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Managing Risk with Insurance and Savings

Experimental Evidence for Male and Female Farm Managers in
West Africa

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ABSTRACT

While there is a fast-growing policy interest in offering financial products to help rural households manage risk, the literature is still scant as to which products are the most effective. In order to inform gender targeting of rural finance policy, this paper investigates which financial products best improve farmers' productivity, resilience, and welfare, and whether benefits affect men and women equally. Using a randomized field experiment in Senegal and Burkina Faso, we compare male and female farmers who are offered index-based agricultural insurance with those who are offered a variety of savings instruments. We found that female farm managers were less likely to purchase agricultural insurance and more likely to invest in savings for emergencies, even when we controlled for access to informal insurance and differences in crop choice. We hypothesize that this difference results from the fact that although men and women are equally exposed to yield risk, women face additional sources of life cycle risk—particularly health risks associated with fertility and childcare—that men do not. In essence, the basis risk associated with agricultural insurance products is higher for women. Insurance was more effective than savings at increasing input spending and use. Those who purchased more insurance realized higher average yields and were better able to manage food insecurity and shocks. This suggests that gender differences in demand for financial products can have an impact on productivity, resilience, and welfare.

Keywords: risk, insurance, savings, gender

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1. INTRODUCTION

Individuals in developing countries are subject to a multitude of hazards, from covariant shocks, such as droughts, to idiosyncratic shocks, such as falling sick. In West Africa, almost every rural household manages farmland and is exposed to the risk of unpredictable rainfall (Karlan, Osei-Akoto, et al. 2014). A wealth of empirical evidence has shown that households are unable to fully insure against such shocks (among others, Townsend 1994) and the inability to protect their consumption and investment choices from these risks has important long-run welfare implications (Dercon 2004; Alderman, Hoddinott, and Kinsey 2006). In this environment of uninsured risk, households often eschew investment opportunities with uncertain returns even if, on average, their returns are high (Morduch 1990; Walker and Ryan 1990; Dercon and Christiaensen 2011).

Improving rural households' ability to manage these risks has the potential to substantially improve farmers' welfare. A variety of financial instruments can help for specific needs, and it is likely that an efficient risk management strategy will use a combination of financial products to allow households to manage the multiple shocks they experience. For example, weather insurance is an innovative financial product and can help rural households manage the impact of widespread drought but will not help a farmer manage losses localized to his or her fields. Improved access to savings accounts could allow households to quickly respond to unexpected illness but will have little value in helping households manage large or repeated shocks.

A considerable literature has emerged in recent years that examines the demand for and impact of financial instruments that can help households manage risk. Cole and others (2013); Karlan, Osei-Akoto, and others (2014); Dercon and others (2014); and Mobarak and Rosenzweig (2013) assessed whether weather index insurance can help households manage uninsured drought risk in India and in Africa south of the Sahara. Dupas and Robinson (2013) assessed whether easy access to savings accounts can help Ugandan women manage health risk. Thornton and others (2010); Dercon, Gunning, and Zeitlin (2011); and Delavallade (2014) assessed demand for and retention of health microinsurance products among the poor. In sum, each instrument has merits, if implemented correctly, in helping the poor manage risk.

In this paper we contribute to this literature by providing estimates from field experiments in Burkina Faso and Senegal of the impact of weather insurance and three types of savings on a variety of investment and welfare outcomes. By randomizing the provision of four different financial products, we compare the effectiveness of different types of instruments in achieving welfare gains. The specific focus of the paper is on financial products that encourage investments in agriculture. We assess whether weather insurance is more or less effective than emergency savings in allowing individuals to manage risk. Karlan, Osei-Akoto, and others (2014) also compared the effectiveness of insurance versus direct cash payments in increasing agricultural investment. However, in our study we explicitly compare different savings instruments with insurance. This is akin to the work of Dupas and Robinson (2013), who investigated the impact of four types of targeted health savings instruments with various commitment levels, whereas the focus of this paper is savings in the context of agricultural investments and shocks instead of health.

The experiment was designed to test how demand for insurance and for savings varies with gender. This was done by randomizing the offer of financial instruments to a selected individual within a household. We contend that this is important in West Africa because—as in much of the developing world—women and men have quite distinct spheres of activity and the risks they face are different as a result. Specifically, women are exposed to much greater physical risk through their childbearing years than are men and they are more involved in caring for children than are men. As a result, although drought risk affects men and women equally, women appear less immediately concerned than men about drought and more vulnerable to health-related shocks to themselves and their children. This is perhaps especially the case in parts of rural West Africa where fertility rates are still particularly high.

In 40 experimental sessions conducted in Burkina Faso and Senegal prior to the onset of the planting season, 800 farmers and members of rotating savings and credit associations (ROSCAs) were endowed with US\$12 (the cost of half a bag of fertilizer) and randomly offered one of four products, at an exogenously determined price or interest rate. One instrument was a weather index insurance that was being sold in both countries by local insurance companies sponsored by an international nongovernmental organization. The other three instruments were savings devices: one was an encouragement to save for agricultural inputs at home through labeling, the second was a savings account for emergencies that was managed by the treasurer of a local group (either a ROSCA or a farmers' group to which the individual belonged), and the third was a savings account for agricultural input investments that was managed by the same treasurer. The field experiment was conducted in Senegal and Burkina Faso at the same time to allow us to begin to assess the external validity of our results within West Africa.

Our findings are consistent with the conjecture that men and women face different risks. We find much stronger demand for weather insurance among men than among women, and stronger demand for emergency savings among women. This difference is not driven by access to informal insurance such as transfers, by area cropped, or by types of crops grown. Our results are consistent with those of Dercon and others (2014), who showed that in the context of weather insurance, which covers only covariate risk, those who are more exposed to income risk that is uninsured in a weather contract (basis risk) are less likely to purchase the product. If women's labor allocation is more affected by health shocks than men's, then this would explain the gender differences we observe.

We find that insurance was more effective than savings at encouraging agricultural investment. Those in the insurance treatment spent more on inputs and used more fertilizer than those in the savings treatments. In addition, the higher input use that insurance encouraged resulted in significantly higher yields. Although few differences in welfare outcomes were observed one month after the intervention, the insurance product offer resulted in better ability to manage risk among these farmers postharvest.

All in all, our results suggest that different patterns of demand for financial products among men and women can result in welfare differences in the long run. A further exploration of why these differences in demand arise is needed. In this paper we conjecture that it is a result of the different nature of risks faced by men and women. If this is the case it would suggest that these differences need to inform how new financial products, such as index insurance products currently becoming more available, are designed to meet the needs of both men and women.

Our paper is one contribution to the emerging literature on the benefits and concerns of offering indexed agricultural insurance to rainfall-dependent smallholder farmers in low-income countries. This literature has documented the potential beneficial impact of these products as well as some concerns. Because these products provide insurance through an index rather than observed losses experienced on a farmer's field, they can come with substantial basis risk. Basis risk is the risk that the index will differ from the actual loss. Index insurance typically insures just one source of risk to agricultural yields—local weather conditions—whereas in the contexts in which it is provided there are often many sources of risk, such as pests, floods, and health shocks to agricultural labor. Theoretically it can be shown that basis risk depresses the value of and demand for these products (Clarke 2011), and Dercon and others (2011) and Mobarak and Rosenzweig (2012) provided empirical evidence consistent with the theory. In documenting both the beneficial impact of index insurance and further evidence consistent with the idea that basis risk does limit demand, this paper is one contribution to this broader literature.

Our results also contribute to the fast-growing literature on savings in developing countries. Dupas and Robinson (2013) argued that, for health-related targets, barriers to savings are better alleviated with savings devices with a light form of commitment offering more flexibility. Saving at home indeed allows individuals to use their savings at a lower cost than savings kept with a group treasurer, for instance. Similarly, Karlan and Linden (2014) showed weaker commitment devices, targeted at education, to be both preferred and more effective at reaching their investment objective. We also find that farmers preferred weaker commitment devices: saving was higher in products that were perceived to be more flexible. Individuals in our sample valued commitment—evidenced by the fact that the amounts of money spent on savings products were, on average, twice as high as those spent on insurance products (even

when the interest rate was zero)—but farmers preferred savings products that they believed gave them more flexibility. Although they saved smaller amounts in savings instruments that they perceived to have higher commitment, these instruments were marginally more effective at encouraging agricultural investments when compared with the other savings products.

The following sections detail the experimental design (Section 2), the sampling of participants and data collected (Section 3), the empirical strategy (Section 4), and the empirical results (Section 5). Section 6 concludes.

2. EXPERIMENTAL DESIGN

We undertook a controlled field experiment in order to characterize the demand for, and impact of, four financial products offered to individuals in rural Burkina Faso and Senegal. In a number of ways our field experiment looked quite like an experimental game. Participants were asked to attend an experimental session and were provided with a monetary endowment, which they were asked to use to make allocations into a financial product offered to them during the session. However, our field experiment departed from standard experimental games because the financial products and their payouts were real in the sense that they were offered by institutions outside of the “lab in the field” experiments and that the experimental time frame was set in the natural agricultural cycle. Another feature that bridged the “lab in the field” experiment with the agricultural cycle is that we facilitated an agricultural input fair in each village at the time of planting, so that instead of having varying market access costs, all our sample had the same market access to the extent of the value of the endowment we gave them.

