Effects of Index Insurance on Economic Decision Making and Credit Seeking in Tigray, Ethiopia

Betsy Ness-Edelstein
Master of Arts, 2012
Introduction
This report examines the effects of a weather index-based insurance program ("index insurance") on farmer loan-taking behavior and household-level economic outcomes (as measured by crop yields) in the Tigray region of Ethiopia. As part of the Horn of Africa Risk Transfer for Adaptation project (HARITA), a pilot index insurance product was offered in the village of Adi Ha starting in 2009 and in four other villages (Awet Bikalsi, Hade Alga, Hadush Adi and Geneti) starting in 2010. In collaboration with a larger impact evaluation of the pilot project conducted by Columbia University’s International Research Institute for Climate and Society, I traveled to a HARITA conference in Addis Ababa and to four of the five pilot villages in July of 2011. I conducted focus group discussions with farmers in each village (totaling 62 farmers) about their experiences with the index insurance product and its impact on their loan taking and input purchasing behavior and their crop yields. I also interviewed staff members of the Relief Society of Tigray (REST), which administered the insurance marketing and rollout effort, as well as a representative of the planning department at Dedebit Credit and Savings Institution (DECSI), the only MFI operating in the region.

What is Weather Index Insurance?
Weather index insurance is a type of insurance (in this case, designed for farmers) that pays out based on a weather index (in this case, the level of rainfall). The insurance contract is based on a pre-specified index; if a season's rainfall is below a trigger amount (configured according to the normal rainfall level in the region), insured farmers get a payout. Farmers get a full payout (the maximum liability amount specified in the policy) if rainfall for the policy period is below a specified minimum (the "exit"). If the rainfall amount is between the trigger and the exit, farmers get a partial payout.

For smallholder farmers, index insurance addresses some of the problems of traditional crop insurance. First, it is far cheaper to administer than traditional crop insurance because it does not require farmers to submit a claim, nor must an adjuster verify actual crop loss. Instead, payouts are triggered automatically when rain gauges or satellites show lower-than-normal rainfall. The cost of this insurance can be additionally lowered by providing the exact same contract option to an entire village (or the maximum area covered by one weather data source); in the HARITA project, farmers have the option to purchase as much coverage as they wish up to a specified maximum, but the index on which their contract is based is standardized, reducing individual transaction costs. Further, there is no moral hazard associated with index insurance because crop loss due to farmer negligence or incompetence is not covered.

An insurance index can never be perfectly correlated to crop yields. While rainfall is the largest single influence on crops, yields can also vary due to other types of weather events, pests, disease, and farmer skill, among other things. Further, the level of crop loss due to a drought may be higher or lower than the rain data would suggest. And since rainfall can vary even within small areas, individual farmers may
have more or less rainfall than the weather station or satellite data officially record; this difference is known as basis risk.

As important as drought year payouts are, they are only one aspect of the potential benefits of index insurance. Index insurance is also designed to be a poverty reduction tool; the thinking is that farmers who are insured can engage in prudent risk taking, such as using more or higher quality inputs, without worry that those investments will be rendered worthless because of low rainfall. They can potentially also take out loans for inputs they otherwise would not. Investment in inputs in turn should lead to higher crop yields in normal rainfall seasons, allowing farmers to gradually increase their wealth over time. Thus, in theory insurance is an important buttress both to farmers, who can feel secure in taking needed loans, and to lenders, which can lend with less fear of covariate defaults.

Increasing farmer wealth in good years is perhaps the most appealing aspect of index insurance from the local business perspective. Dedebit Savings and Credit Institution (DECSI), the only microfinance institution operating in the Tigray region, has begun to look at they ways in which index insurance can help to grow its loan portfolio and lead to increased overall economic activity in the region. (DECSI has applied to the government to be able to offer insurance itself so that it can offer bundled loan-insurance packages; at present, it is considered a financial entity not eligible to offer insurance products.) Covariate risk is a significant barrier to increasing its credit offerings, as droughts tend to affect most or all farmers in the region.

The village Hade Alga illustrates how important this aspect of index insurance can be. Three consecutive drought years in this village (2007-2009) left many farmers with near zero crop yields. After exhausting their coping mechanisms (i.e. livestock sales, temporary migration), many farmers were unable to pay loans they had taken to purchase fertilizer. The drought years negatively impacted farmers’ available funds to invest in inputs in 2010, and furthermore many had outstanding loans from the previous three years and were therefore considered uncreditworthy. Farmers prefer to plant their own seeds, but because of the drought none were available and seeds in 2010 became dramatically more expensive: sorghum is normally 4 birr per kilogram but rose to 15 birr per kilogram that year. The need for investment funds was crucial so that farmers could take advantage of the good rains in 2010 and begin to rebuild their wealth.

