savings under the Default Treatment, with the rapid withdrawal of the accumulated savings upon the end of the loan.**

Combining these results shows that 13.5% of the microfinance clients had an active savings account in the Basic Savings promotion group, 33.5% in Open Treatment, and 58.5% in Default Treatment. Deposits were most often within a small range of the committed amounts, and median savings reached the goals savers had set for themselves in Open Treatment, while missing by less than 20% of their larger goal in the Default Treatment.

Activities on the savings accounts also show numerous withdrawals, particularly in the Default Treatment. After 16 months of observation, net accumulated savings for those who opened an account was $14 in the Basic Savings group, and about $29 in the Open and Default Treatments. Including the non-savers, the Open Treatment raised the average savings from $5.6 to $12.6, and the Default Treatment to $22.6. On balance, then, these results suggest that a widespread implementation of the 10% Default Savings product was likely to lead to large increases in savings balances. We uncovered no evidence that these larger savings balances in any way damage loan repayment; if anything the reverse was true. Results from this experiment were very well received by CHN, because they represent scalable commitment savings products that can be implemented at almost no cost to the bank.

## SAVINGS, SUBSIDIES, AND SUSTAINABLE FOOD SECURITY IN MOZAMBIQUE


### Principal Investigators

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http://www.basis.wisc.edu/projects_ama/Savings_Subsidies_Food_Security_Mozambique.html

What are the short and long run impacts of fertilizer subsidies on smallholder farmers? Do subsidies have greater long-run impacts when they are provided in combination with savings? Are savings matches effective at motivating farmers to begin saving, and do farmers continue saving on their own once matches end? How do group-based incentives for savings differ in their effects from individual-based incentives? This research seeks to shed light on these questions using a field experiment among farmers in rural Mozambique. Vouchers for fertilizer were distributed in a randomized fashion to a sample of farmers in rural Mozambique. In partnership with a local financial institution, we randomized offers of savings accounts to farmers. Some savings accounts were ordinary accounts with standard interest rates, while others were matched savings accounts with match rates of 50%. A random lottery was used to determine the specific savings intervention offered to each farmer group.

Several sub-Saharan African countries have implemented large-scale fertilizer subsidy programs in an attempt to boost the productivity and food security of small farmers. With the recent global escalation of food prices, other countries in Africa and around the world are considering similar fertilizer subsidies. This is a key moment to quantify the short-term impacts such programs have on farm output, and also to investigate if there are ways to ensure that longer-term impacts endure after subsidies are phased out. Do farmers continue to invest in and utilize the improved technologies and the higher-yield inputs that were available to them under subsidies? The key to determining whether provision of subsidies leads to long-term growth, even after the subsidies are no longer in effect, is to discover if farmer practices change fundamentally or whether these practices change only in direct reaction to the availability of subsidies.

The recent implementation of a program that provides input support to smallholder farmers in rural Mozambique offers BASIS the opportunity to examine whether household wellbeing improves under subsidies, and if this improvement can be made sustainable. BASIS researchers are implementing a field experiment among farmers in the program's target regions that will result in recommendations to help make this and similar programs more effective in improving household consumption over the long term, as well as revealing alternative approaches to subsidizing farmers that might prove more effective in improving farmer knowledge, practices and output. Importantly, the BASIS research also looks at whether providing farmers opportunities for savings plans through a local financial provider will help subsidies achieve a greater sustainable impact.

## Collaborations

The International Fertilizer Development Center (IFDC) works in close partnership with the University of Michigan. IFDC Mozambique provided their agricultural expertise, contributed to the completion of the randomization of the agro-input subsidy and banking services, and to the implementation of the surveys.

Banco Oportunidade de Moçambique (from Opportunity International) is the local provider of banking services and financial trainings.

The project evaluates an agro-input subsidy program funded by the European Union and implemented by the Ministry of Agriculture of Mozambique, the FAO, and IFDC.

## Outputs

BASIS Brief no. 2010-04. *Subsidies and the Consequences of Drought: a Field Report,* by Rachid Laajaj and Aniceto Da Fonseca Matias. July 2010.

BASIS Brief no. 2010-02. *Savings, Subsidies and Sustainable Food Security in Mozambique,* by Michael R. Carter, Rachid Laajaj and Dean Yang. May 2010.

Carter, Michael, Rachid Laajaj and Dean Yang. 2011. *Savings, Subsidies and Sustainable Food Security: A Field Experiment in Mozambique*. Working paper, University of Michigan.

## ACTIVITIES

In 2010, the full-scale project was delayed due to a drought in Manica province. Given the conditions it would have been inappropriate to ask farmers to start saving during such a lean period. Early in 2010, a pilot intervention of 361 farmers allowed for a pre-test of the survey and the matched savings program. The pilot was useful for developing the training material, the capacity within IFDC and the operation of the bank, and the communication strategy. The pilot separated treatment groups into an Individual Matched Savings (IMS) where each beneficiary's payments depends solely on the individual's savings, and a Group Matched Savings (GMS), where a beneficiary's payment would also depend on the savings of the other members of his group. The pilot study revealed that a majority of beneficiaries preferred the IMS because of potential free riding issues with the GMS. For statistical reasons, it would have been difficult to implement more than three savings treatments hence we decided to only use the IMS in the full scale study.

At the request of Mozambique's Ministry of Agriculture and the Food and Agriculture Organization (FAO), IFDC implemented an agro-input subsidy program in Mozambique in 2009-10 and 2010-11. Funded by the European Union, the program provided vouchers to targeted smallholder farmers, who were then entitled to receive a package of inputs at subsidized rates sufficient for half a hectare of land. The goal was to promote the long-term use of fertilizer and improved seed varieties. In November to December 2010, vouchers were distributed in a randomized fashion to a sample of approximately 2,000 farmers.

In partnership with a local financial institution, Banco Oportunidade de Moçambique (BOM), BASIS researchers also randomized the access to banking services. Two thirds of the sample received education and information about savings. Of those receiving education half were encouraged to open savings accounts while the other half were encouraged to open a Matched Savings account. The matched savings, designed to encourage farmers to save between harvests so that they are able to purchase fertilizer and other inputs, offered a match of 50% of the farmers' minimum savings between August 1 and Oct 31. The distribution of vouchers was randomized at the individual level, while the financial services (savings and matched savings treatments) were randomized at the locality level, in order to avoid potential confusion and conflict that might have arisen if the matched savings was offered to some farmers but not to their neighbors.

A baseline survey of 1,593 participants was conducted in March and April 2011. The participants were distributed among the six treatment groups as represented in Figure 1.

| | No savings offered | Offered match at regular savings rate | Offered savings with 50% match rate | Total |
|---|---|---|---|---|
| Receives agro-input voucher | 267 | 283 | 245 | 795 |
| Does not receive agro-input voucher | 247 | 311 | 240 | 798 |
| Total | 514 | 594 | 485 | 1593 |

**Figure 1: Number of households in each treatment**

Immediately after the survey, beneficiaries of the savings treatment and matched savings treatments were invited to a training session on the benefits and use of fertilizer and savings accounts. During these training sessions, farmers were asked to select one representative for each group of about five farmers. The representatives were then invited to two follow-up sessions between May and July 2011 and were asked to convey the information to the members of their group. The education sessions included a comic strip and a board game where the beneficiaries were asked to simulate their savings and investment decisions over the calendar year. After the game participants were then given the opportunity to go back and reflect on their decisions. In August 2011, a first follow-up survey was administered to 1,436 farmers (the attrition rate is 9.8% and is uncorrelated with the interventions).

The research design of the full-scale sample appears in Figure 1. It allows us to address the following three questions: 1) the impact of agricultural subsidies, 2) the impact of Matched Savings and 3) the complementarity between the two interventions. For each question, we will look at the impact on the

use of agro-inputs, agricultural production, savings and welfare indicators, in the short and medium run.

## Findings

The preliminary findings show that voucher randomization succeeded in affecting the use of inputs by the beneficiaries, but did not show a significant impact on maize yields due to late voucher distribution and a late drought.

*The agro-input subsidy*

Among households that won the voucher lottery 48% actually received their voucher. The most common reason for not receiving the voucher was not having enough money to cover the 70% agro-input subsidy. Other reasons given were not being present at the time of voucher distribution or the fact that the vouchers were distributed too late. Despite the efforts of the BASIS team to supervise the voucher distribution and enforce the lottery results, 12% of the households who lost the voucher lottery still managed to receive a voucher. The government extension service was in charge of the vouchers distribution. They faced pressures from, on one side the losers of the lottery who would often try to negotiate for an exception to the rule, and on the other side, the organizations implementing the program who wanted the vouchers to be fully utilized. Thus each time a beneficiary did not receive his voucher the voucher was redistributed to another household. As a result, the lottery operated as an encouragement mechanism, and winning the lottery increased a household's chances of receiving a voucher by 36 percentage points.

**A beneficiary playing the board game "Saving for a better future" during a financial education session. Photo by Rachid Laajaj.**

Winning the voucher lottery significantly increased the use of fertilizer by 18 kg, from an average of 22 kg to 40 kg. It also increased the use of fertilizer per hectare from 13 kg/ha to 24kg/ha. When a voucher was received due to the lottery results, we find that receiving a voucher increased the use of fertilizer by 43 kg (each voucher is a subsidy for a package including 100 kg of fertilizer and 12.5 kg of improved seeds). Although the program targeted the increase of agro-input in maize production, some fertilizer was diverted to other crops, and in some cases kept for the following year or sold.

The average maize yield only increased from 800kg/ha for the group that lost the voucher lottery to 826kg/ha for the winners. Surprisingly total household maize production is lower in the winning group (2,270kg) than among the losers (2,090 kgs) although none of the differences are significant. The impact of receiving a voucher on maize production has been surprisingly low mostly because of the combination of a late distribution of vouchers and a late drought. Indeed, the planting season runs from early October to the end of December, but the distribution of vouchers began at the end of November. Furthermore, fertilizer was not available at the retailers until the first week of December due to lengthy negotiations about the package price and the margins of the providers, wholesalers and retailers. In addition, the rainfall was very abundant until mid-January and suddenly stopped from January 15 to the end of February. Consequently, farmers who planted later (whether due to the late distribution of voucher or not) had lower production and a lower return to fertilizer use.

Our analysis shows that the impact of fertilizer use (in kg/ha) on maize yield (also in kg/ha) fell from 6 kg of maize per kg of fertilizer in plots planted in September, to only 2 kg of maize per kg of fertilizer in plots planted in December, and 1kg in January. Given the price of maize (5MZM/kg) and the price of fertilizer (25 to 30 MZM/kg), then a ratio of 6kg of maize per kg of fertilizer is the minimum return necessary to pay back the non-subsidized price of the agro-input. Hence the return to fertilizer was relatively low during the observed growing season, possibly because of the highly irregular rainfall. It also appears that farmers with more experience and with access to irrigation may have benefited from winning the lottery more than the farmers with less experience, which suggests a complementarity of fertilizer with knowledge and other inputs.


**The "bancomovil" is the mobile bank used by Banco Oportunidade to reach remote areas. Photo by Rachid Laajaj.**

*The savings and matched savings intervention*

The financial service interventions significantly increased the proportion of households with a savings account. In August 2011, 16% of control group participants had a savings account compared to 33% in the savings group and 40% in the MS group. Using the data provided by Banco Oportunidade, we find that the average balance in October (before receiving the 50% Matched Savings) was MZM 1,966 (1 USD = 26 MZM), compared to MZM 725 in the savings group. Thus it appears that the matched savings are particularly effective at encouraging formal savings, at least during the period for which the match is calculated. However, we find that the total amount of household savings (including money held out of the formal banking system) has not increased significantly. The beneficiaries either transferred their money from other banks to Banco Oportunidade (for the minority who already owned a savings account), or put money in the bank that they were keeping at home. Given that asset accumulation is a gradual process, it may not be surprising that the total savings balance has not surged in the three months between the beginning of the savings sessions and the first follow up survey. The following surveys will investigate whether the change in the form of savings will, in the long run, modify the beneficiaries' accumulation of financial assets.

We do not find that the households who won the lottery saved more on average. This is not very surprising given that we found a very limited increase in production resulting from winning the right to receive the agro-input subsidy.

# IMPACT OF BUSINESS SERVICES ON THE ECONOMIC WELLBEING OF FARMERS IN NICARAGUA

## Principal Investigators

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http://www.basis.wisc.edu/projects_ama/MCC_Nicaragua_Impact_Evaluation.html

The Millennium Challenge Corporation (MCC) is working with MCA-Nicaragua to implement at $175 million compact to support economic growth through property regularization, infrastructure improvement and rural business development. The AMA CRSP was contracted to aid in the impact evaluation to assess the extent to which the income of the beneficiaries was increased as a result of the program. The projects being analyzed include the benefits of road upgrades, and the benefit to both rural and urban households as a result of property regularization. AMA CRSP researchers have helped develop the methodology for the impact evaluation, including survey design, and have been actively involved in sampling and oversight of data collection.

## Outputs

BASIS Brief no. 2010-01. *Impact of Business Services on the Economic Wellbeing of Small Farmers in Nicaragua*, by Patricia E. Toledo and Michael R. Carter. March 2010.

BASIS Brief no. 2010-01-S. *Impacto de servicios para el desarrollo de negocios rurales en el bienestar económico de productores en Nicaragua*, by Patricia E. Toledo and Michael R. Carter. March 2010.

Carter, Michael R., Patricia Toledo and Emilia Tjernström. 2012. *The Impact of Rural Business Services on the Economic Well-being of Small Farmers in Nicaragua*. Working paper. University of California-Davis. April.

## ACTIVITIES

Low levels of education, lack of access to credit and technology, insecure property titles, poor infrastructure—constraints such as these are typical of rural areas in most developing countries, particularly in the agricultural sector. Implementing development strategies to eliminate or ease these constraints can help farmers realize a greater productive potential. In 2005, the Nicaraguan government, in cooperation with the Millennium Challenge Corporation (MCC), devised a rural economic growth and poverty reduction program for the high-potential Pacific coast departments of León and Chinandega. The program had three components: construction and/or rehabilitation of 74 kilometers of highway and rural secondary roads; provision of legally secure titles for landowners by mapping properties, resolving disputes, improving documentation, and land registry capacity building; and, provision of rural business development services, including technical and financial assistance and providing improved market information and linkages. This report focuses on the direct impacts of this third component, the rural business development (RBD) project.

**MCC's rural business development project supported installation of milk collection centers and promoted improved sanitary practices for dairies. Here a group of producers gather with officials from MCA-Nicaragua.** ***Photo by MCA-Nicaragua, used by permission.***

How well have RBD services worked thus far, and for whom? The analysis for this multi-year impact evaluation spanning the five year life of this programs, were carried out by a team from the University of California-Davis and Ohio University. Using survey data and a randomized rollout strategy, the team's chief findings show that consumption initially dips with the program and then shows modest, long-term increases. Income in the activities targeted by the program rises, but shows a worrisome pattern of dropping off when direct assistance came to an end. The program does appear to have provoked significant increases in both attached and mobile farm capital.