The four financial products offered were as follows:

- **Insurance (T1):** An index insurance product providing protection against too little rainfall for the main crop in the area (groundnuts in Senegal, maize in Burkina Faso). In Senegal the index was weather based, while in Burkina Faso it was a normalized difference vegetation index (NDVI). In both countries the index insurance product was being sold by local insurance companies with the support of Planet Guarantee. The Senegal weather product was modified to make it simpler to explain in a short experimental session, and in both countries the price of the insurance product was varied randomly across experimental sessions.
- **Agricultural investment savings at home (T2):** Savings for agricultural input purchases. Savings were earmarked through placing them in an envelope, which was then sealed and stamped with the purpose of the savings stated on the front. The envelope would be kept at home by the participant and there was nothing, other than the earmarking, that prevented the participant from using the savings for other purposes.
- **Agricultural investment savings with the group treasurer (T3):** As in T2, these savings were earmarked for agricultural input purchases. However, in this treatment, savings were not kept at home by the participant but managed by the treasurer of the ROSCA or farmers’ group to which the participant belonged. To withdraw from the savings, participants would have to take their savings passbook to the treasurer, who recorded the amount withdrawn and the purpose of the withdrawal. Both the participant and the treasurer signed the record of the transaction. The treasurer was asked to inquire of the participant what the reason for the withdrawal was. Interest was paid on savings still held after one month. The interest rate was varied across experimental sessions.
- **Emergency savings with the group treasurer (T4):** These savings had the same commitment level as T3 but were earmarked for emergency expenses. Again, in this treatment, savings were managed by the treasurer of the ROSCA or farmers’ group to which the participant belonged. The withdrawal procedure was identical to that of the savings for inputs managed by the treasurer (T2), and interest was also paid on savings held after one month. The interest rate was varied across experimental sessions. In addition, after one month, individuals in this treatment group were given the option to continue the same arrangement for another three months until harvest time at the same interest rate (T4+). However, this offer was not made known to the participants until one month after the initial session.

All four products offered were products that were available in the study area and thus are indeed financial services that can be feasibly made available to households. The insurance products offered in

Senegal and Burkina Faso were actual insurance products offered by local insurance companies in collaboration with Planet Guarantee. Local ROSCAs already provide a form of savings to members, and in the Oxfam project Savings for Change implemented in Senegal and Burkina Faso (and many other countries in the region) these groups are strengthened and encouraged to provide insurance to members and financing for investment (Beaman, Karlan, and Thuysbaert 2014). The envelopes are akin to commitment savings boxes that have been implemented in a number of settings.

The three savings products can be evaluated and compared as commitment devices. A financial product that requires commitment is one for which reversal of the investment decision is costly. This cost is an early withdrawal penalty, a physical barrier, or a combination of both. The weakest commitment device is the envelope (T2), in which reversal inflicts only a small psychological cost (revision of commitment, tearing up and opening the envelope). For the group savings, reversal is psychologically more costly and involves a physical and monetary penalty. The psychological cost is higher than that of the T2 home savings because a “reverser” needs to explain the decision to somebody outside the household. Furthermore, there is a physical cost because one needs to seek out the treasurer in order to withdraw money from the account. Finally, there is a financial cost because no interest is paid on the money withdrawn before the one-month term.

The four products were designed to help individuals better manage risk, undertake agricultural investments with an uncertain but potentially high return, or both. As shown in Table 2.1, T1 and T4 addressed risk while T2 and T3 encouraged agricultural investments. Although both T1 and T4 were designed to help individuals manage risk, they were very different instruments focusing on very different types of risk. T1 addressed drought risk, which is the foremost of many agricultural risks faced in the study sites and carries with it basis risk (see Clarke 2011 for an explanation). T4 could be used for any type of emergency but was limited by its size to managing shocks with a smaller financial magnitude. The three experimental savings products offered various combinations of purpose and commitment. By assessing the impact of these products we can assess whether helping individuals manage risk is effective in encouraging investment in uncertain but high-return activities and improving welfare. We will also assess whether savings or insurance is more effective at helping individuals manage risk, and whether high- or low-commitment savings products are more effective in encouraging investment.

Table 2.1 Financial product features

Product	Risk or investment	Type of risk product	Type of savings product
Insurance (T1)	Risk	Insurance to address agricultural risk	
Agricultural savings at home (T2)	Prespecified agricultural investment		Low commitment (sealed envelope kept by self)
Agricultural investment savings with the group (T3)	Prespecified agricultural investment		High commitment (savings kept with treasurer)
Emergency savings with the group (T4)	Risk	Savings to address many types of risk	High commitment (savings kept with treasurer)

Source: Authors.

Twenty participants were invited to each experimental session. On arrival, participants were provided with an endowment of 6,000 FCFA (West African CFA francs, equal to about US\$12).¹ All participants then participated in a joint information session that included discussions on the role of unexpected events in everyday life, a risk revelation exercise (in the form of a Binswanger lottery described further in the following section), and information about an agricultural input fair that would be held in one month’s time. The full script of the experimental session (in English) is provided in the Appendix.

¹ This show-up fee was more than enough to cover participants’ time in the experimental session and was equal to the cost of half a bag of fertilizer.

After the joint information session, participants were randomly allocated to one of four groups—through a public lottery—and they continued the experimental session with this group. In each randomly composed group, one of the four financial products was described to participants.

Once these products had been described, participants were asked to decide how much of their 6,000 FCFA endowment they wanted to take as cash and how much they wanted to put into the product that they had been offered. For logistical purposes they could only choose denominations of 500 FCFA to allocate to the financial instrument. Participants were offered the opportunity to ask the experimenter questions for clarification. They were reminded that the decision was individual, that the product offered had both benefits and disadvantages, and that their allocation choice was about what was good for them and their families.

Once participants were ready to make a decision, they recorded their choice in private and transferred their allocation to the savings or insurance product. They received a passbook for Treatments 3 and 4, an insurance certificate for Treatment 1, or an envelope for Treatment 2. At this point they also received payments for the choices they made in the risk and time preference experimental games as described further in the next section.

This approach was inspired by Hill and Robles (2011). The experimental sessions allowed us to control the information provided to participants, so as to ensure that identical general information was provided to all participants and that the same exact setting (endowment, decision time) was in place for choices over all financial instruments. However, ensuring that the savings and insurance decisions made in the session had real impact on life outside of the session allowed us to look at the impact of these products on behavior and welfare outcomes. It also allowed us to use farmers’ own subjective expectations about the probability distribution of weather and health outcomes, and returns on agricultural investments rather than artificially specifying them in the parameters of the game. In addition it also allowed time preferences of participants, and trust in insurance contracts and group treasurers to play more of a role in determining choices than would be the case without a real-life impact. These are all factors that are likely to be important in determining demand for different types of financial products. The limitation of this approach is that by endowing the individual with resources to participate in the experiment, we abstract from liquidity constraints in our estimations of demand for these products.

One month after the original experimental session, a series of input fairs were held in each of the villages where sessions had been held. All participants were invited to the fair and, once at the fair, they were given the option of purchasing inputs. Participants in Treatments 3 and 4 were provided with the remaining money that had been in savings with the group treasurer, and any interest that was due was paid. Participants in Treatment 4 (savings for emergencies) were also offered the opportunity to save again with the group treasurer for further safekeeping over a three-month period at the same interest rate they had been offered earlier (T4+). These interest payments were made in October, at the same time that insurance payouts were also due. Because of favorable weather conditions that year, no insurance payouts were made. Table 2.2 below summarizes the project timeline.

Table 2.2 Project timeline (2013)

Month	Project	Survey
June	Experimental sessions Financial products offer	Baseline survey
July	Input fair Interest payment on agricultural investment and emergency savings products (T3 and T4)	Midline survey
October	Insurance term Interest payment on extended agricultural savings product (T4+)	
December		Endline survey

Source: Authors.

3. EMPIRICAL APPROACH

The random allocation of participants into these four treatment groups allows us to examine the welfare impact of each of these products by comparing the behavioral changes across groups. The provision of an endowment to each individual to spend on a product ensured that take-up was high across all products, affording us some power with which to assess differences in outcomes. The fact that the same endowment was offered across all groups to all individuals allows us to estimate the differential impact of the type of financial product offered.

To increase power, we also run local average treatment effect (LATE) estimation models with take-up instrumented with the interest rate on savings, the price of insurance, and the day on which the experimental session took place (this was also randomized, and we expect subjective expectations about the probability distribution of yields to change as more information about the season becomes available over time).

In our analysis we specifically examine the following questions:

- ***The effectiveness of insurance versus targeted savings in encouraging productive investment and improving welfare:*** We will compare agricultural investments of participants in T1 with those in T2 and T3 to assess whether risk mitigation (T1) or targeted savings (T2 and T3) is more effective at boosting investment in productive assets and encouraging welfare gains in the long run. Karlan, Osei-Akoto, and others (2014) suggested that investments in managing risk may be more effective at encouraging productive investment.
- ***The difference between saving for emergencies and saving for investment in affecting ability to manage risk and investment outcomes:*** We will compare participants in T3 and T4 to assess the impact of saving for emergencies (T4) rather than investments (T3) on investment in productive activities and ability to manage risk.
- ***The role of commitment in savings products in ensuring outcomes:*** By comparing outcomes between T2 and T3 we will look at the impact of high commitment (T3) over low commitment (T2) on investment in productive activities and ability to manage risk. By undertaking this comparison we will explore the question of what level of commitment is beneficial. As Dupas and Robinson noted: “Since much of the value of a savings product appears to be in the mental labeling it facilitates, a product which does not severely limit liquidity is preferred to one that does, especially for people living in an environment in which income shocks are common, such as rural Kenya” (2013, 1140–1141). We therefore explore whether the earmarking product (T2) did raise more demand than the higher-commitment savings product (T3) and which of the two had a higher impact on investment.

4. SELECTION OF PARTICIPANTS AND DATA

The experiment was conducted with 806 individuals in rural areas in the Departement de Kaffrine in Senegal and around Bobo-Dioulasso in Burkina Faso. We chose farmers' groups with a vast majority of members, if not all, cultivating less than 6 hectares of land. ROSCAs had to hold regular meetings in order to be included in the sample. As shown in Table 4.1, 14 ROSCAs and 17 farmers' groups participated in the study. The membership of ROSCAs in both countries was entirely female, while farmers' groups were almost entirely male in Senegal² and mixed in Burkina Faso.