Horn of Africa Risk Transfer for Adaptation Project (HARITA)
The HARITA project is a collaboration between Oxfam America, SwissRe, the World Food Program, Columbia University’s International Research Institute for Climate and Society (IRI), the Relief Society of Tigray (REST) and several local insurance companies (see Appendix I for a full list of stakeholders). This collaborative effort produced the first commercial index insurance product in the Tigray Region in Ethiopia. The pilot stage of this insurance project was made available in one village
in 2009 (Adi Ha) and in five villages in 2010 (Adi Ha, Awet Bikalsi, Geneti, Hade Alga and Hadush Adi).

The structure of the insurance rollout was as follows (in both years): IRI was charged with creating an index for each village, based on historical and simulated rainfall data. As part of the design process, IRI and REST traveled to each village to meet with its appointed “insurance design team,” which informed the contract designers of which crops they desired insurance for and what the important sowing and flowering periods for those crops were. The insurance design teams also verified that the indices being used would have captured the historically bad rainfall years, thereby validating the index and building trust in the product design.

The resulting indices were provided to Oromia Insurance (a local insurance company) as well as to SwissRe to determine pricing (see Appendix II for index parameters and pricing). Once prices and maximum liability were set, representatives of REST and Oromia Insurance traveled to each village along with local actors who performed dramas to illustrate how index insurance works. Then, farmers were given the option to purchase insurance during a set sign-up period. Table 1 shows the number of insurance policies purchased in each village where it was offered in 2010.

<table>
<thead>
<tr>
<th>Village</th>
<th>No. of Households Purchasing</th>
<th>Total Sum Insured (birr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adi Ha</td>
<td>334</td>
<td>248,400</td>
</tr>
<tr>
<td>Awet Bikalsi</td>
<td>269</td>
<td>176,600</td>
</tr>
<tr>
<td>Geneti</td>
<td>198</td>
<td>107,600</td>
</tr>
<tr>
<td>Hade Alga</td>
<td>198</td>
<td>174,200</td>
</tr>
<tr>
<td>Hadush Adi</td>
<td>371</td>
<td>302,600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1306</strong></td>
<td><strong>1,009,400</strong></td>
</tr>
</tbody>
</table>

In 2010, the policies had a maximum liability of 1200 birr (raised to 1600 in 2011), and farmers are able to choose their level of coverage up to the maximum liability amount. The premium they pay is then based on the level of coverage they choose. Farmers have the option to choose between “slight dry” and “very dry” options; the “very dry” option has an expected full payout in one out of five years and is less expensive birr than the “slight dry” option, which has an expected payout in one out of three years.

---

The final price of the insurance includes a loading cost to cover the insurance company's administrative costs and the cost of purchasing reinsurance from SwissRe. Because of this, farmers who purchase insurance every year will cumulatively pay in more money than they can expect to receive on average. However, many farmers indicate that the costs are worth it; in essence, they have no other options in drought years so they consider insurance as akin to saving in good years to pay for the bad years.

To illustrate, in 2010, farmers who wished to insure 1200 birr worth of crop yield paid a premium of 656.28 birr for slight dry insurance or 450 birr for very dry insurance. Even given the significantly higher price for slight dry insurance, it is heavily preferred by farmers who value more frequent payouts.

As of the end of the 2010 season, none of the insurance contracts had yet incurred payouts.\(^2\)

**Geographic and Environmental Context**

The Tigray Region is located in the north of Ethiopia bordering Eritrea. The main economic activity is farming. There is considerable variation in soil fertility and rainfall within the region, so crops vary across villages. Long cycle crops (generally more lucrative but more difficult to grow because they require more days of moisture) include wheat, maize, barley and sorghum. Teff, the grain from which the Ethiopian food staple of injera is made, is grown by nearly everyone in the region. The very lucrative narcotic chat (elsewhere known as qat) is also grown in the region but not in the villages in this study. Farmers usually plant some combination of long and short cycle crops. Often, if early rains look good farmers will plant long cycle crops but will plant teff later on if the early rains fail. In this way, teff already acts as a form of insurance.