### The Nicaragua-MCC compact

After the Nicaraguan government presented its regional rural development proposal to MCC, an intensive consultative process led to the signing of one of the first MCC compacts and agreement on a multi-faceted program to help raise incomes for farmers and other rural business people. A Nicaraguan entity, the Millennium Challenge Account (MCA-Nicaragua), was established to fund and implement the program. The goal of MCA-Nicaragua is to boost the productive capacity in the departments of León and Chinandega, the country's rural "breadbasket," which has proven growth potential due to its fertile land and connection to international markets.

The compact identified low-value rural business and farm activities as a major constraint to economic growth, and the RBD project was established to confront this problem. In conjunction with this project, MCA-Nicaragua planned to implement a property regularization project designed to decrease

the cost of land transactions and increase tenure security. In isolation, evidence of positive impacts from property programs is mixed. MCA's strategy of combining a study of the impacts of property regularization with the impacts of business services was a novel way of trying to determine what mixture of projects has the greatest chance of improving incomes for rural producers. However, while the Nicaraguan government continues to implement the property registration project, MCA's involvement in that component was cancelled. Therefore, the initial evaluation results reported here do not include analysis of titling impacts.

Even with the property regularization project canceled, MCA expects that RBD will train approximately 10,000 rural people—primarily farmers, but also artisans and other rural business people—in a variety of technical areas. As a result of thousands of people transitioning into higher-value agriculture, MCA projects that the additional profits and wages could total US$30 million annually, beginning six years after RBD's launch in 2007.

Is this bold projection being met? To answer this question, a comprehensive impact evaluation was designed to evaluate the experience of agricultural and livestock producers who participate in the RBD project. By comparing differences between "treated" households (those eligible to participate in the project from the beginning) and "control" households (those eligible for the project, but whose participation was delayed by the rollout calendar), the impact evaluation can determine the extent to which providing business services improves the economic wellbeing of households beyond what it would be in the absence of such services. As this brief will show, the evaluation also provides a picture of the types of households that benefit most from the RBD project.

**Eligibility and implementation**

To be eligible for RBD services, a producer must run a small- or medium-sized farming or livestock operation. To operationalize this concept, MCA established eligibility criteria that varied based on a farmer's sphere of economic activity. The box lists criteria for livestock producers. For example, operations that are either too large (more than 100 cows), or too small (fewer than 10 cows) are ineligible for RBD services.

The logic for the eligibility ceiling is obvious, as the MCA project was not intended to subsidize the activities of well-positioned rural producers who are less likely to face the constraints that confront the less well off, including uncertain land ownership, poor access to financial services, weak entrepreneurial and technological skills, and tenuous links to markets. The eligibility floor, and where it should be set, is more controversial and is an issue that confronts rural development projects the world over. The imposition of a floor is meant to assure that all eligible farmers operate at a minimum scale needed to be successful and to justify on-farm investments, yet a higher floor also excludes less well-off households from direct project benefit. The impact evaluation opens a window into the implications of these eligibility criteria.

In 2007, the RBD project began with a massive campaign to attract participation. Offices were opened in the main regional cities of León and Chinandega, where farmers could learn about the project and volunteer to take part. As the project was being advertised throughout the two departments, coordinators chose areas where agro-climatic and other conditions favored the development of specific types of businesses. The coordinators then identified farmers engaged in the same type of productive activity, first focusing on livestock, bean, sesame and cassava, since these represented MCA's most important target areas. Given the interest shown by farmers in other crops, the project was extended to products such as plantain, rice, honey and fruit. Farmers engaged in the same type of productive activity and in geographic proximity were listed as "clusters" of producers, all eligible for business services under the stated criteria for that activity.

Within each cluster, those who chose to participate in the project formed a "nucleus" of producers. For each nucleus, a lead farmer was designated, with the other participants in that production cluster considered "satellite farmers." The lead farmer had to be willing to invest more in his or her operation than the satellite farmers invest in theirs, for example allocating some land for a milk collection center to be used by all members of the nucleus. The lead farmer also must coordinate technical meetings with the satellite farmers. Given the importance of the leader's farm, satellite farms are in relative proximity.

Each member of the nucleus develops a business plan with the support of MCA professionals. After the business plan is approved, MCA works with participating farmers for 24 months. Project benefits depend on the productive activity; in general, all participating farmers receive technical and financial

training, and supplies. If an investment is required, the project can provide up to 30% of the financial resources needed. In other cases, a commercialization network might be provided to some nuclei to improve distribution and marketing channels.

**Evaluation strategy**

The challenge of this, and all impact evaluation efforts, is to identify a control group that is identical to the treatment group in every way except that the controls have not benefited from the project. For the RBD project, the evaluation strategy exploited the fact that, due to capacity constraints, not all eligible farmers could be brought into the project immediately. After working with MCA to identify all the geographic clusters that eventually would be brought into the project, the evaluation team and the RBD office selected a subset of clusters for random assignment to either early or late treatment status. RBD services were provided in early treatment clusters beginning in late 2007. In late treatment clusters, services were not initiated until approximately 18 months later, or early 2009. Because clusters were randomly allocated to early and late treatment status, we can anticipate that, on average, the late treatment group should function as a valid control group, identical, within a margin of error, to the early group in every way except for the timing of the receipt of RBD services. Thus, the economic status of the late group at the time of the second-round survey in 2009 should be a good predictor of what the status of the early group would have been in the absence of RBD services.

Once the random assignment of early and late clusters was made, the impact evaluation team created a roster of all eligible producers in these clusters, and then randomly selected a sample of 1600 households split between early and late areas. These 1600 households were then invited to participate in the impact study, and they completed a baseline survey in late 2007, just as the RBD project was beginning in the early treatment clusters.

Within these clusters, approximately 65% of the eligible households chose to participate in the project. A second-round survey was applied to all 1600 households in the first quarter of 2009, just as the project was rolled out in the late treatment area. While it was not clear at the time of the baseline survey which of the eligible households in the late treatment areas would choose to participate in the project, those households had made their participation decision by the time of the second-round survey. Similar to the early treatment clusters, 63% of eligible households in late treatment clusters declared their intention to join the project at the time of the second-round survey in 2009. The analysis in this brief considers these households to be participants, although the most recent data found that some of these households ultimately did not join the project because of a change in eligibility criteria for bean farmers.

Because the timing of the surveys and project rollout allows for determination of farmer type in both early and late treatment areas, the impact evaluation has the opportunity to study impacts on both *eligible* households (an intention to treat effect) as well as on *participating* households (treatment on the treated effect). Because the RBD project could not be instantaneously initiated in all early clusters, the amount of time that these cluster farmers had been receiving RBD services varied from six to 18 months, with most early treatment farmers receiving between 12 and 18 months of RBD service.

The survey queried farmers about agricultural practices, marketing, and prices for their product. The survey also implemented a full consumer expenditure module, using the same questions employed by the INIDE living standards measurement survey used to gauge poverty rates in the region and the country as a whole. The results reported here rely on these expenditure measures. Total household expenditure, which should be the mirror image of household income (but is more easily measured), is the primary outcome variable of interest for the impact evaluation. Additional analysis will be undertaken to show the impact of RBD services on technology choices, marketing, and prices received.

As shown in Table 1, the randomization between early and late treatment areas worked well, giving confidence that the late treatment group is indeed a valid control group. According to the 2007 baseline survey, farm households located in communities randomly selected for early receipt of business services were statistically indistinguishable from households in communities slated for later rollout of the project. Prior to the start of the RBD project, mean per-capita and household expenditures per month for the early treatment group were almost identical to that of the late treatment group. Other characteristics (farm size, education levels, age, etc.) also showed no statistical difference between the early and late groups at baseline.

**Impacts**

The RBD project was hypothesized to increase annual rural household incomes and asset values by enough to justify project costs. Given the initial similarity of the early and late treatment groups, we could evaluate initial project impacts using the second-round survey data collected in February 2009. There was very little difference between the groups and none of the differences were statistically significant. For example, mean per-capita monthly expenditure for RBD participant households in the early treatment groups is $225, whereas it is $212 for the non-treated participant households in the late treatment areas (measured in 2005 PPP US$).

**A modern milk collection center supported by MCC's rural business development project. Photo by MCA-Nicaragua, used by permission.**

While these numbers from the second round survey are indicative of project impact, we more precisely define project impact as the average increase in monthly per-capita expenditure by farmers who received business services minus the average increase over the same time period for those farmers who did not receive business services. Using this "difference-in-difference estimator," we find that, on average, participants' per-capita monthly expenditures increased by 4 PPP US$ more than did expenditures for those not yet participating in the project. However, these difference-in-difference impacts—which imply about a 2% improvement in the economic wellbeing of the treated—are not statistically significant. Total household expenditures went up approximately 28 PPP US$, a figure that is also statistically insignificant. These calculations ignore the fact that some treated farmers received RBD services for a longer period of time.

**Heterogeneous treatment effects**

Impact evaluations often use the rise in average monthly expenditures across all study households to gauge the impact of a development program on economic wellbeing. Using this indicator, the RBD project did not have a statistically significant impact on the monthly per-capita expenditures of participating households. Yet this average impact does not tell the full story.

Digging deeper into the analysis, we found that treatment effects are significant for what might be termed high-growth households, those whose growth in per-capita expenditures from the baseline to the second survey is higher than average. Conversely, a low-growth household is one whose expenditure growth is below average. Note that we can rank all early treatment households from lowest to highest growers. A similar ranking can be done for all control (late treatment) households.

Interestingly, we find that if we compare high-growth treatment households with high-growth control households, we obtain estimates of RBD project impacts that are statistically significant and range up to 18 PPP US$ per person, per month. Conversely, if we compare low-growth treated households with

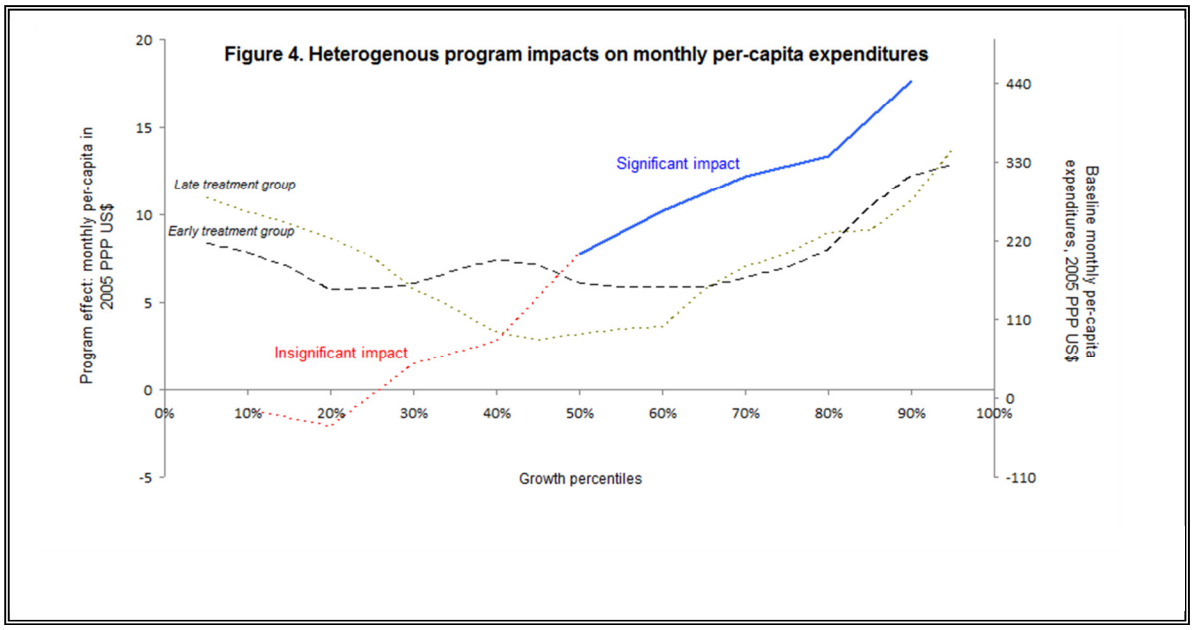
low-growth control households, we find no, or even slightly negative, project impacts.

Econometrically, these heterogeneous impact results were identified using generalized quantile regression analysis. It is important to stress that these results indicate that the treatment effect is not the same across the entire population (program impacts are heterogeneous) and that the average treatment effect poorly represents what is going on in the data.

Figure 1 presents the character of these results in a graphical fashion. On the horizontal axis, we array households in order of their baseline to mid-line growth, with slow-growth households on the left (low percentile rankings) and high-growth households on the right (high percentile rankings). Percentile ranks are calculated separately for treatment and control households. For each percentile range, Figure 1 presents an estimator of the project impact which could be interpreted as a difference-in-difference estimator, for example by taking the expenditure growth for low-growth treatment households and subtracting from it the expenditure growth for low-growth control households. The dotted-dashed impact line in Figure 1 plots these percentile-specific difference-in-difference estimates. As can be seen, the impacts are insignificant and slightly negative for low percentile households. Among better-performing households (above the 50$^{th}$ percentile), the impacts become positive and statistically significant. At the 50$^{th}$ percentile, the impact estimate is about 8 PPP US$ per person, per month; whereas the impact rises to more than double that level when comparing the highest-percentile treatment households with the highest-percentile control households. If we translate these figures into internal rates of return (assuming that the impacts persist for 15 years and using the actual average program costs), we find that the internal rate of return is 1% at the 50$^{th}$ percentile and 14% at the 90$^{th}$ percentile.

What explains this variation in the impact of the RBD project across households? Given that the RBD project established minimum conditions for project eligibility, we might suspect that the low performers would be those households with fewer assets and lower initial living standards. Importantly, the data do not support this interpretation. Projected onto Figure 1 are the initial baseline living standards of the households in the different growth percentiles. As can be seen, the initial living standards of high performing households are no higher than those of other households. Indeed, if anything, the data suggest that initial living standards were higher among low-growth households in both treatment and control groups. While further analysis is needed to corroborate this interpretation, it has the provocative implication that the RBD program could have reached further down the income distribution by lowering initial asset requirements and targeting the initially less well-off farmers.

If it is not initial level of wellbeing that explains who benefits more from RBD services, then what does? While future analysis will explore this question, one



possible answer is that high performance (and therefore high expected impact) can be attributed to an easily observable characteristic. In this case, program targeting could be improved with resources devoted to the top half of the population that would be expected to benefit. Or, it may even be that high performance characteristic is something that can be changed (for example, through good capital access) to improve overall program performance.

On the other hand, it is also possible that high performance and high impact cannot be attributed to any easily observable characteristic. For example, we know that not everyone succeeds in business (even when trying). It may well be that the high-growth households in both treatment and control groups are simply better entrepreneurs and that RBD services help these entrepreneurs do even better, while having little impact on less able entrepreneurs. If those with good entrepreneurial skills cannot be distinguished ahead of time from those with low entrepreneurial skills, then projects like the RBD simply need to be understood as "leaky bucket" endeavors, in which some project expenditures leak to those unable to benefit from them.