Table 4.1 Sample description

Variable	Senegal	Burkina Faso
<u>Panel A: Baseline sample</u>		
Total number of individuals surveyed at baseline	403	403
Number of ROSCAs	7	7
Number of participants	200	203
<i>Percent female (in %)</i>	100	100
Number of farmers' groups	9	8
Number of participants	203	200
<i>Percent female (in %)</i>	4.4	47.5
<u>Panel B: Endline sample</u>		
Number of individuals in initial sample not found at endline	1	1
<i>Percentage of baseline sample (in %)</i>	0.25	0.25
Total number of individuals surveyed at endline	502	496
<i>Percent female (in %)</i>	50.60	71.98

Source: Authors.

Individuals participating in the experiment were members of the selected farmers' groups and ROSCAs. Group leaders were systematically included in the study; the rest of the participants were selected randomly out of a list of other group members. We conducted 20 sessions with 20 or 21 individuals each in both countries. Not more than 40 individuals (two sessions) per group were included in the study in order to limit learning and spillovers. For that same reason, when one group was split into two sessions, the sessions were conducted on the same day.

Selected individuals were visited a few days prior to the first experimental session. The basic objective of the study was explained, and individuals were told that participation would entail participating in a survey, attending a group meeting in which they would be given money and have the opportunity to choose how to use it, and participating in a survey after the end of harvest. They then indicated whether they wanted to participate in the study or not; if so, they signed the consent form, and the survey proceeded. The consent form is provided along with all of the experimental protocols in the Appendix.

The baseline survey asked questions on demographics, assets, expenditure on key categories of goods, agricultural production practices, sources of income, health status, and recent shocks. It also collected data on baseline savings, loans, and remittances. Surveys were conducted using PDAs in Senegal and laptops in Burkina Faso. In addition, each participant was asked whether he or she would prefer to receive a gift of 500 FCFA at the meeting to which he or she had been invited or a gift of 550 FCFA at another similar event to be held in one month. The participant was also asked whether he or she would prefer to receive a gift of 500 FCFA at the meeting to be held in one month or a gift of 600 FCFA at a meeting to be held in three months, at the end of the agricultural season. Time preferences were

² This does not raise a selection issue because farmers' groups in Senegal are indeed mainly composed of men.

recorded and the respondent was given an information voucher with a reminder of the details of the experimental session and of his or her choices on the time preference questions.

A few days later, at the end of the experimental session, the participant received any gift he or she had elected to receive that day through the time preference questions. In addition, at the experiment the following day, each participant was also asked to participate in a standard Binswanger-style lottery (Binswanger 1981) in order to measure risk attitudes before the main experiment as described in Section 2. Although individuals made choices in this risk lottery prior to participating in the rest of the experiment, the results of the risk game were not determined (that is, the coin was not flipped) until the end of the experimental session, after individuals had recorded their main experimental decision of how much to save or spend on insurance.

One month after the experimental sessions, all participants were revisited. As described in Section 2, an input fair was held, during which respondents with savings held by the group treasurer could withdraw the funds, and inputs were offered for sale. For all those that attended the input fair, we recorded the amount left in the savings product and the amount of agricultural inputs purchased during the fair. We conducted a short survey with all those that attended the fair after they had made their purchases and with all other households during a household visit. The midline survey asked about expenditures on key categories of goods, savings, recent health experiences, and food security.

Finally, after the end of the harvest a further survey was conducted on all who had previously been surveyed. This survey collected data on well-being, savings, and some measures of consumption, as well as yields and value of production.

Table 4.2 displays summary statistics of the main variables of interest as well as the p-value of the test that the means are equal for all four treatment groups. There are no significant differences across treatment groups.

Households of participants were large (with 9 and 14 members on average in Burkina Faso and Senegal, respectively). Farming was the main source of income, although income from nonfarm self-employment activities was quite high in Burkina Faso. The average land holding was 5 acres in Burkina Faso and 7 acres in Senegal. In each country about half of the participants were literate, with levels of education slightly higher in Senegal.

Prior to our intervention agricultural insurance was not present in these villages and health insurance was also almost nonexistent. However, drought risk and ill health are widespread. Almost a quarter of participants reported experiencing food shortages as a result of dry weather in the last year, 35 percent of participants had been sick themselves for more than 7 days or their spouses had been sick, and 25 percent of participants had children that had been seriously ill in the past three months.

Furthermore, we see gender differences in exposure to risk. Men offered the insurance product were 12 percentage points more likely to report an agricultural shock occurring within the previous year than women in that group. However, women were concerned more often with the food security of their household than were men (Table 4.3). Together, this may suggest that women are more concerned with nonagricultural shocks to welfare.

Table 4.2 Summary statistics and balance checks

Variable	Insurance (T1)			Agricultural envelope (T2)			Agricultural savings (T3)			Emergency savings (T4)			Equality of means p-value
	Mean	Std. dev.	Median	Mean	Std. dev.	Median	Mean	Std. dev.	Median	Mean	Std. dev.	Median	
Panel A: Demographics and risk													
Male	0.37	0.48	0	0.40	0.49	0	0.37	0.48	0	0.35	0.48	0	0.09
Degree of food insecurity	2.58	2.10	3	2.49	2.02	3	2.50	2.03	3	2.55	2.03	3	0.95
Delay to buy medicine when ill (days)	1.84	7.51	0	1.41	3.56	0	6.89	7.12	0	1.09	1.87	0	0.12
Used savings to cope with the most prevalent shock	0.34	0.47	0	0.36	0.48	0	0.45	0.50	0	0.40	0.49	0	0.12
Amount saved at home (FCFA)	9,607	30,653	0	7,825	28,156	0	7,487	22,852	0	6,862	19,644	0	0.85
Amount in savings account (FCFA)	8,771	54,547	0	8,259	56,269	0	8,677	56,905	0	13,547	106,158	0	0.97
Amount contributed to group savings (FCFA)	1,889	9,745	0	1,621	5,863	0	2,749	12,142	0	2,879	19,282	0	0.53
Amount of monetary help received over 3 months (FCFA)	1,743	7,188	0	2,108	9,023	0	2,323	10,520	0	1,719	7,871	0	0.77
Panel B: Farming													
Total area planted (ha)	6.59	5.37	5	6.93	5.29	6	6.81	6.11	5	6.66	6.09	5	0.89
Main crop is groundnut	0.30	0.46	0	0.29	0.46	0	0.27	0.44	0	0.28	0.45	0	0.85
Main crop is pearl millet	0.20	0.40	0	0.24	0.43	0	0.29	0.45	0	0.23	0.42	0	0.34
Main crop is sorghum	0.09	0.29	0	0.06	0.25	0	0.09	0.29	0	0.10	0.30	0	0.52
Main crop is cotton	0.08	0.27	0	0.07	0.26	0	0.04	0.20	0	0.07	0.26	0	0.15
Total expenses on inputs (FCFA)	52,700	111,514	17,000	52,321	124,996	15,500	42,322	79,442	12,000	42,706	97,009	13,000	0.68
Quantity of fertilizer used (kg/ha)	83.54	137.90	46.06	76.42	160.15	35.71	73.69	131.39	34.52	62.99	118.93	33.33	0.47
Normalized output	0.04	0.89	-0.10	0.02	0.76	-0.12	-0.04	0.63	-0.13	-0.02	0.69	-0.11	0.54

Source: Authors' calculations.

Notes: FCFA = West African CFA francs. All treatment sample. P-value for the F test of equality of the means across four treatment groups.

Table 4.3 Gender differences in food security concerns at baseline

Variable	Burkina Faso	Senegal
Mean women	1.78	2.28
Mean men	1.52	2.15
T-test of difference	2.00**	1.64*

Source: Authors.

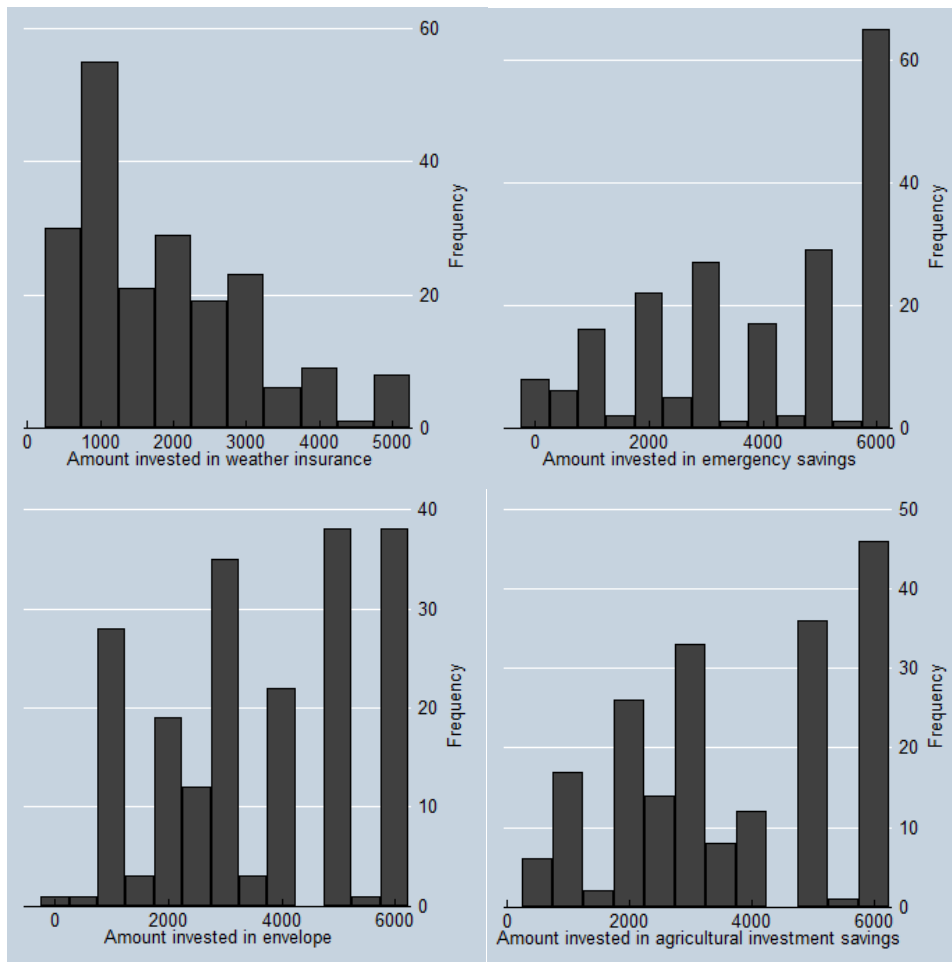
Notes: The survey asked, "How often were you concerned about your household's food security in the last month?" 0 = never, 1 = occasionally (1 to 3 times), 2 = sometimes (3 to 10 times), 3 = often (10+ times). * Significant at the 10 percent level; ** Significant at the 5 percent level.