**Findings from Farmer Focus Group Discussions**

When asked to describe the effects of purchasing insurance, many farmers’ first comment was that insurance provides peace of mind. But arguably the more important aspect of insurance is whether it changes farmer input decisions, which seems to vary among villages. For the most part, farmers said they prefer to use their own seeds (from previous years' harvests), so seeds are not a purchased input (although this could change as farmers learn the benefits of using higher-yield seeds). The amount of land planted, labor and oxen used cannot vary much from year to year because the amount of these inputs available to farmers is fixed in the short term. Therefore, the input that was discussed most was fertilizer.

\(^2\) In 2009 in Adi Ha, satellite data did not indicate a lack of rainfall but by all accounts the maize crop largely failed because of lower than normal early rains. Because this project was in its pilot phase, Oxfam voluntarily made the decision to pay out to ensure that farmers who purchased insurance were taken care of, as well as to maintain trust in the product.
In Adi Ha and Awet Bikalsi, fertilizer use was already comparatively high; loans were often taken to purchase fertilizer and farmers reported few barriers to accessing credit for fertilizer. Before insurance was introduced, many farmers were already using the recommended amount of fertilizer per unit of land. Therefore, input decisions were reportedly not dramatically affected by whether a household had purchased insurance or not, and Adi Ha farmers said that in general yields are not that different between purchasers and non-purchasers in good years. Still, there were some cases where insurance purchasing did seem to affect inputs in these villages. One woman told a story about her two children; her daughter purchased insurance in 2009 and 2010, but the son bought in neither year. The daughter was “more confident” and “more willing to take risks,” so she bought more fertilizer. As a result, she had higher yields than her brother.

Hadush Adi farmers said that insurance purchasers were more likely to already have been using more fertilizer or to be applying it properly (they explained that purchasers’ higher level of farming savvy led them both to use more fertilizer and to purchase insurance). But there was an acknowledgement of a causal link between insurance and higher fertilizer use. One uninsured farmer explained that, had he bought insurance, he would have bought more fertilizer and predicts he would have had higher yields (he ultimately chose not to purchase in 2010 because he wanted to see how it worked for others in the village first).

Hade Alga showed a slightly more dramatic story of fertilizer increase. The soil in Hade Alga’s area is richer, so fertilizer use there is historically lower than in the other villages. Farmers said that overall awareness of the benefits of fertilizer may have been lower than in other areas and therefore there was much more room for an increase in fertilizer use. Indeed, the fertilizer use between purchasers and non-purchasers here was significantly different in the first year insurance was available: farmers said that teff yields for purchasers went from 18 quintals per hectare to 25 quintals per hectare. Increases in sorghum yields were even more dramatic: on average, non-purchasers had yields of 30-40 quintals per hectare and purchasers reaped 70-80 quintals per hectare. Few non-insured farmers raised yields, the farmers said.

Not all farmers who purchase insurance subsequently change their farming inputs. For those who have not changed their input levels because of insurance, climate uncertainty seems to be an important factor in the decision to purchase. One Adi Ha man said “the climate is changing. Maybe this year is good, but we don’t know about the future. So if you purchase insurance and maintain it, you are always safe.” This type of comment illustrates the value of insurance as a preventative measure against maladaptive coping mechanisms in response to shock. It is also evidence that some purchasers view insurance purely as a hedge against climate risk and not as a tool by which to increase yields.

Further evidence that insurance is being used by some as a hedge against downside risk is in re-purchasing behavior. In large measure, those who have purchased
insurance in one year have tended to re-purchase in subsequent years. However, three focus group participants in the village of Awet Bikalsi purchased insurance in 2010 and did not re-purchase in 2011. They explained that they felt they could manage without insurance in 2011 because 2010 was a good year, allowing them to save money for the future.

If the effects of insurance on yields thus far seem less than dramatic, one important reason is that farmers still have very limited experience with index insurance, and their decisions could change more in response to insurance as they become more comfortable with it. There was general agreement among farmers that insurance *can* help improve their yields because of increased fertilizer use and in some cases more willingness to take out loans (even uninsured farmers agree). But they say the difference right now is small because they are still feeling out the product. Some purchasers are waiting to make sure that payouts actually occur as promised in bad years before they start spending more on inputs. The insured Awet Bikalsi farmers specifically mentioned that they did not change their input levels in 2010 because it was their first experience with insurance, but they had already upped their levels of 2011 inputs and expected to see higher yields this year as a result.

