

INTERLINKING CREDIT WITH INSURANCE TO IMPROVE AGRICULTURAL PRODUCTIVITY IN ETHIOPIA

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Research Partners

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- University of California San Diego, USA
- University of Athens, Greece
- EU/JRC
- FAO
- Ethiopian Economics Association
- Dashen Bank, Ethiopia
- Nyala Insurance, Ethiopia

Outline

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- Context
- Motivation
- Research Design
- Evaluation Questions and Outcomes
- Some Initial Results from Baseline Survey Data
- Summary

Context

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- Over 90% of Ethiopia's total agricultural output originates from stallholder agriculture.
- Research has shown that yield increases in Ethiopia are constrained by inadequate use of improved varieties, fertilizers, and other inputs and declining soil fertility, weather-related problems.
- Rapidly declining per capita agricultural landholding
 - 2.3 ha/person (in 1960s) to <0.5 ha/person (2005)
- As a consequence, agricultural productivity has remained low
 - Cereal yield remains below 2 tons/hectare.
- Continuing low agricultural productivity is an important contributor to poverty and food security in Ethiopia.

Barriers to adoption of improved inputs

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- Rain-fed agriculture exposes farmers to huge risks in the purchase of inputs
 - ▣ I pay for fertilizer to day, will it rain tomorrow?
 - ▣ Risk is a commonly given reason for low input use in Ethiopian agriculture (Dercon and Christiaensen, 2009).
- Most Ethiopian farmers also face cash and liquidity constraints, especially in the sowing season, due to imperfect credit markets (Croppenstedt et al., 2003).
- The large correlated risks from weather make agricultural lending extremely risky.

Implication:

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- The presence of large correlated risks prevent:
 - ▣ Banks from lending to agriculture
 - ▣ Farmers from using improved inputs.
- Thus:
 - ▣ The provision of weather index insurance to farmers means that they can afford to take on the risk of using and borrowing for inputs.
 - ▣ Provision of insurance to lenders means that they can take on the risk of lending to smallholder agriculture.
 - ▣ Simultaneous provision of credit and insurance allows us to create 'state-contingent loans':
 - Receive inputs on credit, if the weather is bad farmers who buy the insurance pay nothing back, if the weather is good they pay loan + premium + interest on both.

Obstacles to Insurance Uptake on Demand

7 Side:

- Demand for index insurance products is typically quite low, even though they seem to solve a problem in a very natural way. Why?
 - ▣ **Trust?** Is a new institution credible when asking for money now in return for future promises of insurance payouts?
 - ▣ **Information?** inadequate knowledge about the benefits of index insurance
 - ▣ **Basis risk?** disparity in the distribution of the insured event at farm-level & at nearby metrological station data are taken to trigger payouts.
 - ▣ **Credit constraints?** The poor simply can't afford the premia?
- So, on the demand side as well, linking credit and insurance may overcome the behavioral problems that are barriers to the uptake of index insurance products.

The Interlinking Solution:

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- Provide loans to farmers that are explicitly weather-contingent:
 - Farmers take loans to purchase inputs, insurance premium is added on to the loan amount and paid immediately to the insurer.
 - The beneficiary of the insurance policy is the bank itself, so if the weather index triggers the bank is paid with certainty (no intermediaries between the bank and the insurer)
 - The Cooperative Unions sit between the financial institutions and the borrowers and serve several critical roles:
 - First, they aggregate the transactions and decrease the fixed costs of making loans
 - Second, they are entities with the legal authority to contract with banks, much easier for formal financial institutions to deal with than smallholder farmers
 - Third, they can use their extensive relationships with primary cooperatives and farmers to serve as enforcers of the loan contracts, minimizing default risks.

Evaluation Questions and Outcomes

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- What are the determinants of uptake and how do they differ between the standalone and interlinked treatment arms?
- Experimental estimation of demand curves for insurance with and without interlinking.
- What is the impact of the insurance product on farmer behavior:
 - Does insurance provision increase the use of improved inputs by farmers?
 - Do we see an increase in yields as a result?
 - Can the provision of intelligent financial services be a part of triggering a 'green revolution' in Ethiopia?
- Ultimately, can cooperation between index insurers and banks be the vehicle to expand private-sector credit to

Evaluation Strategy:

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- **Randomized Field Experiment**
- Two Arm Trial:
 - ▣ **A control group:** receives no insurance and no credit
 - ▣ **A ‘standalone’ treatment arm:** receives only the index insurance product; we do not prevent the use of credit but we also do not provide any explicit form of interlinking.
 - ▣ **The ‘interlinked’ treatment arm:** receives state – contingent loans.
- Estimates of impact are obtained by comparing outcomes of interest (e.g. adoption of improved inputs, yield, etc) in each of the two treatment arms to the control group, and to each other.
 - ▣ Provides a simple, transparent measure of the impact of insurance, the impact of interlinked insurance, and the impact of interlinked

Evaluation Strategy...

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120 Kebeles selected by Nyala in Amahara Region.