In summary, the finding of heterogeneous impacts is important, but it remains to be seen if that finding has explicit programming implications or is simply an indication that one cost of RBD-like projects is the expenditure of funds on those who will not benefit from them.

**Deepening the evaluation**

Early results suggest that the RBD project does have significant impact on the economic wellbeing of many rural households, but it does not work for everyone. In light of the initial evidence of uneven impact among participants, we will attempt to clarify why some households gain significant impact from the project while other households participate but do not enjoy benefits. Variables such as credit constraints and tenure conditions could explain some of this impact heterogeneity. Program expenditures also are higher for some activities (for example, livestock) than for others (for example, sesame), and it may be that the larger benefits simply reflect this differential.

The analysis also shows that the RBD project did not directly benefit many households below the mid-point of the rural income distribution. How far down the distribution a technology and business skill transfer project can go is an important and always difficult question. The results so far obtained from this study show that the effect of the program has no relation to the initial living standard of a household. Households close to the eligibility floor could obtain the same absolute benefit from the RBD project as easily as households with a higher endowment of assets. If substantiated, this finding suggests that this MCA project, as well as similar projects, might consider reaching further down the wealth distribution.

# AMA Research Theme:
# *Access to Finance*

Without access to credit, households are likely to engage in low-risk low-return income strategies that inhibit their ability to accumulate assets over time. If they were able to access capital to finance input purchases or other investments, they could improve both their short and long term earnings and wellbeing. Unfortunately, there are many good reasons why households have difficulty accessing capital.

AMA researchers are looking at different innovations to help expand the provision of financial services. By understanding the circumstances that create incomplete access to finance, we can then generate a set of products and policies that will improve both the supply and the demand for credit.

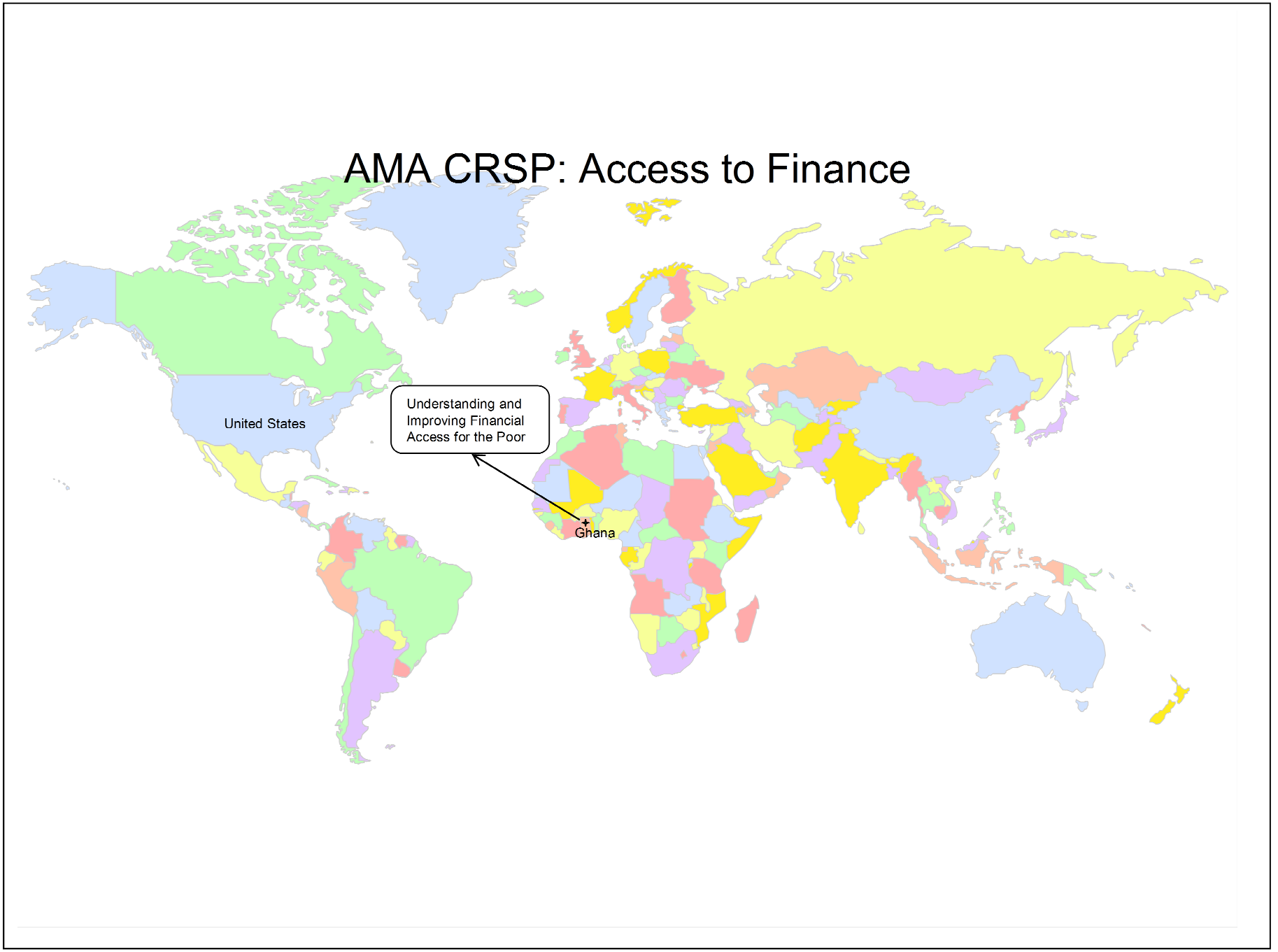
## AMA project

- Understanding and Improving Financial Access for the Poor (Ghana)

## AMA BASIS Briefs

BASIS Brief no. 2010-06. *Identifying Borrowers in Malawi: Dynamic Incentives in Rural Credit Markets*, by Xavier Giné, Jessica Goldberg, and Dean Yang. September 2010.

BASIS Brief no. 2008-04. *Understanding and Improving Financial Access for the Poor*, by Ernest Aryeetey, Dean Karlan, Justin Oliver, Laura Schechter, and Jonathan Zinman. May 2008.


AMA CRSP: Access to Finance
United States
Understanding and Improving Financial Access for the Poor
Ghana

# UNDERSTANDING AND IMPROVING FINANCIAL ACCESS FOR THE POOR (GHANA)


## Principal Investigators

**Ernest Aryeetey**, University of Ghana, Legon

**Dean Karlan**, Yale University


http://www.basis.wisc.edu/projects_ama/Microfinance_Ghana.html

Many poor households lack access to financial markets and services, which limits their ability to undertake higher return production strategies. This project seeks to improve access for the poor by identifying mechanisms that create incomplete access, which innovations are effective at expanding access, and finally in looking at the welfare implications of expanded financial services.

We focus on the following four questions:

1. What demand and supply mechanisms in these markets create incomplete access for low income populations?
2. How do psychological and social barriers affect access to savings?
3. Which innovations in microfinance products and policy measures are effective in expanding access?
4. What are the welfare implications for interventions designed to expand access to financial services?

We address the questions through rigorous research so as to provide policy-relevant and actionable results for policy makers, banks, microfinance institutions, insurance companies and individuals that can be used to make informed decisions. For example, data collected on returns to capital versus returns to capital when combined with rainfall insurance among farmers will allow for improved understanding of the rate of return on investments in the agricultural sector. Data collected on the impact of goal setting through account labeling could shed light on the effectiveness of one cost effective way of encouraging savings behavior. Information on investment decisions and agricultural yield among farmers covered by the index based rainfall insurance product will fill in significant holes in current knowledge base around agricultural risk and the effectiveness of micro-insurance products among populations with low literacy and numeracy levels. A better understanding of how best to help the ultra-poor access microfinance services could help to increase the number of poor households with access to financial services as well as an overall expansion of credit and savings markets.

## Collaborations

*Yale University Economic Growth Center Dataset.* We take advantage of a unique panel dataset designed to provide data on 5,000 households in collaboration with the Institute of Statistical, Social and Economic Research at the University of Ghana (ISSER), and with the Ghana Statistical Service (GSS).

*Ministry of Food and Agriculture (MoFA).* MOFA is an essential partner in numerous projects ongoing in Ghana. Valuable consultations and collaboration with MOFA staff have occurred at all levels. Meetings with agricultural extension agents in the field have provided important insights and important data which have informed study designs and dissemination strategies. Extension agents have also been involved in IPA field staff training, reviewing village entry procedures and tips on working with rural farmers.

*Institute of Statistical, Social & Economic Research (ISSER).* The partnership with ISSER greatly extended IPAs research network in Ghana, allowed for closer collaboration with local researchers, provided valuable advice on data availability and data services in country, and resulted in assistance from local interns and researchers. Knowledge shared about local researchers, previous research completed, and other regional resources have been invaluable. In January 2009, ISSER collaborated with IPA on a large Financial Access conference. ISSER's continuing involvement in the Yale Panel Surveys and MiDA (GLSS5+) Surveys allows for regular updates on progress and opportunities for collaboration.

## Outputs

BASIS Brief no. 2010-06. *Identifying Borrowers in Malawi: Dynamic Incentives in Rural Credit Markets*, by Xavier Giné, Jessica Goldberg, and Dean Yang. September 2010.

BASIS Brief no. 2008-04. *Understanding and Improving Financial Access for the Poor*, by Ernest Aryeetey, Dean Karlan, Justin Oliver, Laura Schechter, and Jonathan Zinman. May 2008.

IPA Ghana hired a Policy and Communications Intern to develop policy and dissemination materials designed to reach local policy makers and practitioners in the agricultural, financial, health and education sectors.

A renowned photographer, Aude Guerrucci, visited Ghana so as to document IPA Ghana's work.

The videographer Niyati Shah documented IPA Ghana projects to be featured short and long education and communication videos to be disseminated electronically through YouTube and the IPA website. http://www.poverty-action.org/node/3893

Updates, commentary and ideas are regularly shared on the IPA Blog at http://www.poverty-action.org/blog

## ACTIVITIES

This year we continued our field experiments in Ghana on accessing microfinance, insurance and savings.

*Examining Underinvestment in Agriculture (EUI).* This study examines how insurance products and capital shocks impact farmers' investment decisions, by comparing groups that have received a direct transfer of capital, rainfall insurance product, or both capital and insurance. Other farmers serve as the control group and receive no intervention, but are also monitored and surveyed. From February to March 2011, we conducted a second electronic follow-up survey, targeting a sample of 1,360 households headed by smallholder farmers.

**Interviewing a Ghanaian farmer. This AMA project seeks ways to improve the poor's access to financial services.**

After completing insurance marketing activities in 2010, IPA disseminated its findings about insurance marketing and demand to the Ghana Insurers Association (GIA) and the newly-established Ghana Agricultural Insurance Programme (GAIP). GAIP and the GIA, with the permission of the National Insurance Commission, requested that IPA continue its work as the only organization marketing weather index insurance to farmers in Ghana, and EUI worked closely with these local partners to finalize the product, reinsurance and contracts.

Shortly after completing the follow-up survey, EUI targeted marketing of the commercial drought index insurance product to 1,101 households in northern Ghana, ahead of the rains and agricultural season. The product was marketed at three premium levels in EUI communities so that researchers could continue to refine insurance demand curves.

From May to June 2011, IPA made contact with 982 of 1,101 targeted farmers (89.1 %) and sold a total of 572 premiums (51.9 %of those intended to treat), covering a total of 3,187 acres.

Current challenges facing the EUI project center around sustainable scaling of the intervention. The EUI project has demonstrated that demand for a rainfall index insurance product, even among largely illiterate and enumerate farmers, can reach up to 90 percent. The project to date has employed a one-to-one farmer-to-marketer protocol, from introduction to the product to premium collection and payout distribution. However, while the one-to-one approach has promoted education, interaction, and clarity and transparency for all involved, it has also required grant-based funding to subsidize administrative and distribution costs. Currently, the project is working with the Ghana Insurers Association as an incubator for innovative and cost-effective index insurance marketing strategies, including group-level administration and message framing, while still testing product demand, associated basis risk and effects on socioeconomic and agricultural outcomes.

Currently, EUI is working with GAIP and GIA to develop and market index insurance ahead of the 2012 agricultural season, and plans to conduct a comprehensive follow-up survey of its sample between January and March 2012. In addition, based on EUI findings that insurance increases agricultural investment but does not significantly improve farm profitability, EUI is in discussion with the Ghana Ministry of Food and Agriculture and a number of local partners to develop the next phase of the project. This study would test combinations of EUI's financial innovations with two new treatments: one, access to extension advice downloaded to mobile phones held by locally embedded "community knowledge workers", and the other, access to input packages that have been proven profitable on demonstration plots run by the Savannah Agricultural Research Institute.

*Savings account labeling and financial literacy training for* susu *customers*. We are testing the impact of account labeling on savings behavior among customers of *susu* agents (savings collectors) in rural Ghana. Our goal is to understand if this purely psychological savings product, which allows funds within an account to be directed towards a specific goal, helps customers increase their savings rates. To ascertain the effectiveness of this product, we administered a survey in 2010 to actively saving *susu* customers across five Mumuadu Bank branches and then randomly selected half the customers to offer the labeled *susu* savings product.

IPA has also administered a follow up survey to Susu customers included in the 2010 survey. This follow-up survey was aimed at measuring the impact of the labeled account on consumer consumption habits. We are currently analyzing responses while continuing to collect additional data from the five bank branches. Over the next year, we plan to explore the impact of these labeled accounts on consumption habits.

Administration of the follow-up survey began in the middle of August 2010 and was completed in May 2011. Roll out at each of the five branches began approximately nine months after the labeled account operations began at each site. Following a month of data cleaning, IPA conducted analysis in July and August.

At a meeting in August 2011, IPA reported the findings to the Mumuadu Board and discussed several new potential projects, possibly as an attachment to any scale up plans for the labeled accounts. The board gave the green light for each idea discussed and is now waiting for a work plan from IPA.

In October and November 2011, IPA staff interviewed selected Susu clients to gauge their interest in the proposed projects and attempted to gain context on findings through enquiries into savings and consumption habits.

Although preliminary analysis showed that the labeled accounts appear to increase personal savings rates for account holders, the consumption patterns for these customers have not yet been determined. We are currently attempting to identify any trends and/or differences in expenditure levels for each of the savings goals. This should help determine if the label on the account is actually representative of the eventual use of savings, or if simply the presence of a second account is more of a driver for savings. Tracking expenditures through existing data is difficult, however, and an additional survey may be required. Locating customers will be a challenge as will encouraging them to participate in another survey.