5. RESULTS

Demand

Figure 5.1 presents the frequency of distribution of the amount invested in each financial device, and Table 5.1 shows summary statistics for the amount invested. All individuals offered weather insurance (T1) and high-commitment investment savings (T3) invested a positive amount. Only one individual offered low-commitment investment savings (T2) did not invest, and 4 percent of individuals did not invest in emergency savings (T4). Amounts invested were higher in Burkina Faso. It is possible that the high amounts invested are in part due to experimental conditions. Participants were offered a lump sum to be invested in part or in full, and they decided to “play the game.” In line with the gift exchange theory (Falk 2007), donating gifts leads recipients to reciprocate and make donations in return. In the context of our study, participants were not invited to make donations in return, but they might have been willing to reciprocate the gift by investing the money they were offered in the products they were offered during the session.

Figure 5.1 Frequency of distribution of amount invested in financial product



Source: Authors' calculations.

Note: Monetary amounts are in West African CFA francs.

Table 5.1 Take-up: Amount invested in financial product

Variable	Burkina Faso				Senegal			
	Mean	Std. dev.	Median	N	Mean	Std. dev.	Median	N
Amount invested in insurance (T1)	2,178	1,167	2,000	101	1,575	1,127	1,000	100
Amount invested in envelope (T2)	3,345	1,804	3,000	100	3,896	1,624	4,000	101
Amount invested in agricultural investment savings (T3)	4,307	1,756	5,000	101	3,115	1,542	3,000	100
Amount invested in emergency savings (T4)	4,930	1,479	6,000	100	2,847	1,841	3,000	101
Amount reinvested in emergency savings one month later	2,212	1,790	2,000	99	2,079	1,673	2,000	101

Source: Authors' calculations.

Note: Monetary amounts are in West African CFA francs.

On average, individuals saved almost twice as much of their endowment as they spent on insurance. The lower share of endowment invested in insurance means that individuals in T1 took away a larger share of the endowment than those in the savings treatment.

A majority of individuals offered the emergency savings product invested more than 4,000 FCFA. The density of distribution is skewed to the right. This is especially the case in Burkina Faso, where most participants invested the entire lump sum they received at the experimental session in the savings device (Table 5.1). In contrast, a majority of individuals offered the insurance product invested amounts lower than 1,500 FCFA. Interestingly, the densities of distribution of the two investment savings are bimodal, perhaps suggesting two target levels of savings for two different values of inputs. We will return to this idea of a savings target in the investment savings treatments later.

Preferences over the types of savings product varied across the two countries. In Burkina Faso, those in the emergency savings treatment chose to invest the most in savings. The amount invested in savings was lowest for those in the treatment in which they were offered the envelope for agricultural savings at home. In Senegal, however, this was the most preferred savings option, and the amount saved was lowest for those in the emergency savings product.

Table 5.2 shows the results of formal testing of the relationship between the amount invested in insurance and in savings, and the type of contract offered. In addition to randomizing the type of savings device, the price of insurance and, where possible, the interest that accrued to savings were randomized. It was not possible to offer interest on the low-commitment savings held at home, given that we could not monitor how much was in the envelope over the course of the month. The interest rate of high-commitment investment savings and emergency savings, and the loading factor on the insurance contract (that is, the ratio of the premium to the expected value of the insurance contract) were randomized at the village level. This procedure allows us to assess the responsiveness of savings and insurance demand to price, as reported in Table 5.2 and Figure 5.2. The randomization of treatment was stratified by gender (by organizing women-only and mainly male sessions), and we also test the impact of gender of respondent on demand.

Columns (1) and (2) of Table 5.2 examine demand for insurance. The first finding of note is that demand for insurance is significantly lower among female participants than among male participants. On average, men spent 570 FCFA more on insurance than women. This is almost 30 percent of the average spending on insurance, a significant and sizable difference.

Table 5.2 Determinants of amount insured and saved

Variable	(1) Insurance	(2) Insurance	(3) Savings	(4) Savings	(5) Savings	(6) Extended savings
Male	570.66 [241.80]**	472.79 [200.39]**	-150.54 [212.10]	-137.55 [214.26]	-613.27 [356.44]*	-13.55 [355.00]
Burkina Faso	319.27 [210.06]	-1,268.25 [352.64]***	847.97 [209.29]***	1,584.40 [261.93]***	1,557.92 [266.06]***	166.83 [348.19]
Group leader	397.05 [257.56]	352.32 [250.41]	319.15 [198.79]	401.89 [197.05]**	410.56 [195.57]**	-273.63 [419.38]
Insurance discount	25.90 [39.19]	7.09 [32.22]				
Day of offer	138.34 [37.90]***					
Senegal * day of offer		0.33 [47.34]				
Burkina Faso * day of offer		237.59 [28.28]***				
Agricultural savings			-178.78 [214.06]	406.06 [470.04]	200.44 [473.55]	
Agricultural savings * male					702.91 [316.25]**	
Low-commitment savings			242.74 [315.37]	1,058.83 [372.30]***	1,000.70 [381.84]**	
Burkina Faso * low-commitment savings				-2,220.17 [376.42]***	-2,148.35 [379.89]***	
Interest			11.65 [9.70]			29.39 [12.08]**
Emergency savings * interest rate				22.47 [13.40]	23.62 [13.98]*	
Ag savings * interest rate				1.00 [10.00]	0.48 [9.72]	
Sample	T1	T1	T2, T3, T4	T2, T3, T4	T2, T3, T4	T4
Observations	201	201	603	603	603	200
R-squared	0.25	0.34	0.08	0.16	0.17	0.07

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** p < 0.01, ** p < 0.05, * p < 0.1.

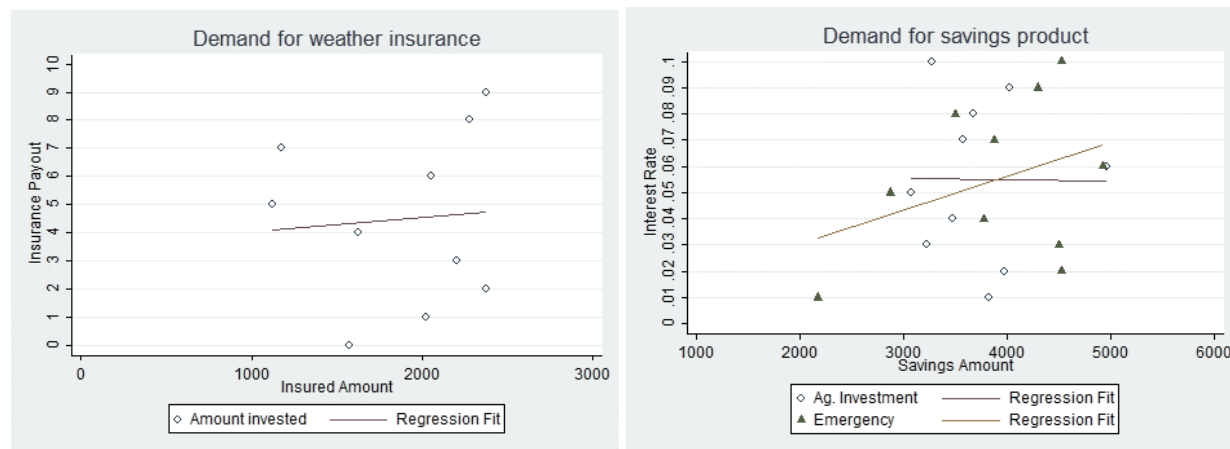
We explore a number of hypotheses as to why this difference occurs. A male preference for the insurance product could arise if men may be more engaged in agricultural production or produce more water-intensive crops, or if men and women have differential access to informal insurance. Surprisingly, while men offered the insurance product were 12 percentage points more likely to report an agricultural shock's having occurred within the previous year than women in that group, this difference does not significantly affect take-up of the insurance product nor of any savings product. Controlling for access to remittance income as a form of insurance does also not remove the gender difference. In addition, while men in the insurance treatment arm cultivate about 0.5 hectare more than women on average, the size of land cultivated does not significantly affect insurance or savings products take-up. Participants growing

sorghum or cotton are significantly more likely to invest in the weather insurance product, but this is largely driven by differences between Senegal and Burkina Faso because few households in Senegal grow either crop. However, while controlling for the main crop cultivated does slightly reduce the size of the gender differential impact on take-up, this impact remains quite large.

We hypothesize that the difference arises because men and women are exposed to different risks in this environment. While agricultural shocks affect the income sources of both men and women, women are in addition exposed to much higher health risk during pregnancy and childbirth as a result of high fertility rates, and as primary childcare givers, women are more exposed to the risk of ill health of their children. As a result, the agricultural insurance product, in insuring only one of the risks they face to their income stream, poses larger basis risk to women than to men. Therefore the value of and thus demand for this product is lower among women.