Random assignment of treatment at Kebele level

Strata for study:

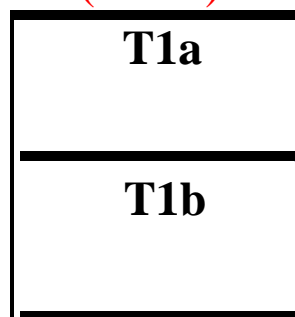
Credit users at baseline

Non-credit users at baseline

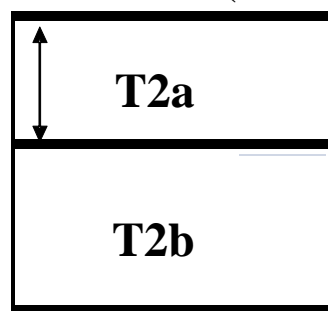
Subsidy to price of insurance randomized at Kebele level

Stand-alone Insurance

(N=40)

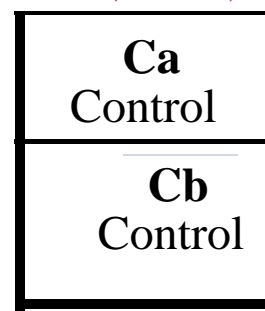


Interlinked Credit & Insurance (N=40)



Control Kebeles

(N=40)



Survey experiment randomized at household level. At each Kebele:

6 coop HHs survey only

6 coop HHs survey + insurance promotion

6 coop HHs survey + promotion + price voucher

2 non-coop HHs survey only

18 coop HHs survey only

2 non-coop HHs survey only

Descriptive Results of Baseline Survey 2011

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Randomized assignment

Table 1. Balance at baseline: household demographic and socioeconomic variables

	Treatment	Control	P-value
Household size	5.251	5.363	0.186
Head is male=1	0.866	0.861	0.727
Head's age	49.318	47.683	0.01
Head reads and writes=1	0.469	0.462	0.727
Head is married=1	0.838	0.836	0.865
Hectares of land	1.295	1.243	0.134
Rears livestock=1	0.973	0.973	1.000
Holds bank account=1	0.161	0.167	0.706
Beneficiary of public safety nets=1	0.123	0.14	0.223
Main occupation is agriculture=1	0.871	0.885	0.32
Drought=1	0.911	0.914	0.845
Owens a radio=1	0.316	0.3	0.428
Head is risk averse=1	0.422	0.454	0.145

Descriptive Results...

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Randomized assignment

Table 2. Balance at baseline: adoption of improved practices

	Treatment	Control	P-value
Used fertilizer (Urea)=1	0.558	0.543	0.499
Used fertilize (DAP)=1	0.537	0.515	0.301
Used improved seeds=1	0.295	0.306	0.605

Descriptive Results...

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Table 3. Major constraints to increasing agricultural productivity (%).

	1 st most	2nd most	3rd most
Production shocks (rainfall, frost, pests, diseases)	48.91	43.04	37.24
Liquidity constraints (own cash, credit)	8.68	12.53	17.24
Shortage of land and poor soil fertility	19.57	11.92	8.83
High prices of inputs (fertilizers, seeds, chemicals)	11.64	17.42	20.28
Labor shortage	6.68	8.10	5.79
Other	4.51	6.99	10.62
Total	100.00	100.00	100.00

Source: EPIICA baseline data 2011.

Descriptive Results...

Table 3. Improved input use among sample households at baseline.

Farm inputs	% of sampled HHs applying input	% of HHs who reported applying input less than wanted
Improved seed	29.93	25.98
Organic fertilizers/compost	58.54	6.69
Chemical fertilizers, urea	55.35	32.37
Chemical fertilizers, DAP	53.02	31.94
Veterinary services	30.89	7.56
Livestock feed	14.30	14.83

Source: EPIICA baseline data 2011.

Descriptive Results...

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Table 4. Access to Agricultural Credit in by Survey Location

	Whole sample	North Shewa	West Gojjam	South Wollo	North Wollo
# of HHs who received agr. credit last year	485 (20.2)	301 (25.10)	143 (29.79)	6 (1.67)	35 (9.72)
Average size of agr. credit obtained (ETB)	1399.54	1263.86	1546.5	1700.3	1896.6
Average additional agr. credit wanted (ETB)	1753.96	1577.26	1522.57	3000	4220
% of total agr. credit demand met	44.38	44.48	50.39	36.17	31.01