**Improving welfare for farmers. Offering insurance and capital to randomly selected maize farmers allowed us to measure the increases to production and revenue gained by these farmers.**

In the coming year the preliminary findings will be updated with additional account data acquired over the next month from each branch. Using this data and the responses from the follow-up survey, we will look further into the timing of expenditures to identify savings trends related to each of the savings goals. IPA will continue to work with Mumuadu management to decide upon and implement a new project also aimed at helping bank customers to increase their savings rates. There will also be ongoing discussions with Mumuadu over the implementation of POS systems that enable clients to deposit and withdraw money directly from Susu collectors.

*Returns to business management consulting*. Are micro-entrepreneurs dynamic, business-savvy thinkers held back only by their access to affordable capital, or is the picture more complex, with many micro-entrepreneurs lacking the business acumen to make profitable investments even if they had perfect access to capital? By providing management consulting services and/or capital grants to a group of 160 micro-entrepreneurs we are addressing this question. By rigorously evaluating the project, we will discover insights into the importance of entrepreneurial acumen, access to capital and the combination of acumen and capital that can help answer broad and pressing questions on how to unlock microenterprise growth.

In December 2010, we conducted a final follow-up survey of 149 respondents on revenue, expenses, profitability and investment. From January 2011 to May 2011, we conducted preliminary analysis and prepared a draft report. In July 2011, we shared our preliminary results with the partner organization and received valuable feedback. From September 2011 to November 2011, we began preparing a working paper with preliminary conclusions. Currently, we are preparing a working paper that will be submitted for publication in a peer-review journal. Challenges include developing a policy outreach strategy.

*Graduating from Ultra-Poverty (formerly the Ghana microfinance graduation pilot).* We began an impact evaluation of the Targeting the Ultra Poor (TUP) Graduation Model in northern Ghana. The evaluation will measure the model's ability to move chronically poor households from extreme poverty to self-sufficiency over a twenty-four month period by combining consumption support (the transfer of a productive assets) with an intensive period of training, financial education and savings. The TUP intervention is one method of enabling the ultra-poor to learn to use micro-entrepreneurship to build businesses and improve their lives. The TUP program first identifies the ultra-poor within a community, and intensively works with these families to improve business-oriented skills. The TUP households are provided the transfer of a productive asset (such as a cow or goats) with which they will start their enterprise development. There also is a community-based component, where TUP works with local leaders to alleviate community-wide sources of poverty (e.g., providing safer water supplies to reduce levels of sickness). The program hopes for positive changes in school attendance of children, food security, health, and increased assets among the ultra-poor. Through this study, IPA and its partners will be able answer questions on how best to help the poor escape ultra-poverty.

The implementing partner organization, PAS recruited and hired six Field Agents (FAs) to directly implement the Savings Only treatment referred to as Savings Out of Ultra Poverty (SOUP) program whilst the evaluation team hired about 70 surveyors to conduct a baseline survey. Field Agents conduct weekly visits to collect savings, though withdrawals can only be obtained from the bank by the clients themselves. To ensure that clients' savings are secured, Team Leaders opened individual savings accounts for 733 clients of the two SOUP programs, Ordinary SOUP and Matched SOUP.

The Participatory Wealth Ranking (PWR) process was conducted by the field agents, and ran from November 2010 until February 2011. A senior management team (SMT), along with the leadership of each community, conducted poor and ultra-poor household verification exercises to confirm the client names and the results of the PWR exercise. This process went on concurrently with the PWR process starting early January and ending in March 2011. The outcome of the PWR and household verification processes was the identification of over 6,000 potentially poor and ultra-poor households.

After consensus was reached by the leadership, a team member then visited each poor and ultra-poor HH personally to verify, paying particular attention to HHs with either questionable concerns or other issues identified in the PPI tools or from chief and elders. The team then made final selection of the ultra-poor HH.

The verification process ended on March 25, 2011 with over 4,000 HHs identified as ultra-poor, spread across 241 communities. Of these households, 733 were sampled for the SOUP program and about 700 were sampled for the control. From February to May the evaluation team successfully surveyed 3,848

households (96.5% of our total sample) spread across 7 districts in the Northern and Upper East Regions of Ghana. The remaining 137 households were lost to various factors, such as migration and death. Each household was administered two surveys; the first was a longer household-level survey, containing modules on household characteristics, education, migration, health, consumption, transfers, agriculture and livestock, assets, and food security. Second, we administered a survey privately to the primary female client, which examined topics such as mental and physical health, loans and savings, literacy, physical health, and memory. These surveys were both programmed in Blaise and were administered using netbooks. GPS coordinates of each household were also collected. To conduct these surveys, the evaluation team established 4 field offices and employed up to 70 field staff.

The sample was stratified on 3 village-level variables and 7 household-level variables to ensure key observables were balanced across the treatment groups. While stratifying by station, we randomly assigned communities to each of 2 groups: Savings Out of Ultra Poverty (SOUP), and pure control. All households in pure control communities were kept as control households. Within SOUP villages, the team randomly assigned households to Matched SOUP, Ordinary SOUP or Control.

- *Ordinary SOUP:* The operation is the same as the normal Susu program where an Agent visits the client's household weekly to collect savings of at least GHC 0.50 ($0.33).
- *Matched SOUP:* The same procedure as the Ordinary Savings but with a slight difference where clients receive a 50% match for their savings, with a maximum match of GHC 1.50 ($1.00) per week (for a GHC 3 ($2.00).

During June 2011 we developed a Field Agents Operation Manual that aimed to achieve two things. First, to serve as a reference material during the targeted field worker training, secondly, as an operation tool for Field Agents during client training.

As part of the effort to roll out the implementation process successfully, there was a weeklong capacity building for six Field Agents (FAs) and three Team Leaders (TLs) the week of June 6, 2011. The targeted training provided the field staff the skills and knowledge to effectively play their weekly roles in graduating the ultra-poor in their respective communities. With the requisite knowledge and skills, the FAs have trained a total of 733 SOUP households. Two remedial trainings for these FAs were successfully conducted in June and October, 2011.

As part of the weekly home visit protocol, FAs have educated clients on financial management aimed at increasing clients' knowledge of finances and helped them acquire the habit of saving small amounts for emergencies. Each week a total of 733 clients are visited, who are expected to save a minimum of GHC 0.50 ($0.33).In June and July 2011 in order to ensure that program communities understood how the communities and beneficiaries were randomly sampled, Field Agents (FAs) as part of the community sensitization, explained the outcome of the PWR and final verification processes. FAs also sensitized and educated community members about the research and SOUP program designs. In addition, the clients were sensitized on the SOUP component and how weekly home visits would be conducted. The sensitization took place in 77 communities and all 733 households. This activity gave clients a better sense of the program and they learned what was expected of them.

From July through September 2011 the FAs visited each client once a week to mobilize and collect savings of at least GHC 0.50. Mobilization of weekly savings from all SOUP clients started the week of July 11. So far the program is progressing smoothly with an average savings of GHC 1.00 ($0.66) per client per week. However, some clients are unable to save the minimum of GHC 0.50 ($0.33) regularly. Client's savings are deposited in individual accounts in rural banks with each client issued a passbook. More efficient financial tracking sheets were developed for tracking weekly client savings.

Currently, the evaluation team is preparing the first of many follow-up surveys to be conducted in January 2012. It will cover 30% of the baseline sample, using a randomization plan that ensures fair representation of various treatment groups. A second follow-up with wider coverage is planned for June/July 2012.

As for monitoring, after a successful roll-out of the SOUP program, the implementation team is focusing on intensive monitoring visits to program communities and clients starting in November 2011. To ensure that all FAs are monitored and supervised, 10% of each FA's clients have been randomly sampled for monitoring throughout the implementation period. In addition, other communities and clients not randomly sampled will equally be monitored. Two monitoring tools have been developed. The first tool is used as an

observation checklist during FA's weekly home visit. The second checklist is used to gather data directly from the client. Weekly, the implementation team will monitor at least: Five FAs, five communities and 50 client households. As part of the intensive monitoring, FAs field documents- monitoring tools and logbooks will be reviewed to ensure data is captured and data forms timely and accurately filled. Weekly savings' collection and deposits is on-going until May 2013.

*CARE Village Savings & Loan Associations*

Innovations for Poverty Action (IPA) is partnering with CARE International to evaluate the impact of CARE's Village Savings & Loan Associations (VSLAs) in a randomized control trial (RCT). The goal of the partnership is to provide scientific evidence on the economic and social impact of CARE's VSLA program. To that end, IPA and CARE are conducting randomized control trials of CARE's VSLAs in Ghana, Malawi and Uganda. The result will be a rigorous examination of the Associations' impact in a robust set of contexts that will help determine whether and how to scale the VSLA programs.

The VSLAs are groups of mostly women who deposit money into a common fund used to make loans to group members, which are paid back with interest. At the end of a specified time period, all members can retrieve their deposits plus interest. The intent is to provide an effective cash management tool for the poor at a smaller scale than the markets traditionally served by microfinance institutions and in communities where there is little access to formal financial services. The program is particularly interested in helping women and youths gain social capital and respect by successfully controlling their finances and linking these changes to improvements in other areas like agricultural technology adoption.

VSLAs allow group members to save together, make loans to each other and provide for a communal fund that can be used for large or unexpected expenditures. Members of a community self-select into groups of 15-20. The groups are free to set contribution amounts, interest rates and other rules themselves. Groups are encouraged to write their own constitutions that codify such decisions and are responsible for keeping track of their own finances. The week-to-week activities of the VSLA groups are administered wholly by the groups themselves and their elected officers. CARE partnered with Presbyterian Agricultural Services (PAS) in Garu Tempane and East Mamprusi and Rural Aid Action Program in Lawra to implement the VSLA ESCAPE program in Ghana. In addition, CARE implemented the program directly in Builsa. Depending on the district, CARE or its implementing partner entered and sensitized communities, provided educational seminars on the VSLA program and lockboxes to interested groups, and provided on-going monitoring and support, especially with bookkeeping. The lockbox comes with three locks and keys, which are given to three different association officers, while the box is kept by a 4th officer.

IPA's partnership with CARE has two dimensions. The first is program design. Proper implementation of and adherence to the random assignment is key to identifying the true impact of the program, and IPA has provided its study design expertise to conduct the randomization and monitor its execution. The second dimension is data collection and analysis. IPA oversaw the administration of a comprehensive baseline survey in the summer of 2008 and has administered a follow-up survey between January and May 2011. Endline data collection was completed and the team is currently working on data cleaning and beginning a preliminary impact analysis. Results are expected by early 2012.

From February to May 2011 IPA conducted the Endline survey using electronic survey instruments, covering 7,149 households in 177 communities across 5 districts in the Northern Region of Ghana. Five survey instruments and questionnaires were applied to households and communities. The household questionnaire was aimed at any household members who were most knowledgeable about that particular section. The survey modules recorded information on household characteristics, education, migration, health, consumption, transfers, agriculture and livestock, assets, and food security, among others. The Adult Female questionnaire was aimed at a woman in the household between 18-65 years old. This questionnaire focused on the lending and saving activities of the female primary respondent. Questions on social capital and a time preferences were asked during this survey that was applied privately. The Other Adult questionnaire was directed towards any other adult (male or female) in the household excluding the primary respondent. This questionnaire focused on the lending and saving activities of other members excluding the primary respondent. The Village questionnaire covered the economic, political and social activities of the community. The Market questionnaire was concerned with the unit costs of most common crops in different unit forms (bags, bunches, bowls etc). This was done for as many as 5

central markets in the district we worked in. The final analysis commenced in July 2011. The preliminary results are expected by January 2012.

As part of the IPA Ghana strategy to engage local practitioners, researchers and policy makers in open dialogue about what works and what does not work in development, IPA organized a one-day training introduction to Impact Evaluations and RCTs for 25 CARE Tamale staff members and partners on July 7th.

A take up analysis followed the baseline report on Dec 2010 where some spillover was detected in the control communities. IPA decided to increase the sample size in order to achieve greater statistical significance from 5,285 to 7,149 households, an average of 40 HH per community. Data entry has also taken longer than expected, because we are coordinating efforts with analysis on IPA-led CARE VSLA evaluations in two other countries. During Fall 2011 the CARE VSLA endline data set from Ghana was cleaned and analyzed alongside the data from Uganda and Malawi. Final results will be available in March 2012.

IPA and CARE Ghana are currently organizing upcoming an IPA presentation of the results to CARE staff as well as a training on how to present results so that the CARE team can share them with the local stations, stakeholders, and clients. There are also plans to inform a larger external audience through conferences in Ghana, particularly at the IPA Savings Conference in Accra in early March 2012. Joining the Savings Conference would allow us to draw a larger audience, and to use results from a number of projects, including CARE, to engage stakeholders in discussions about savings.

## FINDINGS

*Examining Underinvestment in Agriculture (EUI).* Rich panel data from EUI's comprehensive surveys show that farmers with capital and insurance increased their total agricultural investment by 20 percent, and farmers with insurance alone by 13 percent. However, there was no evidence of corresponding technological transformation, intensification or high returns to these additional investments. Insured farmers were found to have increased inorganic fertilizer use by 25 percent, cultivation area by 8 percent, expenditures on land preparation by 12 percent (mostly due to increased cultivation area) and total labor use on plots by 13 percent. Farmers with insurance also harvested more, increasing their output by 8 percent. This was enough to cover additional purchased inputs, but not enough to cover the costs of the additional labor. For most EUI farmers, then, the slight increase in output led to a small amount of extra cash and increased food security in the form of grain stocks, rather than significant gains in farm profitability.

IPA measured varying levels of demand, depending on the assigned premium level and history of payouts. In areas where there had been an insurance payout the previous year, demand was 93.2 percent at the subsidized price of GHS 3 per acre, 89.3 percent at the actuarially fair price of GHS 6 per acre, and 86.4 percent at the marked-up price of GHS 9 per acre. In areas where there had not been a payout the previous year, demand was 70.1 percent at the subsidized price, 55.7 percent at the actuarially fair price, and 37.4 percent at the marked-up price.

*Savings account labeling and financial literacy training for* susu *customers*. 956 customers have opened a labeled Susu account across the five Mumuadu branches, representing a 96 percent uptake rate for those offered an account. These customers have continued to use their accounts to save with an estimated total of 188,394 Ghana Cedis deposited into labeled accounts through August 2011. Preliminary results are positive. Customers with a labeled Susu savings account show a 31.2 percent increase in total deposits after 9 months of account operations across 5 branches as compared to Susu customers without the labeled account. This increase is statistically significant. Over this same time period, withdrawals by customers with the labeled account were not significantly higher than customers without the labeled account, indicating that these funds provided a stable source of additional capital for Mumuadu.

*Returns to business management consulting*

We found that, on average, the consultants' recommendations were adopted for a time, but the tailors had abandoned them one year after the training stop. On average, there was no positive impact on profit or revenue from the consulting and, if anything, there was a negative impact. The tailors who received the capital grant invested the money in their businesses, and in particular used the capital to invest in raw materials, but these investments did not increase profits. One year after the capital grant, profit was lower among those who received the capital drop compared to the control group.