Second, in contrast to the experimental literature that shows a high price elasticity of insurance demand (Cole et al. 2013; Hill et al. 2013; Karlan, Osei-Akoto, et al. 2014), we find no demand response to the price. The right-hand panel of Figure 5.2 shows that demand in general increases in the price, but the regression analysis shows this trend is not significant. In contrast to other studies that estimate a high price elasticity of insurance demand, the randomized discounts in this study were not made explicit to participants. The insurance price, rather than a discount value from a market price, was stated in the session. It is likely that the value of the insurance product was not accurately perceived—it is hard to calculate the expected value of an insurance product and even more so when you have limited years of primary education—and therefore it was hard for participants to judge whether the price offered was discounted or not.

Figure 5.2 Price responsiveness of insurance and savings



Source: Authors' calculations.

Note: Monetary amounts are in West African CFA francs.

The fact that insurance take-up was not responsive to changes in the way the loading factor was presented is in itself an interesting finding. But it may lead us to be concerned that individuals did not understand whether the insurance had any value for them. However, there was another source of exogenous variation in the value of the product, and one that was arguably better understood by the participants. We were offering the insurance product in the final days of the dry season before the rains came. In good years the rain would have started already. Thus the later the date on which the insurance was offered, the higher the chance of receiving the late rain payout. Indeed we see a strong offer date effect: the later insurance was offered, the higher the endowment amount that was invested. This suggests that the investment decision was rational. Results in column (2) of Table 5.2 show that this effect was particularly strong in Burkina Faso. Given that our ordering of sessions was random, this effect provides

an exogenous source of variation in the demand for insurance that can be exploited in instrumental variable estimates of the effect of insurance on outcomes.

The determinants of savings are explored in columns (3) to (5) of Table 5.2. Data from all three savings treatments are pooled. On average, there was no gender difference in the amount saved across treatments. However, results in column (5) indicate that gender differences in the amount saved are observed between savings treatments. Labeling savings for agriculture, as was done in T2 and T3, did not have a significant impact on the amount saved. However, it did have a significant impact in reducing the amount that women saved. Women were more likely to save in the nonagricultural savings treatment, T4. The persistence of this gender effect whereby men tend to invest more in the weather insurance product while women tend to invest more in the emergency savings product may reflect vulnerability to different types of risk across gender, such as men's typically being more exposed to agricultural shocks and women's being more exposed to health- and child-related shocks. The questions on perceived exposure to risk in our baseline and midline questionnaires do not appear sophisticated enough to capture this difference, even though this was a strong result of the qualitative work conducted in the preparatory focus groups.

On average the treatments that were designed to have a higher commitment device (T3 and T4) induced a lower rate of saving. This is despite the positive interest rates offered in these treatments and indicates that high-commitment savings carry a cost to participants. However, in Burkina Faso we find that the envelope treatment, which was designed to be a low-commitment treatment, had significantly lower savings, as indicated in Table 5.1. Discussions with participants after the end of the treatment revealed an apparently widespread belief that if you elected to take some of the endowment home in the envelope it was very important that it be kept there until one month later so that the money in the envelope could be returned, unopened and in full. There seemed to be a belief that the money in the envelope did not truly belong to the participants. If this was the case, it is understandable that less was invested in this treatment. There is no gender difference in the impact of the high-commitment treatment in either country.

Although on average the interest rate did not have a significant impact on the amount invested, it did have a significant effect in T4. The amount that participants elected to invest in emergency savings was responsive to the interest rate offered (Figure 5.2 and column [5] of Table 5.2). This was true both for the amount invested for one month during the experimental session and for the amount invested at one month until harvest (column [6] of Table 5.2). This was largely driven by Burkina Faso respondents who had more interest in this type of savings than Senegalese respondents.

In the case of agricultural investment savings, it is surprising to see that the savings are inelastic to the interest rate (column [3]), in contrast to the positive effect of the interest rate on emergency savings. Why are emergency savings more elastic to the interest rate than agricultural investment savings? One interpretation derives from the difference in labeling between the two products. The agricultural investment savings product is strictly labeled for a prespecified goal, which might lead people to invest a target amount irrespective of the return they will get from their savings. Indeed the bimodal nature of agricultural savings shown in Figure 5.1 (for both high- and low-commitment instruments) suggests that there may be a target investment amount that people have in mind. On the contrary, the looser type of labeling attached to emergency savings makes the investment target less clear. When making their investment decision, individuals therefore are more sensitive to the return they can get from it. An alternative interpretation relies on the nature of both expenses. By definition, emergency expenses are urgent, and while these savings are highly liquid, the psychological cost of having to immobilize money with the treasurer for emergency spending is higher than for agricultural investment, which is bound to occur at a later date anyway. Discount rates are therefore likely higher for emergency spending and increasing faster over time than for agricultural investment. This may also explain why the demand for the emergency savings product is more elastic to the interest rate than the demand for the agricultural investment savings product.

Although not shown, we explored correlates of the amount invested in insurance and in savings. While risk aversion is likely to significantly increase take-up of the agricultural investment savings product, its impact is not significant on take-up either of the insurance product or of the other savings products. Interestingly, receiving a higher amount of transfers from migrants over the three-month period preceding the baseline significantly reduces savings in the emergency savings product, both in the initial offer and one month later (columns [4] and [5]), indicating that commitment is preferred by those with less buffer liquidity.

Before turning to the question of the impact of the four instruments, we detail what happened with the savings products during the one month between the experimental session and the input fair (for T1 to T4), and during the three months following the fair (for the extended savings product T4+). This helps us understand what might be driving the impact that we analyze in the following subsection.

The majority (96 percent) of individuals offered one of the two high-commitment savings products kept a positive amount of savings with the group treasurer for the whole one-month duration of the experiment. They kept 4,485 FCFA on average in their savings in Burkina Faso and 2,742 FCFA in Senegal. In Senegal, a significantly higher number of participants withdrew from the envelope before one month (38 percent) than from the two high-commitment savings products (10 percent), and they withdrew significantly higher amounts from the envelope (3,618 FCFA on average, 85 percent of their initial savings) than from the savings products with social commitment (around 2,400 FCFA, 65 percent of their savings), indicating that social commitment does help individuals save more for a longer period of time. In contrast, in Burkina Faso, no individuals withdrew money from the envelope during the month it remained at home. This is consistent with the idea noted earlier that in Burkina Faso, participants in T2 did not believe the money in the envelope was truly theirs.

Impact

In this section, we examine the impact of insurance and savings on outcomes measured one month after the experimental session and again after harvest. Specifically, we look at investment in farm inputs, agricultural output, and savings, and measures of food security and consumption. In order to examine the comparative advantages of each financial product, we estimate the intent to treat effect (ITT) by running the following regression:

$$y_{it} = \beta_0 + \beta_T T_i + \beta_y y_{i,t=0} + \beta_{BF} BF_i + \beta_M Male_i + \varepsilon_{it}, \quad (1)$$

where y_{it} stands for various types of agricultural investment, savings, and consumption indicators measured for individual i at time t , where t is either midline or endline. T_i is a vector of treatment assignment dummies and $y_{i,t=0}$ is the baseline measure of y_{it} . In all specifications, a gender dummy and a country dummy are also included because the randomization was stratified by country and gender.

However, we may expect the impact of insurance to vary depending on how much insurance an individual decided to buy. We therefore also estimate the LATE of insurance and savings by instrumenting the amount of insurance invested in by the money's being allocated to the insurance treatment and the day on which insurance was offered. The first-stage regression is thus similar to that presented in column (1) of Table 5.2 (except that the sample is expanded to include participants in all treatments). Likewise, we may also expect the impact of savings to vary based on how much an individual decided to save. We instrument for the amount of savings undertaken with the type of savings instrument to which an individual was allocated and the interest rate. The first-stage regression is that in column (5) of Table 5.2.

We start by considering the impact of insurance on investments in agricultural production. No significant difference was observed between the average input use and production behavior of those in the insurance treatment and those in savings treatments (the ITT estimates, not shown to conserve space). However, when the number of insurance purchases is taken into account, we observe significant differences between those who purchased insurance and those who did not. Table 5.3 reports the LATE

estimates, in which the amount of insurance purchased is instrumented with assignment to insurance and the distance between the offer day and the start of the insurance contract. Insurance increased spending on inputs prior to the fair and use of fertilizer both before and after the fair. This is consistent with the findings of Karlan, Osei-Akoto, and others (2014) in Ghana and the findings of Berhane and others (2013) in Ethiopia, adding further evidence from a different context that insurance can encourage input use. There was no increase in the area of land cultivated (in contrast to Karlan, Osei-Akoto, et al. 2014). We did not observe spending on inputs during the fair itself by those who purchased insurance, suggesting that the main increase in input spending occurred outside of the input fair. When the baseline values are included, the same results hold, although fertilizer use after the fair is no longer significant.