**LOANS**

The potential impacts of index insurance on the local microfinance environment is another important question. DECSI is the only MFI in the region and it operates sub-branches that are easily accessible (in walking distance) to each of the villages included in the pilot. DECSI offers both group and individual loans as well as savings products. Individual loans are guaranteed by the government. Loans for livestock production are made in cash, but agricultural input loans (i.e. fertilizer or seeds) are provided in voucher form that farmers then redeem with local farmer cooperatives or the Bureau of Agriculture. Their maximum loan size is 20,000 birr (10,000 birr for first-time borrowers). Interest at the time of the interview was 18% per year on a declining basis, but the rate was soon to be up for review due to complaints from farmers that it was too high. Repayment rates vary depending on the type of loan, but fertilizer loans are typically taken at the beginning of the planting season and due shortly after harvest time.

Given the divergence between the maximum index insurance liability (1200 birr in 2010 and 1600 birr in 2011) and the maximum DECSI loan size, the ability of insurance to enable more loan-taking behavior may be limited. Indeed, farmers noted that if they do not take more loans when they are insured it is because their insurance payout likely would not cover their entire loan. A Hade Alga farmer mentioned specifically, “we insure for crop production, not for loans.”

DECSI has extraordinary reach in the region; it says that a majority of Tigray residents are DECSI customers and that therefore access to financial products in the region is already relatively high compared to other rural, developing country contexts.
Many farmers take in-kind fertilizer loans every year. In drought years, they have historically turned to temporary labor migration or selling livestock to earn money to pay back their loans. If they do not repay, it is common for them to be placed into village jails until family members can find money to cover their debts.

When there is a threat of mass default, the government has sometimes intervened to extend farmers’ repayment periods. This is what occurred when Hade Alga saw three consecutive drought years. In 2010, many in Hade Alga had to pay back 2009 loans by selling livestock or cash crops like fruit. However, some could not pay back 2009 loans, and though their repayment period was extended, their inability to pay outstanding loans made them ineligible for new 2010 loans. Diminished asset bases and lack of access to new loans led those farmers to lower input levels, which led to lower yields than those who were eligible for loans in 2010.

Therefore, it is in years following drought years that insurance seems most poised to increase access to credit. Had Hade Alga farmers been insured in 2009, they would have been more likely to pay back loans and therefore be eligible to take fertilizer loans in 2010 to take advantage of the good rainfall that year.

Currently, DECSI does not consider whether a farmer is insured when it evaluates his or her creditworthiness. However, it has applied to the Ethiopian government to be able to offer insurance directly. Once it has approval, it plans to bundle insurance and loan packages, and when rains fail the insurance payment will go directly toward repayment of the loan. It may also change its loan terms for insured borrowers, since they are less risky. The interest rate will remain the same for all borrowers, but those with insurance might have longer grace periods or repayment rates and might become eligible for larger loan sizes.

**Conclusions and Recommendations**

- Bundling will help insurance increase access to credit (or perhaps more plausibly it will increase farmer willingness to take loans to increase production, since access is already quite high). But there needs to be careful attention paid to the appropriate ratio of insurance maximum liability to loan size.
- Allowing microfinance institutions to offer this product will also increase competition, which could lead insurers to seek ways to lower the price of premiums.
- There is some concern that with insurance/loan bundling there will come pressure from DECSI for farmers to take both when they only want insurance or a loan but not both. DECSI says that if they are granted approval to sell insurance, they will also sell it as a standalone product and will not require loan clients to purchase it. It is extremely important that farmers indeed are given a choice of standalone or bundled products so that they can purchase the products that make most sense for them.
• Over time, farmers may tire of paying premiums that are so high compared to their maximum possible payout. There is little that can be done to decrease the premium price at present, as most of the premium price goes toward eventual payouts and a relatively small percentage is added as a loading cost. However, most farmers indicate that the price is worth paying.

• The HARITA index insurance program is scaling up quickly, having been offered in 43 villages and purchased by more than 13,000 households in 2011 (up from one in 2009 and five in 2010). Given this rapid growth, it seems that opportunities for premium costs to come down may increase at least slightly due to higher geographic diversification. Other index insurance products are rapidly being developed and introduced elsewhere in Ethiopia and in other countries as well. As this market grows, opportunities for further hedging (i.e. through weather derivatives markets) and securitization may grow, also potentially lowering costs.