# AMA RESEARCH THEME:

## *ASSET BUILDING AND PATHWAYS FROM POVERTY*

ASSETS AND NATURAL RESOURCES CAN PLAY A KEY ROLE IN HELPING HOUSEHOLDS move out of poverty. In some cases safety nets—such as food aid or cash transfers that help households stay above critical thresholds in times of need—are the most appropriate. In other cases, households that are already below the poverty line need help climbing out. Policy reform, such as land titling, helps to protect households' assets and allows them to make more productive long term decisions. Other government interventions, such as aid programs, conditional transfers, and educational programs help give poor households the tools they need to get on a successful pathway out of poverty. The goal is to protect existing assets and create an environment that allows for further asset accumulation over time, giving households the resources they need to manage shocks and stay out of poverty. AMA researchers are looking at the implementation of different policies, including transfer programs and land tenure reform, and are forming recommendations on how these programming interventions might have a greater impact for poor households.

Use of natural resources, such as forest products, is necessary for many people's livelihoods. Yet, often, incentives for sustainable use of the resources are lacking. It is important to protect resource quality over time. Understanding how households use their natural environment can help us develop policies to protect both the user and the resource. Innovations such as payment for environmental services programs and other initiatives are providing new alternatives in the successful management of forest and agricultural resources. AMA researchers are investigating policies that will protect both resources and those households that depend on their use.

### AMA PROJECTS

- Cash Transfers, Risk Management, and Asset Accumulation: Policy Evaluation for Rural Poverty Reduction in Nicaragua
- Pathways for Ensuring Access to Assets: Land Reform and Beyond (Liberia and Uganda)
- Natural Capital and Poverty Reduction (Malawi and Uganda)
- Using Local Food Aid Procurement to Transform Relief into Development: Market Information and Food Insecurity Response Analysis

### AMA BASIS BRIEFS

BASIS Brief no. 2012-02. *Who Owns the Land? Perspectives from Rural Ugandans*, by Allan Bomuhangi**,** Cheryl Doss**,** and Ruth Meinzen-Dick. January 2012.

BASIS Brief no. 2011-01. *Can Cash Transfer Interventions bring about Behavioral Change and Improve Early Childhood Development?* by Karen Macours, Nobert Shady and Renos Vakis. September 2011.

BASIS Brief no. 2010-07. *Impact of Subsidies on Fertilizer Use, Land Allocation and Forest Pressure: Evidence from Malawi*, by Christopher Chibwana, Charles Jumbe, John Mazunda, Monica Fisher and Gerald Shively. September 2010.

BASIS Brief no. 2010-05. *Income, Poverty and Charcoal Production in Western Uganda*, by Fydess Khundi, Pamela Jagger, Gerald Shively, and Dick Sserunkuuma. July 2010.

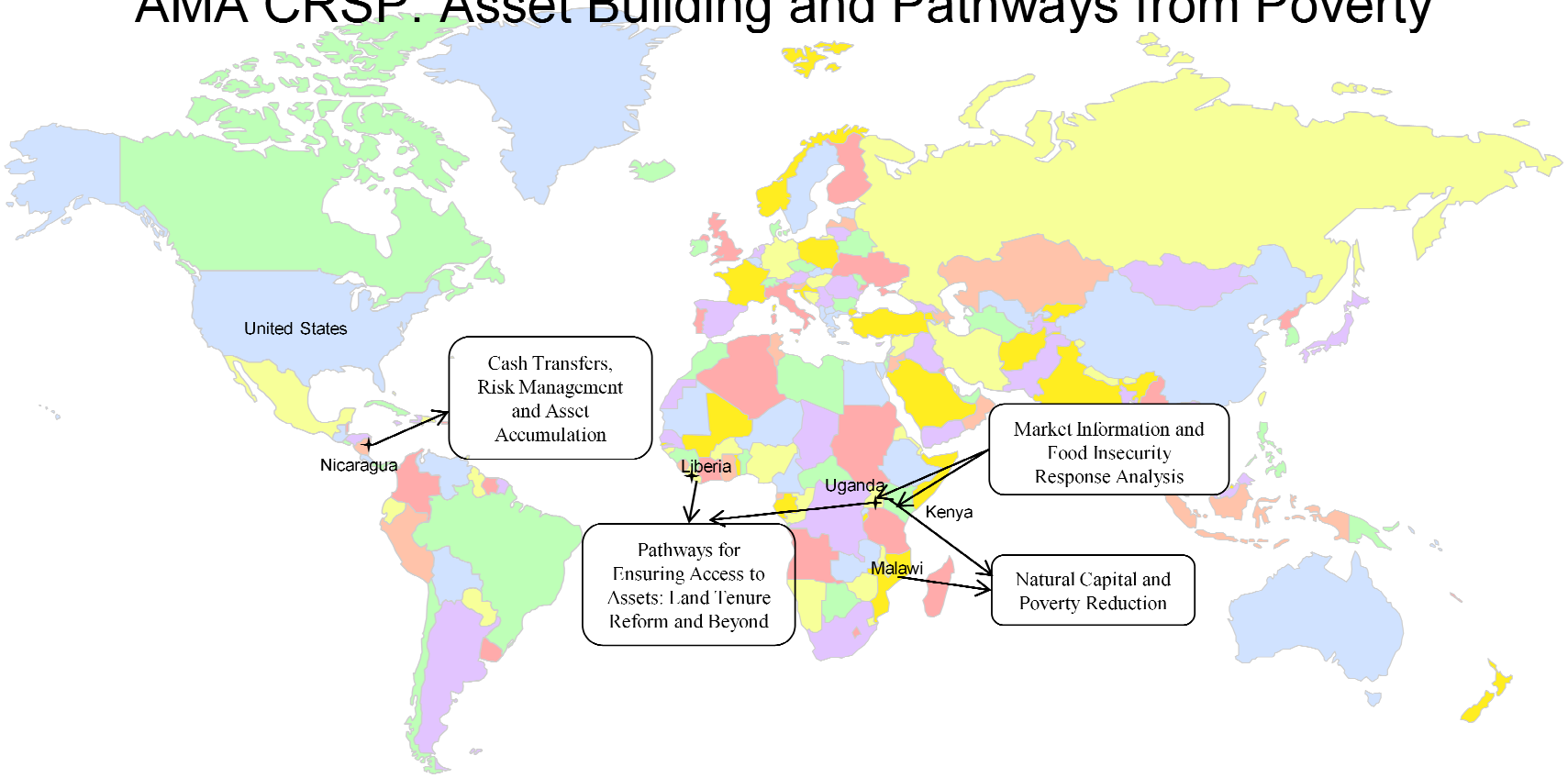
BASIS Brief no. 2010-03. *Food Aid, Food Prices and Producer Disincentives in Ethiopia*, by Getaw Tadesse and Gerald Shively. June 2010.

BASIS Brief no. 2008-02. *Using Natural Capital to Manage Risk and Reduce Poverty*, by Arild Angelsen, Monica Fisher, Charles Jumbe, Gerald Shively, and Dick Sserunkuuma. February 2008.

BASIS Brief no. 2007-02. *Land Tenure Reform and Beyond: Ensuring Women's Access to Assets,* by Cheryl Doss, Ruth Meinzen-Dick, Jeanette Carter, and Gorettie Nabanoga. July 2007.

BASIS Brief no. 2007-01. *Evaluating and Improving Interventions for Asset Accumulation, Risk Management, and Rural Poverty Reduction in Nicaragua*, by Karen Macours, Renos Vakis and Vanessa Castro. July 2007.

# AMA CRSP: Asset Building and Pathways from Poverty



# CASH TRANSFERS, RISK MANAGEMENT, AND ASSET ACCUMULATION:

## POLICY EVALUATION FOR RURAL POVERTY REDUCTION IN NICARAGUA


### Principal Investigators

**Vanessa Castro**, Centro de Investigación y Acción Educativa Social, Nicaragua

**Karen Macours**, Johns Hopkins University, USA


http://www.basis.wisc.edu/projects_ama/rural_poverty_reduction.html

A lack of a minimum endowment of assets can cause households to be stuck in long-term poverty traps, and negative shocks can cause households to fall below the minimum asset threshold necessary to pull themselves out of poverty. Conditional cash transfers are one mechanism to help increase asset endowments, as well as investment in education, health and nutrition. This project evaluated the long-term impact of a cash transfer pilot program, and whether it increased the asset base and/or facilitates income diversification. It also looked at the changes in household's return on productive activities following their participation in the program.

The project looked at a recently completed pilot program by the Ministerio de la Familia (MIFAMILIA) in Nicaragua. It combined a traditional conditional cash transfer program with additional interventions aimed at increasing the asset base and risk management capacity of poor rural households exposed to weather risk (droughts).

By providing evidence on the effectiveness of different types of interventions, the recently inaugurated government team in charge of social policy and rural development will be able to make informed decisions, especially about the restructuring of existing initiatives. The project addressed a number of the policy priorities of the new Nicaraguan government, including reduction of hunger and extreme poverty, malnutrition, gender empowerment and microfinance, and shed light on discussions regarding the effectiveness of conditional cash transfers as opposed to other programs, such as food aid.


### Additional support

World Bank: $569,069

Inter-American Development Bank: $100,000

## Collaborations

This research built the Nicaraguan pilot program *Atencion a Crisis*, implemented between November 2005 and December 2006. There are strong synergies between the BASIS activities and at least three other activities by Nicaragua's Ministry of Family. The most direct synergies exist between the evaluation of *Atencion a Crisis* and a new evaluation of the original conditional cash transfer program, the *Red de Proteccion Social*, which started in 2000 and was implemented in a different part of the country. This evaluation focused on the long-term impacts on human capital accumulation. Similar outcome measures were used (e.g., same cognitive tests, labor market histories, etc.) in order to increase the lessons learned from both projects.

The ministry recently restarted a centrum-based early childhood development intervention (PAININ), which partly covers the same communities as *Atencion a Crisis* and the complementary early childhood development pilot focused on parents. The sample of treatment communities for the early childhood development pilot was balanced between communities with and without PAININ. The ministry also started a new program focused on early childhood development in urban areas, financed by the IADB. Given the similar objectives of some components of *Atencion a Crisis*, there is an ongoing dialogue with the IADB team to coordinate and increase the lessons learned. Finally, the ministry is considering a new social protection program through house visits by community workers (following the model of *Chile Solidario*) focusing on empowerment, early childhood, reduction of child labor, and labor market integration in urban areas, with possible financing from the World Bank. Given similar objectives and approaches of some components of *Atencion a Crisis* and the complementary interventions, conversations were held to share lessons learned.

More broadly, there has been a relatively extensive sharing of methods and approaches with other projects that focus on measuring early childhood development outcomes—in particular World Bank and Inter-American Development Bank projects in Ecuador, Brazil, Cambodia, Chile, Colombia and Mozambique.

## Outputs


BASIS Brief no. 2011-01. *Can Cash Transfer Interventions bring about Behavioral Change and Improve Early Childhood Development?* by Karen Macours, Nobert Shady and Renos Vakis. September 2011.

BASIS Brief no. 2007-01. *Evaluating and Improving Interventions for Asset Accumulation, Risk Management, and Rural Poverty Reduction in Nicaragua*, by Karen Macours, Renos Vakis and Vanessa Castro. July 2007.

Del Carpio, Ximena, and Karen Macours 2010. "Leveling the Intra-household Playing Field: Compensation and Specialization in Child Labor Allocation." *Research in Labor Economics,* 31: 259-296.

Del Carpio, Ximena, and Karen Macours. 2008. "Leveling the Intra-household Playing Field: Compensation and Specialization in Child Labor Allocation." World Bank Policy Research Working Paper Report No. WPS4822. Also forthcoming in *Research in Labor Economics*.

Macours, Karen, and Renos Vakis, 2008. "Changing households' investments and aspirations through social interactions: Evidence from a randomized transfer program in a low-income country." Johns Hopkins University and World Bank Working Paper Report No. 45211.

Macours, Karen. Norbert Schady and Renos Vakis. 2012. "Cash Transfers, Behavioral Changes, and Cognitive Development in Early Childhood: Evidence from a Randomized Experiment". *American Economic Journal: Applied Economics,* April.

Macours, Karen. Norbert Schady and Renos Vakis. 2008. "Cash Transfers, Behavioral Changes, and Cognitive Development in Early Childhood: Evidence from a Randomized Experiment." World Bank Policy Research Working Paper No. 4759.

Macours, Karen, Fernando Galeana and Renos Vakis. "Supply-side Responses to High Food Prices: Evidence from Small Farmers in Nicaragua."


Publications aimed at dissemination of market and community information in Spanish: one children's tale (*la panadera emprendadora*), two comics (*Como comprar y vender; Como invertir tus ganancias*), and two informational brochures.

Website aimed at information dissemination: www.worldbank.org/atencionacrisisevaluation

## ACTIVITIES

*Evaluation of the Atencion a Crisis pilot program.*

The project builds on the design of a multi-dimensional pilot program in Nicaragua that randomly assigned three different interventions targeting short-term risk coping and long-term asset accumulation and risk management. The analysis of the third round of the panel dataset is underway and will shed light on the original intervention's medium-term impacts (two years after the end of the intervention).

We focused on possible impacts of each of the three interventions on household income diversification and risk management. We also analyzed the longer-term impacts on early childhood development outcomes, and used the experimental variation between treatment groups to shed more light on the underlying mechanisms.

**Early intervention can have lasting effects on health and nutrition.**

Preliminary analysis considered

- a household's other investments in human capital after the end of the program, in particular, education, health, nutrition
- changes in household physical and social assets
- the heterogeneity of medium-term impacts on productive activities of the productive investment grants and the training package
- medium-term impacts on gender empowerment
- household aspirations, attitudes, and social interactions.

*Finalization of the early childhood development intervention.* House visits by community educators as part of the complementary early childhood development pilot intervention ended in early 2011. Two different modalities of the intervention were piloted (one targeted primarily at mothers, the other targeted primarily at fathers), and are randomly assigned to households in the three original treatment groups and households in the comparison group.

Given that the intervention has a community focus, the randomization was done at the community level. This will allow a rigorous evaluation of the complementary impacts for different types of beneficiaries and also capitalizes on the prior rounds of data, allowing for a difference-in-difference and/or fixed effects estimation.

In the last phase of the pilot, a more intensive monitoring mechanism was implemented with additional World Bank funds.

*Additional Data Collection.* A fourth round of the panel data collection aimed at evaluating the impact of the parenting intervention was completed. This further builds the longitudinal *Atencion a Crisis* dataset. Collection was primarily financed with World Bank and IADB funding, with complementary funding from BASIS. The data will be analyzed in the first half of 2012, and dissemination activities are planned for June 2012 in Nicaragua.

*Dissemination of quantitative research findings.*

Research findings of the medium-term impact evaluation were disseminated through a number of seminars and conferences. Research findings were presented the USAID-BASIS policy conference in Washington DC (September 2011) and at academic and policy conferences and seminars at Columbia University, EUDN, DFID, INRA- Rennes, INRA-Montpelier, FAO, Université Panthéon-Assas (Paris 2), and 3ie conference (Cuernavaca, Mexico).