Table 5.3 Impact of insurance (local average treatment effect) on agricultural investment

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	After one month				Over whole season		
	Total spending	Spending at input fair	Other spending on inputs	Fertilizer per acre	Fertilizer per acre	Land cultivated	Yield
Insurance amount (FCFA)	0.0003 [0.0001]**	0.0003 [0.0002]	0.0004 [0.0003]	0.0002 [0.0001]*	0.0002 [0.0001]*	-0.0001 [0.0002]	0.0001 [0.0000]*
Agricultural savings	0.1230 [0.3051]	0.4313 [0.2618]*	0.4877 [0.4343]	0.2881 [0.1721]*	0.0444 [0.1861]	0.3922 [0.8965]	0.1209 [0.0634]*
Low-commitment savings	0.0656 [0.4559]	-0.0941 [0.2505]	-0.0024 [0.4225]	-0.6254 [0.2664]**	-0.2068 [0.2445]	-0.8998 [0.7210]	-0.0206 [0.0617]
Low commit *	0.5940 [0.5417]	0.9633 [0.5455]*	-0.0668 [0.5311]	0.1705 [0.2995]	0.7489 [0.2601]**	-0.2759 [0.9020]	-0.0109 [0.0749]
Burkina Faso	-1.1464 [0.4934]**	3.4903 [0.8192]**	-1.7189 [0.6392]**	0.9038 [0.3758]**	0.4904 [0.3804]	-0.9853 [0.9023]	-0.0291 [0.0670]
Male	1.0251 [0.4104]**	-0.2028 [0.8331]	1.6748 [0.6044]**	0.8204 [0.3271]**	0.4798 [0.3525]	1.7119 [0.8374]**	0.0990 [0.0765]
Constant	9.6026 [0.4796]**	0.6325 [0.5999]	7.6769 [0.5316]**	1.4609 [0.3128]**	3.2106 [0.3353]**	6.6218 [0.7969]**	-0.1671 [0.0650]*
Observations	804	804	804	780	781	787	804
R-squared	0.0529	0.2187	0.0796	0.0752	0.0448	0.0234	0.0088

Source: Authors' calculations.

Notes: FCFA = West African CFA francs. Robust standard errors in brackets. *** p < 0.01, ** p < 0.05, * p < 0.1.

Higher use of inputs resulted in yield increases for those who purchased more insurance. The measure of yields used is an average of the yields of all crops grown, in which yields of each crop are normalized by subtracting the average yield for that crop and dividing by the standard deviation of the yield distribution for that crop.

The higher rates of input use and recorded yields for those that purchased more insurance indicate that the gender differences in take-up of insurance may have a negative impact on agricultural incomes among female farmers if the higher yields cause a high enough return to overcome the cost of increased input use.

It is worth noting that the amount of farm inputs bought at the fair was significantly lower in Senegal than in Burkina Faso. Of the sample in Senegal, 92 percent did not buy any inputs at the fair, compared with 51 percent in Burkina Faso. Farmers in Senegal were indeed expecting subsidized inputs to be provided by the government soon after the fair, and in the fair products were sold at the market price. However, the fair was held shortly before the final fertilizer application of the season. We find that

in Senegal, spending on inputs was higher outside of the fair. Across all treatments, men were found to spend more on agricultural inputs than women. While men spent significantly (86 percent) more than women on inputs, irrespective of the product they were offered, these differences do not translate into significantly higher agricultural output for men, all other things being equal.

The ITT and LATE estimates for the savings treatments are presented in Tables 5.4, 5.5, and 5.6. The regressions in these tables include all participants that were in the savings treatments but not those in the insurance treatment. Thus they compare the effectiveness of different types of savings treatments to each other. The results indicate that the type of savings product, more than the amount of savings, affected the amount invested in agricultural inputs. Table 5.4 indicates that participants in the emergency savings treatment had no different input use than those in the agricultural savings treatments. In Burkina Faso the envelope resulted in considerably higher spending on inputs during the fair and, as a result, higher input use. It is not quite clear why this treatment resulted in higher levels of spending during the fair. Farmers saved less in this treatment in Burkina Faso than in Senegal. As discussed above, there seemed to be a perception among participants in this treatment that any money in the envelope was not truly theirs, and behavior was consistent with this belief. If this was the case, then it could be that on the day of the fair, when participants realized the money in the envelope was indeed theirs, it encouraged higher spending in the fair. There was no final impact on yields for those in this treatment.

Table 5.4 Impact of savings (intent to treat effect) on agricultural investment

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	After one month				Over whole season		
	Total spending	Spending at input fair	Other spending on inputs	Fertilizer per acre	Fertilizer per acre	Land cultivated	Yield
Agricultural savings	0.04 [0.30]	0.45 [0.30]	0.40 [0.43]	0.03 [0.19]	-0.18 [0.17]	0.20 [0.94]	0.08 [0.06]
Low-commitment savings	0.02 [0.50]	-0.08 [0.25]	-0.28 [0.44]	-0.59 [0.26]**	-0.11 [0.21]	-0.98 [0.65]	-0.02 [0.06]
Low commit *	0.49 [0.59]	0.91 [0.54]*	0.30 [0.63]	0.24 [0.33]	0.58 [0.27]**	-0.13 [1.05]	-0.05 [0.07]
Burkina Faso	-1.54 [0.50]***	3.46 [0.79]***	-2.58 [0.60]***	0.57 [0.31]*	0.30 [0.29]	-0.31 [0.97]	-0.07 [0.08]
Male	0.86 [0.37]**	-0.25 [0.84]	1.52 [0.56]***	0.51 [0.28]*	0.03 [0.24]	1.81 [0.89]**	0.14 [0.09]
Observations	603	603	603	571	570	581	603
R-squared	0.13	0.24	0.14	0.19	0.28	0.11	0.09

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** p < 0.01, ** p < 0.05, * p < 0.1. The sample is T2, T3, and T4.

The results in Table 5.5 underscore that it was the type of savings instrument rather than the amount saved that had an impact on agricultural investment. In and of itself the amount saved did not have an impact on spending, although it is worth noting that the amount saved varied significantly across the types of savings instruments (as shown in Table 5.2), and this variation is considered through the inclusion of treatment dummies as controls.

Table 5.5 Impact of experimental savings (local average treatment effect) on agricultural investment

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	After one month				Over whole season		
	Total spending	Spending at fair	Other spending on inputs	Fertilizer per acre	Fertilizer per acre	Land cultivated	Yield
Amount saved	0.0001 [0.0009]	-0.0015 [0.0010]	-0.0013 [0.0010]	0.0010 [0.0010]	0.0007 [0.0008]	0.0001 [0.0002]	0.0009 [0.0020]
Burkina Faso	-1.2669 [1.6896]	5.8988 [1.7474]***	-0.0112 [1.7069]	-0.8385 [1.7916]	-0.5310 [1.3335]	-0.2348 [0.3741]	-2.3897 [3.4828]
Male	1.0254 [0.4217]**	-0.3811 [0.8474]	1.5394 [0.6462]**	0.9624 [0.3910]**	0.4970 [0.4191]	0.1427 [0.1083]	1.8254 [1.0597]*
Constant	9.4292 [2.7792]***	5.1962 [3.2800]	12.1826 [3.2274]***	-1.5551 [3.1309]	1.2575 [2.4265]	-0.5763 [0.7056]	3.7750 [6.2733]
Observations	603	603	603	588	587	603	591
R-squared	0.0454	-0.1376	-0.0875	-0.5038	-0.2291	-0.1482	0.0019

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The sample is T2, T3, and T4. Other control variables included agricultural savings, low-commitment savings, and low commitment * Burkina Faso.

We also present LATE regressions using total savings balance, as opposed to looking only at experimental savings. The total savings variable is the sum of balances in informal and formal savings accounts, ROSCA savings, and experimental savings if applicable. We use amount contributed to the ROSCA in the past 30 days (midline) and in the past three months (whole season) as a proxy for ROSCA balance. The results, shown in Table 5.6, present a similar story to the one in Table 5.5. The coefficients are smaller in size, but similarly all statistically insignificant. This further emphasizes that it was the type of savings treatment, as opposed to total savings balance, that affected agricultural investment.

We also examine whether the treatments had additional impacts on household welfare, outside of encouraging investments in agriculture. We examine whether nonexperimental savings behavior is significantly different across treatments. This may be the case if increased savings in the experiment crowds out savings in other instruments. We observe very little difference across products. Results are not shown to conserve space. Those in the low-commitment savings treatment in Burkina Faso invested more in ROSCAs than those in other treatments, perhaps suggesting that the lower amount of saving in the envelope was compensated for by increased saving in other forms. However, after harvest, when the savings products are no longer available, this effect disappears. There were no other significant differences.

Table 5.6 Impact of total savings (local average treatment effect) on agricultural investment

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	After one month			Over whole season			
	Total spending	Spending at fair	Other spending on inputs	Fertilizer per acre	Fertilizer per acre	Land cultivated	Yield
Total savings	0.0000 [0.0000]	-0.0000 [0.0000]	0.0000 [0.0000]	0.0000 [0.0000]	0.0000 [0.0000]	0.0001 [0.0001]	-0.0000 [0.0000]
Burkina Faso	-1.7156 [0.8267]**	4.1041 [0.8664]***	-3.0533 [0.9889]***	-0.0157 [0.7114]	0.0452 [0.5635]	-2.4343 [1.6519]	0.1058 [0.1217]
Male	0.6745 [0.5542]	0.1063 [0.9400]	1.1672 [0.7416]	0.3521 [0.4534]	0.0815 [0.4356]	0.6106 [1.2674]	0.2305 [0.1118]**
Constant	9.6516 [0.5393]***	0.6669 [0.5994]	7.9395 [0.5924]***	1.5363 [0.4248]***	3.3000 [0.3625]***	6.5275 [1.2121]***	-0.1626 [0.0851]*
Observations	603	603	603	588	587	591	603
R-squared	-0.1423	0.0855	-0.1536	-0.9410	-0.5835	-0.3855	-0.7570

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The sample is T2, T3, and T4. Other control variables included agricultural savings, low-commitment savings, and low commitment * Burkina Faso.

Tables 5.7 and 5.8 present regression results for a variety of welfare measures in the month after the experiment and at the end. Self-reported food security is assessed in columns (1) and (3). The number of days on which luxury food items—meat, fish, rice, and onions—were consumed in the week prior to the survey is reported in columns (2) and (4). Onions are a key commodity that we asked about because they are a nonessential food item largely purchased on the market during the lean season if they can be afforded. The endline survey, after harvest, collected information on how well individuals managed shocks that occurred during the experiment period, and these measures are examined in columns (4) and (6).