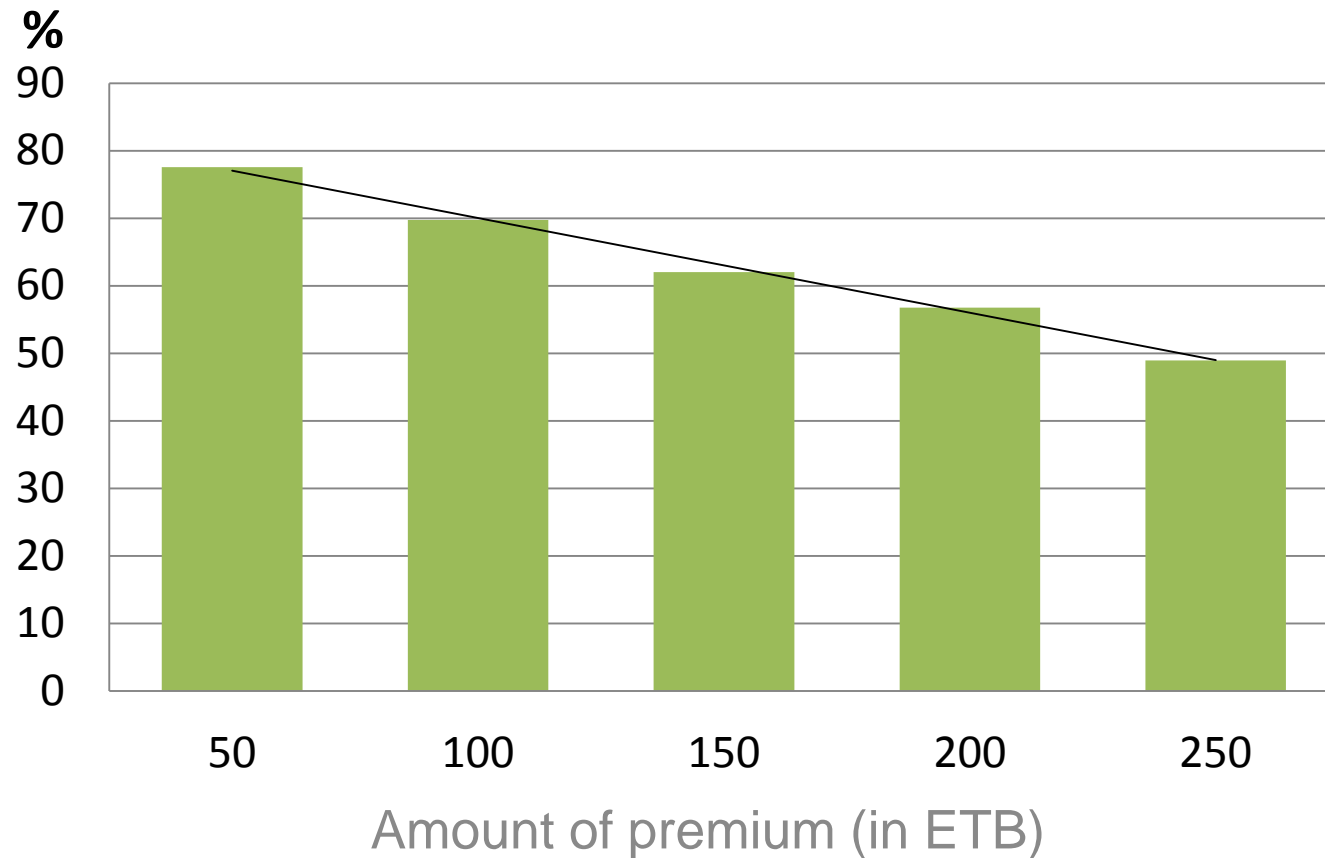
Note: Figures in parentheses are percentages.

Source: EPIICA baseline data 2011.

Descriptive Results...

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Figure 1. Demand for index insurance (hypothetical insurance contract).



Source: EPIICA baseline survey data 2011.

Probit Estimation of WTP for index insurance (hypothetical insurance contract)

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Table 3. Determinants of WTP for index insurance. (Significant factors only).

	dy/dx	p-value		dy/dx	p-value
Rears livestock=1	0.171 (0.099)	0.087	Mid-altitude=1 (ref. is high altitude)	-0.205 (0.05)	0.000
Holds bank account=1	0.107 (0.064)	0.096	Lowland=1 (ref. is high altitude)	-0.267 (0.068)	0.000
Head is risk averse=1	-0.078 (0.044)	0.08	West Gojjam (ref. is North Shewa)	-0.132 (0.071)	0.062
Premium amount	-0.0013 (0.0003)	0.000			
Member of a farmers' coop	0.08 (0.049)	0.105			
Beneficiary of public safety nets=1	0.106 (0.067)	0.11			

Note: Regression analysis was done using a probit model.

The model incorporated several demographic and socioeconomic characteristics, including treatment dummies.

Summary

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- Randomized field experiment was generally successful:
 - ▣ Balance at baseline with regard to covariates/confounding factors
 - ▣ Balance at baseline with main indicators of input use: adoption of fertilizers, improved seeds
- Provision of index insurance appears to be an important instrument for managing risks in our study Areas:
 - ▣ Baseline data also show presence high demand for index insurance (hypothetical insurance contract)????
 - ▣ Actual take-up of index insurance yet to be examined as data on actual insurance product sales by Nyala Insurance are available.
 - ▣ We next conduct follow up survey (2013) to analyze the causal impact of insurance uptake on input use, yields, etc.

Thank you very much!