Our early childhood development research received much attention from policy-makers, in particular at the Inter-American Development Bank, which is heavily investing in this topic. The research has been used in policy dialogue between the Inter-American Development Bank and its client countries.

Finally, the research on risk management generated as part of the project has received a lot of attention of policy makers, in particular at the World Bank. It has served as input in the WB's new Social Protection agenda.

## FINDINGS

Transfer programs that combine a social safety net approach with mechanisms to increase a household's asset base and diversify economic activities can enhance household risk management. Two years after the intervention, we found that beneficiary household consumption, in particular food consumption, was less affected by negative weather shocks when compared to household consumption in non-treatment families. Impacts are found to be larger for households that received transfers to invest in productive activities, in addition to transfers targeted at human capital. The underlying mechanisms generating these beneficial outcomes appear related to improved income diversification. We also found that changes in a household's attitude regarding traditional and less-traditional activities led to benefits.

Social interactions were found to affect a household's attitude towards its future prospects and to amplify program impacts on investments in human capital and productive activities. Empirical evidence indicated that communication with motivated and successful nearby leaders can lead to higher aspirations and corresponding investment behavior.

The conditional cash transfer program had significant effects on cognitive outcomes, especially language. These impacts were in evidence two years after the program ended. Impacts are larger for older pre-school aged children, who are also more likely to be delayed. The program increased intake of nutrient-rich foods, early stimulation, and use of preventive health care—all of which have been identified as risk factors for early childhood development. Households increased expenditures of these inputs more than can be accounted for by the increases in cash income only, further suggesting that the program changed parental behavior. In part, these changes in behavior are still apparent two years after the end of the program.

The findings suggest that gains in early childhood development outcomes should be taken into account when assessing the benefits of cash transfer programs in developing countries. More broadly, it illustrates that gains in early childhood development can result from interventions that facilitate investments made by parents to reduce risk factors for cognitive development.

*The conditional cash transfer program had significant effect on cognitive outcomes, and the impacts were in evidence two years after the end of the program.*

Based on lessons learned from this impact evaluation, the team has provided input for the design of a new government early childhood stimulation program (funded by the IADB), as well as a new Social Protection project (funded by World Bank), and is engaged in the broader policy dialogue on early childhood development and social protection at the World Bank and the Inter-American Development Bank.

The project has resulted in increased capacity, with 140 practitioners, researchers and students, trained in monitoring and impact evaluation methods, and 60 community educators trained in program design and implementation for early childhood development intervention. Also, three US students completed an MA degree and one US student completed a Ph.D. degree. Three Nicaraguan students are continuing with coursework towards a degree.

**The *Atencion a Crisis* program had strong effects on improving language, short-term memory and social skills.**

# PATHWAYS FOR ENSURING ACCESS TO ASSETS:

# LAND REFORM AND BEYOND (LIBERIA AND UGANDA)


## Principal Investigators

**Jeanette Carter**, University of Liberia

**Cheryl Doss,** Yale University, USA

**Ruth Meinzen-Dick**, International Food Policy Research Institute

**Gorettie K.N. Nabanoga**, Makerere University, Uganda


http://www.basis.wisc.edu/projects_ama/land_tenure_reform.html

This project examines how people gain secure access to assets, including land, and how the patterns differ for women and men. We examine how the formal legal frameworks and social norms, including marital and inheritance patterns, shape an individual's access to land and other assets. Collecting both community surveys and household and intrahousehold survey data from Liberia and Uganda provides an opportunity to analyze these relationships and draw policy lessons. One unique feature of this data is that we can examine women's access to assets in the context of particular community norms and practices.

The focus on strengthening women's access to land and other assets is well founded. Access to land plays an important role in alleviating rural poverty both directly and indirectly. Land can be a direct source of income, insurance and collateral. Indirectly, land is a source of social status and bargaining power.

Liberia and Uganda provide case studies at two very different points in the land reform process. Liberia is facing increasing pressure, both domestic and international, to resolve land tenure issues that have been exacerbated by years of civil war. Uganda legislated land reform in 1998, which has not been fully implemented across the country. Both Liberia and Uganda exhibit a diversity of land tenure systems, ranging from private and individual to communal and common property and customary and statutory systems coexist.

This project is unique in that most projects interested in land look at access to land in isolation, without considering the interrelationships of land with other assets. We focus on three questions: How do people gain access to assets and how do the patterns differ by gender? Under what conditions are women able to successfully claim assets to which they are entitled? How can policy and practice be modified to ensure that women have secure access to assets and that they can exploit them for productive use in both the short and long run?

## Additional support


IFPRI matching support from CGIAR Systemwide Program on Collective Action and Property Rights (funded by Government of Norway, Italy, and World Bank) totaled: $71,116.

The University of Liberia provided salary and allowances for Jeanette Carter and office space at the Institute for Research. The Government of Liberia provided in-kind support through the Governance Commission.

Vanguard provided funds for a workshop in Entebbe Uganda which totaled: $120,000

Chronic Poverty Research Centre, Asset Inheritance and the Intergenerational Transmission of Poverty Program provided support for the project and to attend and prepare and prevent a paper at a conference in London.

## Collaborations

Gorettie Nabanoga is coordinating a three year (2010-2012) research project aiming at increasing the understanding of how different options for REDD architecture and policy will affect greenhouse gas emission reduction and benefit sustainable development and poverty reduction. The project aims to establish participation of different social groups in sustainable resource use and management, and pilot the benefits of sharing mechanisms of the different social groups. The project is funded by NORAD and co-ordinated by The International Institute for Environment and Development (London) and The Norwegian University of Life Sciences (UMB). This is a multi-national project involving Brazil, Vietnam, Ghana and Tanzania. Findings from this BASIS project help enrich the REDD project by providing a better foundation for understanding how rights and decision-making over agricultural resources are shared among men and women.

Ruth Meinzen-Dick co-leads an IFPRI research program on Strengthening Women's Assets for Better Development Outcomes. This project is part of the overall research program, and the methods for assessing land property rights, in particular, while other studies help inform this project by examining asset trajectories of accumulation and loss of assets. Under that program, IFPRI has a Gender, Agriculture, and Assets Project (GAAP), which assesses how different agricultural development programs have affected the gender distribution of assets. This project is closely tied in to the CGIAR Systemwide Program on Collective Action and Property Rights (CAPRi), which Meinzen-Dick coordinates. The CAPRi program focuses on the links between property rights and conflict, including postconflict rebuilding. Ruth Meinzen-Dick and colleagues at IFPRI have also been asked to develop a Women's Empowerment in Agriculture Index for USAID's Feed the Future Initiative. One dimension of this index relates to the gender distribution of ownership and control of key productive inputs. The survey instrument is being embedded in the Feed the Future M&E system and draws on our findings on how to measure control over assets. The community tenure profile and intrahousehold survey protocols developed for this BASIS project have been shared widely within IFPRI, with the GAAP project participants, and are discussed in a new "toolkit" of methods to study gender and assets (developed by GAAP), and have been shared with MCC's evaluation unit.

Cheryl Doss continues to work extensively on projects on women's access to assets. She is a PI on the Gender Asset Gap Project, a collaborative project that has collected sex-disaggregated asset data in Ecuador, Ghana, and India (funded by the Dutch MDG3 program.) The two projects have been able to share experiences and findings.

## Outputs


BASIS Brief no. 2012-02. *Who Owns the Land? Perspectives from Rural Ugandans*, by Allan Bomuhangi**,** Cheryl Doss**,** and Ruth Meinzen-Dick. January 2012.

BASIS Brief no. 2007-02. *Land Tenure Reform and Beyond: Ensuring Women's Access to Assets,* by Cheryl Doss, Ruth Meinzen-Dick, Jeanette Carter, and Gorettie Nabanoga. July 2007.

Bomuhangi, Allan, Cheryl Doss, and Ruth Meinzen-Dick. 2011. *Who Owns the Land? Perspectives from Rural Ugandans and Implications for Land Acquisitions*. Forthcoming as an IFPRI Discussion Paper. This paper is also under review for a special issue of *Feminist Economics* on Land Acquisitions, Food Security and Gender.

Cheryl Doss, Mai Truong, Gorettie Nabanoga, and Justine Namaalwa. 2011. *Women, Marriage and Asset Inheritance in Uganda*. Chronic Poverty Research Centre Working Paper No. 184, April. Also forthcoming in a special issue on Asset Inheritance and the Intergenerational Inheritance of Poverty by *Development Policy Review*.

Doss, Cheryl, and Ruth Meinzen-Dick. 2009. "Collective Action within the Household." Paper presented at International Association of Feminist Economists.

Doss, Cheryl, Caren Grown, and Carmen Diana Deere. 2008. "Gender and Asset Ownership : a guide to collecting individual-level data." World Bank Policy Research working paper no. WPS 4704.

McCarthy, Nancy. "Customary Land Use in Liberia: A Review of Supreme Court Decisions." Submitted to Governance Commission of Liberia.

Truong, Mai and Cheryl Doss. *Annotated Bibliography on Women's Access to Assets*.

## ACTIVITIES

*Uganda.* The key project for this year was to complete the data cleaning, continue the analysis, and to disseminate the findings. The PI from Makerere University, Gorettie Nabanoga and one of the Uganda team members, Justine Namaalawa spent three weeks at Yale University working with Cheryl Doss on the data analysis.

The Uganda team developed three District reports for the dissemination of the findings to the district technical staff and representatives of the sample communities. In May 2011, we revisited Luweero where we presented the report to the district technical staff and representatives from the sampled communities. In June and September, we revisited Kibaale and Kapchorwa and made similar presentations. The reports are being revised and formatted for publication. In addition, a country report has been drafted and has been sent out for comments.

**Meeting held at the Mengya Village primary school in Uganda.**

On August 16, we held a policy meeting in collaboration with Uganda Land Alliance. This was a forum to present our preliminary findings to a national level audience. Thirty-five people attended, including representatives from IFPRI Uganda, ACODE, Ministry of Gender, Labour and Social Development, AT Uganda, Ministry of Finance, Uganda Media Centre, Uganda Parliament, American University, University of Florida, USAID, Associates for Development, MWEDO-Arusha, Wellspring, Uganda Land Alliance, Yale University and Makerere University.

In addition, Cheryl Doss presented a paper using the survey data at a workshop on Asset Inheritance and Intergenerational Transmission of Poverty Project hosted by the Chronic Poverty Research Centre and ODI in London in October 2010.

The project faced several challenges in its final year. It would have been useful for the project team in Uganda to be able to spend more time with the comparative team. We had planned for an additional week together in October, but the Uganda team's arrival was delayed when their plane caught fire and had to return to Entebbe. Cheryl Doss had planned to spend time in March in Uganda, but the trip was delayed to uncertainty around the Ugandan elections.

*Liberia.* The Liberia country team stopped functioning in 2009 thus Cheryl Doss and Ruth Meinzen-Dick took the lead on the work. The data collection was completed by incorporating individual asset ownership questions in a survey that was fielded by Innovations for Poverty Action (IPA). The survey was completed and the data cleaned. The analysis for a paper has been completed, and we are currently drafting the paper.

Training of two Liberian master's students has proceeded as planned. The students were able to conduct their own field research, and have submitted their masters' theses at Makerere University.

The project in Liberia has faced numerous challenges throughout the life of the project. We are very pleased that we have been able to collect data that will be useful for analyses of gender and assets issues. Due to the numerous delays and switching to a new model for data collection, we have just recently begun analysis.. Dissemination activities have also been difficult because we no longer have a team in Liberia. We will be disseminating the paper and project brief through numerous organizations and contacts in Liberia, many of which have expressed interest in our findings.

*Additional Activities.*

We held a three day workshop in Entebbe, Uganda in August 2011 that included both the Uganda and

comparative teams of the BASIS Project and the team from the Gender Asset Gap Project. Participants included people from statistical agencies and those from women's and land advocacy organizations. Presentations included the key findings on the gender asset gap from projects in Uganda, Ghana, Ecuador and Karnataka, India. In addition, a representative from each statistical agency made a brief presentation on the sex disaggregated data collected by their agency. The advocacy groups discussed their current work. One highlight was the break-out group discussions that focused on what data can be collected to support the efforts of women's and land advocacy groups.

The project held another workshop on Gender and Assets in Washington, DC on October 13, 2011. This workshop attracted over 100 participants from USAID, consulting firms, NGOs, research and donor organizations. It brought together the results from this project along with an overall presentation on the importance of considering gender and assets (by Cheryl Doss), results of the BASIS-funded research conducted by Agnes Quisumbing and colleagues in Bangladesh and Ethiopia, and other research conducted by the Gender Asset Gap Project and the Gender, Agriculture, and Assets Project. Caren Grown of USAID also discussed the Women's Empowerment in Agriculture Index, being developed by IFPRI, which builds upon the research on the importance of women's assets, as well as findings from this research on how to measure women's assets. The workshop helped to demonstrate the practical applications of the research findings for development projects conducted by USAID and other organizations.

**Conducting an interview to determine traditional patterns of land ownership, land use and control of assets in Uganda.**

## FINDINGS

Going beyond conventional household-level analyses to look at the differential access and control of assets by men and women is important to understand the relationships between poverty and assets. In particular, because women's access to assets is often tied to their relationships within the household and community, they are vulnerable to losing this access when the household dissolves, either through divorce, desertion or death.

*Uganda.* The data demonstrate that local understandings of gendered land ownership are considerably more complex than externally-imposed definitions, especially those based on titles. Both men and women report a relatively high degree of joint "ownership" of land, even though women's names are rarely on the documents and women may lose these claims if their marriage dissolves. Women do have recognized use and decision-making rights to land; conversely, very few men report having independent rights to alienate land. Thus, reported "ownership" is not associated with full rights to do anything one wants with the land, independently. Yet our respondents perceived themselves as relatively secure in their land rights and most expected to have access to the same plots of land in five years.

*Where men and women do not have titles, it is essential to look more at land access than land ownership.*

But as we probe more in detail on particular bundles of rights, we see that women have fewer recognized rights compared to men, especially for alienation (to sell, bequeath, or rent land). When we consider documented rights, the gender gap becomes even more apparent. Whereas 69% of men and 57% of women report owning land, the proportion of having any documents showing land rights in their own name falls to 52% for men and only 18% for women. If we further consider registered deeds in their own name, it falls to 2% of men and 1% of women.

Although respondents claim that they have relatively secure use rights to land under present conditions, there are serious questions about whether such rights will be robust enough to withstand challenges from powerful outside interests seeking to acquire land. The answer to this will depend, to a large extent, on what land rights

are recognized in the context of large-scale land acquisitions. Will investors and government agents involved in brokering deals recognize and deal with only those with registered deeds, or will they acknowledge the legitimacy of a broader range of claims? Depending on how land owners are defined, different groups will be considered stakeholders. Our study demonstrates that the majority of men and women have a stake in the land, but very few have registered deeds, thus they are susceptible to being sidelined if land deals take a narrow definition of legally recognized—rather than socially legitimate—rights.