Those offered the savings treatments consumed less well one month after the experiments than those in the insurance treatment (Table 5.7, column [2]). The difference could in part be driven by the fact that investments in insurance were lower than investments in savings, which resulted in more unrestricted cash taken home by individuals in the insurance treatment than by those in other treatments. Indeed, this difference is no longer present after harvest (column [4]). Individuals offered the insurance product were better able to manage shocks that occurred during the experiment period (column [6]), 4 percentage points more than the control group. This is consistent with the finding that these individuals produced more on average and had more savings.

Table 5.7 Impact of insurance (intent to treat effect) on consumption and managing shocks

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	After one month		After harvest			
	Degree of food insecurity	Ate meat, fish, rice, or onions	Degree of food insecurity	Ate meat, fish, rice, or onions	Days before buying medicine	Used household liquidity to manage shock
Insurance	0.07 [0.09]	1.66 [0.67]**	-0.12 [0.18]	-0.11 [0.72]	-0.01 [0.24]	0.04 [0.02]*
Burkina Faso	0.36 [0.16]**	-6.68 [0.89]***	0.17 [0.25]	-12.85 [0.98]***	-1.42 [0.20]***	0.05 [0.02]**
Male	-0.38 [0.12]***	0.57 [0.78]	-0.28 [0.24]	0.68 [0.95]	-0.46 [0.23]*	-0.01 [0.02]
Observations	804	796	804	791	804	794
R-squared	0.17	0.19	0.21	0.31	0.04	0.02

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5.8 Impact of savings (intent to treat effect) on consumption and managing shocks

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	After one month		After harvest			
	Degree of food insecurity	Ate meat, fish, rice, or onions	Degree of food insecurity	Ate meat, fish, rice, or onions	Days before buying medicine	Used household liquidity to manage shock
Agricultural savings	-0.16 [0.12]	-1.25 [0.52]**	-0.32 [0.21]	-0.59 [0.82]	0.13 [0.26]	0.00 [0.02]
Low-commitment savings	0.17 [0.10]	0.74 [0.51]	-0.01 [0.25]	-0.24 [0.67]	0.48 [0.69]	-0.03 [0.02]
Low-commit *	-0.05 [0.20]	1.27 [1.11]	0.05 [0.36]	0.97 [1.59]	-0.41 [0.68]	0.02 [0.03]
Burkina Faso	0.40 [0.19]**	-7.58 [0.91]***	0.08 [0.33]	-12.76 [1.08]***	-1.34 [0.26]***	0.04 [0.02]*
Male	-0.35 [0.14]**	0.35 [0.91]	-0.24 [0.27]	0.48 [1.03]	-0.26 [0.28]	-0.01 [0.02]
Observations	603	597	603	593	603	597
R-squared	0.16	0.21	0.19	0.28	0.04	0.02

Source: Authors' calculations.

Notes: Robust standard errors in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The sample is T2, T3, and T4.

6. SUMMARY AND CONCLUSION

Individuals in developing countries, and especially in Africa south of the Sahara, have limited access to financial products that help mitigate the numerous risks they face. A fast-growing literature shows the high demand for and significant impact of health, weather, and crop insurance (Cole et al. 2013; Karlan, Osei-Akoto, et al. 2014; Dercon et al. 2014; Thornton et al. 2010; Delavallade 2014) as well as of savings products (Dupas and Robinson 2013). However, and while this is a pressing policy question, literature is still scant as to which of these financial products might be the most efficient at favoring risky investment, fostering agricultural production, and improving welfare. This paper addresses this question in the context of a field experiment conducted simultaneously in rural areas of Senegal and Burkina Faso between June and August 2013. Eight hundred participants were randomly offered one among four financial products—weather index insurance, low-commitment agricultural investment savings, high-commitment agricultural investment savings, and high-commitment emergency savings.

Insurance was found to have the most consistent impact on input use and purchase. As a result, yields were higher for those who bought more insurance. There is some evidence that as a result individuals who were offered insurance were better able to manage risk.

We found significant gender differences in take-up. Women invested significantly less in the insurance product. Given the impact of purchasing insurance on agricultural investment, yields, and well-being, our results suggest that this lower take-up of agricultural insurance disadvantages women. The reason hypothesized for this lower take-up among women is the fact that women face higher levels of risk that is uninsured by a rainfall product and that directly impacts the yield they realize (as well as other outcomes)—for example risks of childbirth as a result of very high fertility rates or risks of lost income and production as a result of caring for sick children. In an environment in which these costs are uninsured and fall primarily on women, a rainfall insurance product carries less value for women than for men. Further work is needed to understand whether this is indeed the main factor behind the gender difference in demand and, if it is, to understand how financial products can be better designed to meet the different risk needs of women.

Our findings are consistent with previous studies showing individuals' preference for savings products offering liquidity in the presence of labeling (Dupas and Robinson 2013).

APPENDIX: PROTOCOLS

Experimental Sessions and Baseline Survey Protocol

Listing of Groups

Candidate villages will be identified. Groups in the villages will be listed during sensitization using the **group listing document**. The listing does not need to be complete, but enough groups need to be identified to make the implementation of the fieldwork possible. The criteria for the selection of groups are clearly marked on the sampling form:

- Farmers owning less than 6 ha of land. This rule applies to a group on average. Therefore select only farmers' groups that have mostly (not necessarily all) farmers with less than 6 ha. This does not apply to ROSCAROSCAs, just to farmers' groups.
- For ROSCAROSCAs, it is important to determine whether the ROSCA is currently meeting regularly. This will be done by ascertaining whether it meets every month and whether its last meeting was indeed held in the last month. All groups need to have someone that can be relied upon to keep money saved by members. This is often an active treasurer. The main village where members of the group/ ROSCA are from will also need to be identified.

Selection of Groups

Using the list of groups on the **group listing document**, groups will be selected for the fieldwork, and the survey and experiments scheduled according to the following guidelines:

- No more than two sessions per village [*to limit learning*]
- No more than two sessions per farm group or ROSCA [*to limit learning*]
- If group or ROSCA is less than 45 people, schedule it for one experimental session (with an aim of collecting 20 completed surveys and experiments for this group)
- If group or ROSCA is more than 45 people, schedule it for two experimental sessions (with an aim of collecting 40 completed surveys and experiments for this group)
- Use the preceding rules conditional on there being an equal number of sessions for ROSCA and farm groups (10 sessions of each)
- Use large groups when possible [*this helps for logistics, dealing with one farm group as opposed to several*].

Once the schedule has been put in place, the group leaders will be called so that they are aware they have been selected and that they and the group treasurer will be asked to meet with the survey team, provide a list of members, and discuss logistics.

Village-Level Randomization

Once the schedule has been put in place, the Principal Investigators will determine randomized insurance payout size and savings interest rates across villages.

Meeting with Group Leaders and Selection of Households

- At the beginning of survey work, the survey team will meet with the group leader and ask for a list of members of the group
- Depending on whether one or two sessions are being held for the group, 20 or 40 members will be selected for participation in the study (20 for each experimental session held with the group). The selection will be done in front of the group leader (and other group members if deemed necessary to ensure transparency).
- The members will be selected as follows:
 - All group leaders will be included in the sessions.

- Ordinary group members will be randomly selected using random number tables / random draw until 20 members in total from the group (including the leaders) have been selected.
- Supervisors will keep a list of all members and will record the status of the leaders and identify clearly which members have been selected.
- If selected members are not available during the survey time or refuse to participate, they will be replaced with additional randomly selected members.
- If it is proving difficult to ensure that all 20 surveyed households participate in the session to which they were assigned, then for future sessions more than 20 households will need to be surveyed in each group (the survey budget will be increased accordingly).
- At this meeting, the group treasurer will also be given some instructions on the experiment and what is being asked of him or her regarding the group savings treatments. The **instructions for treasurers**, **treasurer form (ag)**, and **treasurer form (emergency)** will be used for this purpose.

Survey

- The survey respondent is the member of the group/ROSCA, not any other household member.
- The respondent will be asked for consent for the study prior to the survey using the **consent form** approved by IFPRI's Ethics Institutional Review Board.
- The **questionnaire** will be conducted using PDAs according to the survey protocol put in place by the Samba (Senegal) / Innovations for Poverty Action (Burkina Faso) field team.
- At the end of the survey the respondent will be given an **information voucher** with the information about the experimental session that he or she is to attend. The voucher will also record the participant's first time preference choice.
- Supervisors will record the name of all surveyed members and their identifying information on the **experimental record** before the experimental session is to be held.

Experiment Registration

- Before the beginning of the experimental session, the identities of the attendees at the games will be cross-checked against the list on the **experimental record** by the experiment supervisor.
- Attendees will provide the **information voucher** that they received, and they will receive any payment for time preference choices that they are owed by the experiment supervisor. If payments are made, vouchers will be collected by the supervisor as a receipt of payments made. Vouchers will be returned to the members whose payments are due in one month.
- Once identified, attendees will be provided with an **envelope containing 6,000 FCFA**. Attendees will be told that this is money that they will use during this meeting and that we are going to explain how they will use this money during the meeting.

Experiment: Common Information Sessions

The following information is provided to everyone in a joint session using the **script**:

1. Introduction of the research team and the background of the project
2. Introduction of endowment: You have been given an envelope with 6,000 FCFA. This is your money. We will describe to you how you can use this money today.
3. The participants will be told that they will be split into four groups and each group will hear a description of a way that they can use their money that might help them invest in agricultural production or that might help them manage risk. *[This will be as broad as possible, being careful to not give any specific details about the types of financial products so that we avoid any*

alteration of behavior that results from comparing the product offered with the other set of options.]