The dangers of women being marginalized in land deals are particularly acute. Although we found (surprisingly) high reported rates of land ownership by women, either independently or (more commonly) with their spouse, these rates fall dramatically if only documented land rights are considered. Yet women play a key role in agricultural production and household food security. Both the welfare and the social legitimacy of land deals are likely to be undermined, if the complex forms of local land rights for women and men are not taken into account. Given the very low proportion of men or women who hold title deeds in their own name, it seems unlikely that strategies focused on titling will be effective in securing the land rights of large numbers of the rural population, especially women. However, we learned that NGOs are focusing on other strategies to obtain official recognition for alternative documentation such as funeral eulogies, and to encourage women to obtain such documentation. The evidence from our study can be used to support and refine the latter strategy.

Although there are many challenges to collection of ownership data in a context such as Uganda, where the concepts of ownership are complex, there are some basic data collection lessons that were learned. First, many surveys ask whether the household owns the dwelling or any land. They then often ask if there is an ownership document. Our results suggest that it is important to ask three additional questions. If the land or house is owned by someone in the household, it is possible and useful to ask who within the household the owner is – and to allow for the listing of multiple owners. Similarly, if there is an ownership document, the follow-up question should be what kind of document it is, and whose names are on the document. These additional questions would provide much more information about women's rights to land and their potential vulnerability.

*Liberia.* In Liberia, our individual asset questions were incorporated into the second round of a two-round survey. While this means that our data is less detailed for Liberia than for Uganda, we can take advantage of some of the questions that were asked in both rounds about household level assets and conflict experiences. The assets that we analyze are land, housing, goats, chickens, rubber trees, coffee/cacao trees, motorcycle, telephone, radio and mattresses.

Respondents were individuals who were asked about whether their households owned key assets and whether they owned the assets individually. Several striking results were obtained; men are more likely than women to report that their household owns assets other than the dwelling and agricultural land. So it is

**The donkey is a common asset accumulated by both men and women in Uganda.**

not simply that the women respondents report that they own fewer assets themselves, but also that they live in households that are less likely to own key assets. The one exception was for housing; women respondents were more likely than men to report that they themselves owned the household in which they lived. In addition, never being married, widowed or divorced had a much stronger negative effect on women's asset ownership than did similar marital status for men.

We found less of an impact of conflict on asset ownership than we had expected. Using measures of the proportion of respondents in each village that had been part of an armed group, been a refugee or seen conflict, there is no consistent pattern. Nor are there consistent patterns by gender.

We use two approaches to examine the changes in asset accumulation over the year between the two rounds of the survey. In each round, 20 individuals were interviewed in each village, but they were not the same individuals. And the individual level asset data was only asked in the second round. For the second round, we analyze the incidence of ownership of the key assets at the individual level, including variables for the proportion of respondents in that village in the first round who reported their household owning the asset; a measure in the change in this proportion between the first and second rounds; and a term interacting this change with whether or not the respondent is male. The coefficient on this interaction term is not significant for any of the assets, implying that changes in asset ownership within the village do not impact men and women differently.

Again in this set of estimations, marital status is significant. Being non-partnered (never married, widowed or divorced) is correlated with being less likely to own all assets.

Second, we pool the two rounds of data and examine household level ownership of assets. Including a measure of whether the observation is in the first or second round and a term interacting the second round with whether the respondent is male. This is a second test of whether the change in assets differs for men and women, this time focusing on household level asset ownership. Men were more likely to live in a household with land in the second round, but less likely to live in a house with goats, chickens, rubber trees, motorcycles or a mattress.

# NATURAL CAPITAL AND POVERTY REDUCTION (MALAWI AND UGANDA)


## Principal Investigators

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http://www.basis.wisc.edu/projects_ama/Natural_capital.html

In many countries poor households turn to resource extraction to generate income, manage risk and secure livelihoods. However, this strategy prevents full participation in other activities and an escape from poverty. This project will document the ways in which natural capital serves as informal insurance and a safety net against income variability and transitory shocks. It will also examine household dependence on natural resources, and how this varies with wealth, gender and market conditions. Finally, it will consider whether income from natural resources can serve as a pathway out of poverty by helping households accumulate physical, financial and human capital.

In some countries, income from resource extraction accounts for up to 45% of total income for rural households. The importance of resource extraction is amplified in the presence of risk, which will likely increase as climate change threatens productivity, especially in marginal agricultural areas. Improved information about how households use natural resources and their role in income generation and risk management will help governments generate natural resource management policies that will not disadvantage the poor. In addition, researchers will look at the long term sustainability of resource extraction, and will look to inform policies in directions that improve both economic and environmental outcomes. The project will work to highlight ways to ensure that a larger share of resource rents go to local people, and articulate ways to enhance poverty alleviation without increasing environmental degradation.

## Additional support


Purdue University matching funds: $71,430.

Norwegian University of Life Sciences for graduate student support: $120,000.

SANREM CRSP support for synergies between CRSP projects: $49,670.

National Science Foundation supports data collection in Malawi: $50,000.

CIFOR supports data collection: approximately $1,000,000.

Borlaug-LEAP fellowship for student research in Malawi: $20,000.

## Collaborations

The first and primary synergy has been with CIFOR's Poverty Environment Network (PEN). The PEN project involves collection in more than 25 countries of environmental and socioeconomic data using a consistent survey instrument and implementation approach. These surveys include a very detailed recording on a quarterly basis of all income sources including all uses of forests. Furthermore, the PEN global data set, because it contains information from more than 200 communities in 25 countries, allows us to study how the role of natural resources in supporting and insuring rural livelihoods varies according to forest type, forest tenure, market access, and other contextual factors. Household panel data from Malawi and Uganda are included in the project and have been used by the AMA BASIS team to study the role of natural insurance in those countries.

The second project synergy was with a National Science Foundation (NSF)-funded project from the division of Human Social Dynamics. The NSF project focused on examining causes for poverty at the household level in Malawi and involved quarterly household surveys. This work allowed us to expand a previously-conducted household cross-section data set into a panel so as to better capture income dynamics in the area of Mt. Mulanje in southeastern Malawi. This work complemented our other Malawi fieldwork, which was undertaken in central and western regions of the country.

The third synergy is that several MS students studying in the program in Development and Natural Resource Economics (DNRE) at the Norwegian University of Life Sciences collaborated with our research projects in Malawi and Uganda, working on thesis topics that fed into the project goal of examining the role of environmental income in risk management, asset accumulation, and poverty reduction. Three graduate degrees at the Norwegian University of Life Sciences were supported as part of a BASIS cost-sharing obligation by that university.

An additional synergistic activity, unanticipated at the start of the project but important during 2011, was collaboration with Gero Carletto at the World Bank to contribute lessons from our involvement in the PEN project to current LSMS-ISA efforts in Uganda, Malawi, Ethiopia and Nigeria. We reviewed LSMS-ISA survey instruments to identify gaps in data collection related to the role of natural capital. Based on this work, questionnaires used by the World Bank for data collection have been modified.

Finally, in the context of work in Uganda, we have achieved synergies with the USAID-funded Global Nutrition CRSP project. Some of the data collected by the BASIS CRSP project now forms a baseline for research focusing on rural nutrition and the impacts of rising fuel prices and scarce fuel wood on cooking behaviors, food choice, infant feeding practices and maternal and child health.

## Outputs


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## ACTIVITIES

Our activities in 2010-11 focused on delivering local training and outreach activities in Malawi and Uganda, completing research activities in each country, and working to present and publish research findings. We made progress on a number of cross-cutting issues, comparative studies, and analyses of a number of datasets for Malawi and Uganda, as well as the CIFOR-PEN global dataset. During the course of the project we faced challenges in identifying viable candidates in our host countries for graduate study in the U.S. Substantial recruiting efforts were undertaken in both Malawi and Uganda, but the pool of potential applicants with the background, interests, and skill sets to satisfy admission requirements were shallow. In addition, our work on Malawi's Farm Input Subsidy Program proved somewhat controversial, requiring considerable sensitivity in disseminating research results in country.

*Uganda.*

We carried out two household surveys, one focusing on charcoal production (n=600) in the districts of Hoima, Masindi, and Nakasongola and a second focusing on timber production (n=180) in Kabale and Chamba. In addition, an extensive market value chain survey was completed for the charcoal trade between producing villages and the Kampala retail market (n=273). These surveys helped us to directly address one key objective: examining factors influencing household dependence on natural resources and how this reliance varies with levels of income or wealth, gender, and market conditions. Two datasets have been analyzed through collaborative work at Makerere University, Purdue University, and the Norwegian University of Life Sciences. In the summer of 2011we also collected data in western Uganda (Hoima, Kibaale) to extend by one additional round a household panel (6 villages; 175 households) that was established in 2003 and 2007. This activity leveraged previous investments in data collection and also creates a potential highly synergistic bridge to follow-on research being supported by the Global Nutrition CRSP in Uganda.

Two of the surveys were designed to provide a "stump to stove" analysis of charcoal production in three charcoal producing districts in western Uganda. The aim of these studies was to better understand who produces charcoal and how charcoal production fits into the overall livelihood and risk-management strategies of rural households and communities. Importantly, the districts chosen for the surveys differ in their forms of forest-related governance. Initial evidence suggests that extraction patterns and rates differ markedly by district, in ways that are not necessarily related to wood availability or market proximity.

Accordingly, we formulated hypotheses related to the impact of local governance on resource extraction and household exposure to risk-mitigating resources. In the case of the value chain surveys, we collected data from nearly 300 market participants, spanning producing villages to retail markets in Kampala. Analysis of these data focused on decomposing profits along the supply chain to examine issues related to market access, market organization and market power. Through this effort we were able to describe how market structure and performance influence household welfare and risk exposure, which is critical for the design of policies related to this sector. This work resulted in BASIS Brief 2010-05, "Income, Poverty and Charcoal Production in Western Uganda," three M.S. theses and two published journal articles.

Our third Uganda survey covers communities in southern Uganda that provide migrant labor for seasonal timber cutting and sawn wood production in the central part of the country. Key hypotheses of interest for this work relate to the role of off-farm labor in mitigating idiosyncratic and covariate (village-level) agricultural risks, and the role of off-farm labor arising from forest resource extraction in asset accumulation. A key feature of the survey design for this study is that the two locations have similar access to forests but different land tenure systems, allowing us to examine the role of the latter in influencing rates of resource extraction. During the year analysis for this activity was completed, resulting in an additional journal article (Jagger, Shively and Arinaitwe, forthcoming).The key finding is that the interactions between labor endowments and land constraints are the main drivers of participation in logging activities. Our findings show that income from migrant logging significantly reduces income inequality in the home community.

Non-degree training in Uganda was extensive in 2008, 2010 and again in July 2011. Since the beginning of the project, a focus has been to strengthen research capacity at Makerere University and allied offices in the Ugandan government. In July 2011 we conducted a one-day training workshop for members of Makerere University staff, graduate students in forestry,

agriculture and geography, and various members of the government research community. The title of the workshop was "Ex post methods for evaluating projects and policies." A total of 45 individuals participated (34 males and 11 females).

Three related M.S. degrees have been completed at the Department of Economics and Resource Management at the Norwegian University of Life Sciences. The theses focus on poverty dynamics and the role of forests. Journal articles were prepared from two of the theses. One student spent the 2010 spring semester at Purdue University as a visiting researcher and is now continuing as a Ph.D. student in Norway. One M.S. degree was completed at Purdue University with full support of the AMA BASIS project.

**Fuelwood transporters outside Lilongwe, Malawi. Photo by Gerald Shively**

*Malawi.*

We launched a household survey with 200 randomly-selected households in three southern Malawi villages in around Mulanje. A key element of the survey was a quarterly income questionnaire similar to the Poverty Environment Network (PEN) survey instrument. One main revision of the PEN format is the use of separate interviews for husbands and wives in the income recording for the purpose of improving data completeness and accuracy. In rural Malawi, husbands and wives perform some income-generating activities separately and are often unwilling to share information on income generation in the presence of a spouse. In addition to income recording, separate questionnaires were used to collect information on household demographics, landholding, wealth holdings, food security, expenditure shares for various goods and services, change in economic situation in the last five years, crises and unexpected misfortunes in the last three years (e.g., crop failure, serious illness of family member), change in forest use in the last five years, perceptions of forest values, willingness to participate in forest co-management, awareness of climate change, adaptation and response to changing climate, and receipt and use of agricultural input subsidies.

A series of economic experiments were used to collect information on householder risk attitudes and trust. In addition, geo-coordinates of all dwelling units and various locations of production and distribution were recorded. GIS data were acquired to develop a geodatabase to be merged with the household-level data. This longitudinal study looks at agricultural strategies and social supports as they influence cropping and forest biodiversity in the presence of climate variability. In addition to household interviews, GPS and soil measurements were taken.

An additional household survey (n=400) was conducted in Kusungu and Liwonde districts of Malawi in 2009. This survey was a follow-up to 2002 and 2006 surveys. Our goal was to combine these surveys to construct a household panel, which we have done. The surveys formed the basis for thesis research by two students. The focus is the nexus between maize, tobacco and forest pressure. Our observations motivated a series of questions related to market- and policy-induced forest degradation, the role of institutions in shaping resource extraction patterns, and tradeoffs between short-term and long-term poverty alleviation. We also finalized research topics and a questionnaire for an 800-household survey being conducted by the Norwegian University of Life Sciences.

Data processing has been completed and data analysis took place at Purdue and IFPRI in Malawi during 2010-2011. The surveys include extensive information on household-level (idiosyncratic) and village-level (covariate) shocks and household response to these events. Four papers have been prepared. Two have been accepted for journal publication and two remain in process. This work has been presented numerous times in public, including at conferences of the African Association of Agricultural Economists, in Cape Town,

South Africa and the Association of Agricultural Economics Association in Pittsburgh. A number of related research papers, presentations and policy briefs have benefitted from direct or indirect support through BASIS AMA project affiliation.

The training of our first M.S. degree Malawian student was completed in July 2010. The training of our second M.S. degree Malawian student was completed in June 2011. Other training includes an "Ethics in Research" session conducted at Bunda College, University of Malawi. Participants included 18 males and 8 female staff members. We also completed a three-day training workshop for members of the Ministry of Agriculture and Food Security staff in Malawi. The title of the workshop was "Policy-oriented research for improved policy-making in Malawi." It was conducted at the University of Malawi Center for Agricultural Research and Development and included hands-on data analysis training using Stata and household data from Malawi. Participants included 26 males and 10 females. A follow-up workshop took place in May 2011. The goal was to provide follow-up in-depth training to strengthen research capacity in government ministry offices and University of Malawi. During the course of the project we also worked with several members of the Ministry of Agriculture and Food Security on issues related to analysis of the Malawi Integrated Household Survey II.

*Core/cross-cutting activities*.

A global PEN database has been established, consisting of data from sites in Malawi, Uganda and 23 other countries. Work during the past year focused on getting the database ready for analysis by the end of 2010, and doing a preliminary analysis of an incomplete dataset. These results have been presented at several venues, including the World Forest Congress in Buenos Aires in 2009 and the IUCN World Congress in Seoul in 2010. A major activity has been a methods book, entitled *Measuring Livelihoods and Environmental Dependence: Methods for Research and Fieldwork*. The manuscript was published in March 2011.

## FINDINGS

We examined a broad set of major shocks encountered by rural households in Uganda over a retrospective three-year period (2005-2008). We measured shocks in terms of their frequency and magnitude, focusing attention on shocks that can be most clearly identified as exogenous and unanticipated. Examining shocks in terms of their relative value enables us to exploit variation in losses across households to investigate the extent to which different coping strategies are used depending on the intensity of losses. We examined these issues using the household data collected in the Masindi district, Uganda, where vulnerability most frequently takes the form of the loss of a productive household member or crop failure.

We found that, on average, such shocks result in income losses of 40% or more for many households. As in other developing regions, financial services and other institutions that might be used to mitigate losses are poorly developed. This limits the coping mechanisms available to households, especially those that are asset poor and headed by women. Because of a long history of migration into the study area the social and economic fabric of the area is weak. As a result, forest extraction constitutes an economically significant part of many households' livelihood portfolios, providing as much as 70% of subsistence and cash income in some villages.

Charcoal production in Uganda ranges from small-scale clandestine production to large-scale production in which large land holders who are establishing livestock ranches contract land clearing to urban charcoal traders who employ specialized work crews. Small-scale pastoralists trying to establish pastures may sell trees to charcoal burners who provide their own labor. These patterns suggest a complex dynamic relationship between charcoal producers and agriculturalists. In some cases, it appears that agriculture and livestock production is a precipitating factor in forest loss and in other settings that forest degradation is occurring as an independent outcome of household exposure to idiosyncratic risk. We found positive and statistically significant effects of participation in charcoal-related activities on household income and poverty levels, with income impacts of participation equal to approximately $1 per day. Charcoal production is especially important for households with low agricultural capacity and limited stocks of human and physical capital. In contrast to popular views and results from other studies, those engaged in charcoal production are *not* the poorest cohorts in our sample.

Profit margins in charcoal production in Uganda, including those for transporters and wholesalers appear to vary widely across locations and are weakly correlated with patterns of district-level law enforcement and regulation. Among 12 sampled producing villages, charcoal prices varied from a low of 83 shillings per kilo to a high of 200 shillings per

kilo, suggesting that the point-in-time price variability for charcoal far exceeds that observed for many agricultural products. We find that approximately 70% of the value of the charcoal value chain is captured by intermediaries and traders. Margins among producers and retailers are generally small. These patterns indicate low barriers to entry for producers and retailers and some degree of market power among a relatively small number of intermediate agents.

We measured the impacts of Malawi's 2009 Farm Input Subsidy Program (FISP) on fertilizer use and maize yields in central and southern Malawi. We found positive and statistically significant correlations between participation in the FISP and intensity of fertilizer use. Fertilizer use is higher among households that plant improved maize varieties than among those that plant traditional varieties. We combined these results with those from a maize production function and found the program associated with an increase in maize availability of approximately 250kg per household in our sample.

*Project Impacts.*

The clearest impacts achieved thus far in the project have been associated with overall contributions to improving research capacity at Makerere University and the University of Malawi, through a series of week-long research trainings for students and staff. We consider the training in ethical conduct of research an especially noteworthy and novel contribution in this area. We believe this has the potential to create a ripple effect among the staff. Another important impact has been the dissemination of project data among host-country researchers and training in analysis methods to support replication of research results.

The number of host country individuals trained at the degree level in the United States and Norway is seven completed (43% female). The number of host country individuals participating in non-degree training either inside or outside the host country to date is 220 (29% female). We contacted 125 policy-makers and high-level host-country stakeholders (NGO, research community, etc.) through project activities. More than forty research publications have appeared, and the project has been covered by media, both print and radio, in Malawi.

**Training workshop, Makerere University, Uganda. Photo by Gerald Shively**

# USING LOCAL FOOD AID PROCUREMENT TO TRANSFORM RELIEF INTO DEVELOPMENT:

# MARKET INFORMATION AND FOOD INSECURITY RESPONSE ANALYSIS


## Principal Investigators

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**Dick Sserunkuuma:** Makerere University, Uganda

**Richard Mbithi Mulwa:** University of Nairobi


This research has three objectives:

- generate useful market information and food insecurity response analysis (MIFIRA) baseline information in major regions of two East African countries where USAID and other donors are frequently engaged in humanitarian response to acute and chronic food insecurity
- develop and implement a scoring system to use with the MIFIRA framework
- develop MIFIRA training materials and "train the trainers" so as to promote dissemination of this framework within the region.

### Additional Support


In 2010-2011 we received support from a consortium of four private voluntary organizations (PVOs) – Catholic Relief Services, Land O'Lakes, Mercy Corps and World Vision – for activities to help the PVOs use response analysis such as MIFIRA to help them identify suitable places for local or regional procurement (LRP) of food aid under the USDA LRP pilot program and USAID's Emergency Food Security Program. This consortium of PVOs formed a "Local and Regional Procurement Learning Alliance" with Cornell to advance the use of response analysis tools and rigorous impact evaluation of LRP activities.

The total of these awards was $272,880.


### Collaborations

This project builds on a completed USAID Internal Capacity Building Grant to CARE (Office of Food for Peace, Bureau of Democracy, Conflict and Humanitarian Assistance, and USAID). In 2007, Cornell, in collaboration with Tufts University and CARE, developed the MIFIRA framework. Cornell then collaborated with CARE-US to identify market assessment strategies for CARE. Fieldwork in Malawi, Ethiopia, and Bangladesh with CARE country offices assisted in this effort.

The Strategic Analysis and Knowledge and Support Systems (SAKSS) food security project funded the International Livestock Research Institute and Cornell from September 2008 to December 2009 to refine the MIFIRA framework within the context of the arid and semi-arid lands regions in eastern and southern Africa and to undertake a baseline market analysis in northern Kenya. The project's findings informed how the MIFIRA framework can best reflect the unique attributes of pastoral livelihood systems and their markets.

During fiscal year 2011, we worked with the Local and Regional Procurement Learning Alliance, which was a consortium of PVOs that received USDA or USAID funds for local procurement of food aid, cash, or vouchers. The consortium members include Catholic Relief Services, Mercy Corps, World Vision, and Land O'Lakes. We provided technical support on MIFIRA to their country offices distributing locally or regionally procured food aid, or distribution of cash and vouchers under the USDA Local and Regional Food Aid Procurement Pilot Project and under the USAID Emergency Food Security Program. Learning Alliance members had access to the MIFIRA training materials developed under the AMA CRSP grant as well as received training materials on price collection and price monitoring and analysis. Learning Alliance members attended a two-day training in Istanbul in November 2010 led by Cornell University on collecting and analyzing prices. Price monitoring enables agencies to update their

response analyses and to identify when a particular transfer may no longer be appropriate. These agencies have expressed keen interest in MIFIRA as a tool for USG-supported food assistance agencies. Other agencies, including Save the Children, CARE, and UMCOR have expressed interest in joining the LRP Learning Alliance.

Member agencies of the LRP Learning Alliance have applied for a micro-grant from the USAID Technical and Operational Performance Support Program (TOPS) to host a one-day workshop entitled "Local and Regional Purchase Learning and Knowledge Sharing Workshop." One session, led by Cornell University, is a review and discussion of response analysis approaches, including MIFIRA.

The African Economic Research Consortium (AERC) has been awarded a contract with the United Nations World Food Program to establish a market and price data hub and to provide analytical support to the WFP's Purchase for Progress local procurement projects. Cornell University has been informally advising AERC to assist its development of ex ante response analyses for WFP. The AERC's approach will draw on MIFIRA.

## Outputs


Hill, Elaine, Joanna Upton, and Arnold Xavier. 2011. "Local and Regional Procurement in Uganda: Lessons learned from a pilot study of the Market Information and Food Insecurity Response Analysis Framework." Working paper, July.

Lentz, Erin and Christopher Barrett. "Draft Training Materials on MIFIRA: A Market Information and Food Insecurity Response Analysis Framework." May 2010. Full course materials including PowerPoints, syllabus, and spreadsheets for data analysis.

Michelson, Hope, Erin Lentz, Richard Mulwa, Mitchell Morey, Laura Cramer, Megan McGlinchy, and Christopher Barrett. "Cash, Food or Vouchers in Urban and Rural Kenya: An Application of the Market Information and Food Insecurity Response Analysis Framework." Forthcoming in *Food Security*.

Michelson, Hope, Mitchell Morey, and Laura Cramer. 2010. "Results of the Market Information and Food Insecurity Response Analysis (MIFIRA) Framework Conducted in Two Locations in Kenya." Working Paper, August.

Mude, Andrew, Robert Ouma, and Erin Lentz. "Responding to Food Insecurity: Employing the Market Information and Food Insecurity Response Analysis Framework in rural Northern Kenya." Revise and resubmit at the *Journal of Development Studies*.

Upton, Joanna and Elaine Hill. 2011. "Local and Regional Procurement of Food Aid in Uganda: The Experience of Maize Traders." Working Paper, March.


To view MIFIRA publications check http://dyson.cornell.edu/faculty_sites/cbb2/mifira.htm

## ACTIVITIES

This project addresses AMA CRSP research priority of "managing risk and vulnerability to enhance asset protection and accumulation." By responding to food insecurity with the most appropriate tool, adverse effects on markets, consumers, and suppliers can be minimized or avoided. Furthermore, the baseline findings can contribute knowledge to USAID's food security and market development in Kenya and Uganda. So far, there has been significant non-degree training of research professionals and practitioners. The 2010-11 annual activity plan revolved around four types of activities - data analysis, development of quantitative scoring mechanism, revision of training materials and training – that are each instrumental to the longer term project objectives.

We made substantive progress on the third objective to develop training materials. During the winter and spring of 2010, we developed a half-semester Masters-level course on the MIFIRA framework. The lectures and presentations from the Cornell course are the backbone of the training materials, which our academic affiliates used and revised when they offered their "training of trainers" MIFIRA courses. These courses were offered at the University of Nairobi and Makerere University during 2011. The courses were open to students as well as practitioners. Twenty-six students were trained at University Nairobi and nine students and practitioners were trained at Makerere Univeristy. Following these MIFIRA trainings, our academic affiliates met with us in Ithaca, NY from July 25-29, 2011 to discuss revisions to the training materials.

Progress in the past year was delayed by parental leave (April-June 2011) by one of the project's principal staff, Erin Lentz, who has now returned to work half-time. We have also struggled considerably with the second objective – development of a scoring system to be developed from the MIFIRA analyses to help with matching locations for careful causal impact analysis. We continue to work on this problem but have thus far had no success in finding a satisfactory approach.

The Kenya team has a paper conditionally accepted for publication in a special issue on institutions and food insecurity in Kenya in the journal *Food Security*. This work stems from the summer 2010 fieldwork. A complete report based on the fieldwork findings from Uganda was also finished this year; revision for a peer-reviewed publication is ongoing.

MIFIRA course materials, including 14 lecture notes and associated PowerPoints, a syllabus, and accompanying spreadsheets for data analysis were developed and are undergoing revision. These materials collectively comprise a MIFIRA training module and provide additional in-depth guidance on using MIFIRA to assess the appropriateness of various responses to food insecurity.

The academic affiliates from each country received training in operationalizing MIFIRA. Each academic affiliate participated in survey design discussions, contributed to enumerator trainings, attended field research in at least one site, and provided comments on preliminary findings. Their participation in these activities was complementary to their use and revision of the MIFIRA training materials for leading training courses.

The academic affiliates trained students, PVO staff, and other interested parties during 2011. Professors Sserunkuuma and Mulwa each offered a MIFIRA training or course. These courses incorporated lessons learned from the spring 2010 MIFIRA course offered at Cornell University and from the affiliates' participation in fieldwork.

Professor Sserunkuuma led a ten-day MIFIRA training workshop from July 1 to July 15, 2011 for nine attendees at Makerere University. Dr. Mulwa incorporated MIFIRA materials into a semester-long course, *Food Economics and Policy*, in the University of Nairobi's Agricultural Economics Department, This course was mandatory for fourth year students in Agricultural Education and Extension. Students from Agribusiness Management also participated.

After teaching this course at their respective universities, during the week of July 24, Professors Sserunkuuma and Mulwa met with Cornell researchers to discuss possible revisions to the materials. Based on feedback from partners, MIFIRA will be revised to include a more careful discussion of how differences between cash and vouchers may affect market analyses. We are currently in the process of revising the materials. Based on discussions with our academic affiliates, we are also reorganizing the training modules to better reflect the

needs of a practitioner audience who will most likely undertake a MIFIRA training as a self-paced auto-tutorial. We expect that following these revisions, the MIFIRA training materials can be used as stand-alone technical guidance.

We continue to use our existing, extensive contacts with aid agencies, different levels of government, and donors to stimulate discussion and bring attention to the goals, findings and possible range of policy lessons to be learned from this research project.

## FINDINGS

The project will be completed by March 2012. To date, the main results are as follows.

First, analyses using the Kenya and Uganda baseline data are complete. At least one agency (Catholic Relief Services – Kenya) is using these findings to develop its programming strategy. A paper using the Kenya data is forthcoming in the journal *Food Security*. Students have completed a working paper with the Uganda data.

Second, work on the scoring mechanism is ongoing. Barring unforeseen complications, it will be completed by the end of the project, although this has been far more of a struggle than we had anticipated.

Third, many of the training activities are complete. We have run training courses at Cornell University, University of Nairobi, and Makerere University. We are now transitioning toward revising the training materials during the remainder of 2011.

Fourth, we intend to reorganize the training materials from a lecture-format toward a module-format. The original materials were designed for class-room based training. The new format should enable humanitarian and development practitioners and other professionals to do a self-paced training on-line or from a CD. The modules will include a mixture of background modules (e.g., background materials for those with less familiarity with economics or statistics and background materials for those with little experience with food assistance programming) and core modules such as the presentation of MIFIRA questions and applications of the techniques that can be used to inform answers to each question. The final revisions to the MIFIRA toolkit and training materials will be completed by March 2012.

Finally, our outreach activities are ongoing. PVOs and international agencies continue to demonstrate a demand for the MIFIRA toolkit and training materials. Many components of MIFIRA were directly applied by PVOs undertaking analyses as an input into proposals for USDA funding for local and regional procurement (LRP) pilot program funds. PVOs have formed the LRP Learning Alliance to collaborate and share lessons learned about LRP programming, including building capacity for effective market analysis and price monitoring, key aspects of the MIFIRA framework.

**MIFIRA Course: last day of class July 15, 2011, Makerere University, Uganda**