4. Explain their rights as participants: Participants will be told they are free to leave at any point in time, but that if they leave before the end of this meeting, they should hand the envelope to the supervisor at the door.
5. Introduction of risk: We are going to be speaking about risk today. We face many different sources of risk. Will the rains be good this year? Will my crop be affected by pests? Will I have good health over the next months? If things are good, then we do well and life is good; if events are bad, then life becomes more difficult. Risk also affects how much we earn from the effort we put into different activities. If we invest in groundnut production but the rain does not come, we get less money for the effort we put in. If we invest in our trading business but people do not have money to spend, we get less money for the investment we make.
6. Risk game: A game will be played to show how random chance can affect the return on different choices. Five lotteries will be explained to participants. The participants will be shown what will happen if the outcome is heads and what the outcome will be if it is tails, using a **risk game poster/handout**. Participants will be asked to choose which lottery they would choose to play. Each participant is asked to go to the back and to say to the supervisor which lottery he or she would choose to play. The supervisor records the responses on the **experimental record**.
7. Input fair: Participants will be told that we will come back in one month and have an input fair where the local input supplier will be available with three types of input to sell. The three inputs that will be available will be described.

Experiment: Assignment to Treatment

- After the joint information session, a bag that contains as many numbers as nonleaders (equal sets of the numbers 1, 2, 3, and 4, representing the product that they will be offered³) is circulated in the room and each nonleader participant chooses one number from the bag. Again the **script** will be used to explain this procedure to participants. Leaders (treasurers, presidents), identified in the **individual listing document**, draw their number from a separate bag containing one of each of the four numbers.
- The number chosen by each participant will be recorded on the **experimental record** by the experiment supervisor.
- Each participant is told to go to a given area of the room based on the number he or she has selected. In this way assignment to treatment is randomized at the individual level and stratified by experimental session and by leadership status.
- Individuals break out into four groups of five people each. An enumerator (or trainer) will be assigned to each of the groups.

Experiment: Small-Group Sessions

- The **script** will be used for the presentation of material in the small-group sessions.
- Individuals are first asked to think about people in the room that they discuss financial decisions with; they are asked to think of three people.
- Available enumerators record the names of people with each participant in private. They fill in the **in-sample network form** to do this and hand it in to the supervisor. The supervisor codes responses, leaving any remaining queries for clarification with the participant when he or she leaves the session.

³ If the number of nonleader participants is not a multiple of four, we randomly select the remaining numbers to be included, ensuring overall balance between treatments.

- The specific product is explained to the individuals (see descriptions of each of the treatments below). The participants decide how much of their 6,000 FCFA endowment they want to take as cash and how much they want to put into the product. This will be done in 500 FCFA denominations.
- After the product is explained, participants can ask questions of the experimenter for clarification. They are reminded that it is an individual decision and that they have to decide what is good for them and their family.
- Once they are ready to make their decision, they should go back to the supervisor to let him or her know what they have decided and to record their choice.
- After recording their choice, they leave.

Insurance (T1): The insurance treatment is a weather-based index insurance scheme / NDVI in Burkina Faso. The product will be offered by IFPRI, but we will leverage the group context (farmer groups and ROSCAs) to partially mitigate trust issues. Payouts will be handled by IFPRI directly. The insurance payout will be randomly varied across villages (that is, 10 different payout structures for each of the 10 villages). The participants will be explicitly told that the payout has been randomly chosen but that everyone in the village faces the same payout. These payouts will have to vary across villages such that we get representations of actuarially fair, unfair, and favorable insurance schemes.

Low-commitment agricultural investment (T2): Participants who are assigned to this treatment and opt to take this treatment will put their money in an envelope that is sealed and stamped. The savings amount in this lockbox will be earmarked for input purchases on input day. Three inputs will be offered to participants and they can choose which one they commit to.

High-commitment agricultural investment (T3): Participants who are assigned to this treatment and opt to participate in this treatment will decide how much money they want to designate to save for input purchase (on input day), but as opposed to T2, the savings will be managed by the farmer group or ROSCA treasurer. Three inputs will be offered to participants and they can choose which one they commit to. If a participant wants to withdraw the savings amount for the earmarked value, she or he will have to go through the treasurer. To withdraw money, participants will have to take their passbook to the treasurer, who will record the date, amount withdrawn, and purpose, and both the participant and the treasurer will sign the record of the transaction. The treasurer will be encouraged not to give out the money before input day. Participants will not be able to add to the amount, but they will not have to take it all at once.

High-commitment emergency expenses (T4): Participants who are assigned to this treatment and opt to participate in this treatment will decide how much money they want to designate to save for emergency expenses, and the savings will be managed by the farmer group or ROSCA treasurer. To withdraw money, they will have to take their passbook to the treasurer, who will record the date, amount withdrawn, and purpose, and both the participant and the treasurer will sign the record of the transaction. The treasurer will be encouraged not to give out the money unless the participant needs money for an emergency. Participants will not be able to add to the amount, but they will not have to take it all at once.

Interest will be paid on both of the high-commitment savings products (T3 and T4). This interest will be paid only once, on input day, for a given village. If, based on the treasurer's accounts, the individual kept the savings in the farmer group or ROSCA lockbox the entire period from the day of the experiment to input day, then the interest on the savings is paid. No interest is paid after input day. The interest rate for the high-commitment savings products (T3 and T4) will be randomly varied across villages. So we will have 10 different interest rates, one for each of the 10 villages (that is, 1 percent to 10 percent in intervals of 1 percent).

Experiment: Exit

- As participants leave, they tell the supervisor their decision, and their decisions are recorded on the **experimental record** as follows:
 1. Insurance: Decision is recorded, money is taken, **insurance vouchers** are provided, and their serial numbers are recorded.
 2. Lockbox: Decision (amount of fertilizer to be bought) is recorded, money for inputs is put in an **envelope**, the amount and purpose is written on the envelope, and the envelope is sealed and stamped.
 3. Fertilizer through group: Decision (amount of fertilizer to be bought) is recorded, money is taken to be given to group treasurer, and an agriculture passbook (**pass card for group savings [ag]**) is provided to the participant to record this decision.
 4. Emergency savings through group: Decision (amount to keep for bad day) is recorded, money is taken to be given to group treasurer, and an emergencies passbook (**pass card for group savings [emergencies]**) is provided to the participant to record this decision.
- The supervisor then flips a coin to determine what the participant gets paid for the risk game. This result gets recorded by the supervisor on the **experimental record**. Participants will be paid additional money earned in the risk choice game.
- Any questions arising from coding the network membership of the participant will be clarified on the **in sample network form**.
- All participants sign the **experimental record** to confirm choices made and the amount of money they are leaving with.

Meeting with Treasurer at End of All Experimental Sessions for That Group

- At the end of all of the experimental sessions with one group, the experimental team will meet with the group treasurer and go through the **instructions for treasurers** again.
- All money that has been given to group savings will be given to the treasurer, and the **treasurer form (ag)** and **treasurer form (emergency)** will be filled in using the experimental record.

Input Fair at End of July

[Note: This work has not been contracted and will be refined further after the initial experiment has been completed.]

- Group leaders will be told the details of the group fair and asked to communicate them to members.
- All members that arrive from T3 or T4 will be paid their money and the interest they are owed by the treasurer.
- Time preference payments will be made.
- Inputs will be offered to all members.
- Inputs purchased by all members will be recorded by the research team.
- Consumption and time use data will be collected on all members by the research team. Members that do not show up at the fair will be visited at their house in order to collect consumption data.

Harvest Visit at End of Year

[Note: This work has not been contracted and will be refined further after the initial experiment has been completed.]

- Group leaders will be told that the insurance data are going to be presented. The group leader will be told if there are going to be payouts. The group leader will be asked to communicate this information to members.
- The rainfall/NDVI data will be explained.
- Any insurance payouts will be made.
- Time preference payouts will be made.
- Data will be collected on harvest outcomes and consumption, and attitudes toward financial products.
- Control and peer households will also be visited and surveyed.

Input Fair and Midline Protocol

The input fair is scheduled in each village, with one or two villages per day, between 25 and 35 days after the information session, depending on scheduling constraints. At that time, in addition to making input supplies available to participants (who get priority) and nonparticipants (within transport constraints of about 1 ton per village), the following tasks will be performed:

- Payment of time preferences for questions A 13 and A 14 of the baseline survey
- Payment of interest for T3 and T4 (see Experimental Sessions and Baseline Survey Protocol)
- Check of envelopes (T2: Has the seal been broken?)
- Setup and recording of decisions on T4+ (see details below)
- Performing midline survey with participants and a random control group (see details below)

CALLS/CONTACTS TO MAKE BEFORE THE FAIR

Village Leader

Information about the Fair

The village leaders are recontacted before the fair to repeat information about the process of the fair. They are reminded that although information session participants will have priority on what is brought to the village, up to 6,000 FCFA each, nonparticipants also have access to whatever is not sold to participants that day, at the same conditions (market price and packaging).

Information about the Midline Survey

Village leaders are also informed that a midline survey will be performed at the time of the fair, possibly spilling over afterwards. The random selection process for nonparticipants is also explained at that time.

Group President

Payment of Time Preference for All Participants

Group presidents (one or two per village) are asked to remind their members to come to the fair in order to be paid by the experimenters (IFPRI's representatives) the amount that is owed to them regarding time preference questions A 13 and A 14 of the baseline survey.

Fair Input Demand Information

Group presidents are asked to collect information from *all participating members* (T1, T2, T3, and T4) about types and quantity of inputs they wish to purchase at the fair (although without needing to commit to a purchase) up to a value of 6,000 FCFA each.

T2 Participants and Envelopes

The group president is asked to remind T2 participants to come with their **envelope** (even if the seals are broken) to the fair. A list of those participants is communicated to the president.

Information about the Midline Survey

Presidents are also informed that a midline survey will be performed at the time of the fair, possibly spilling over afterwards. The random selection process for nonparticipants is also explained at that time.

Group Treasurer

Payment for T3 and T4, Closing of T3 and T4

Group treasurers (one or two per village) are contacted and reminded to bring the savings money and the two **treasurer forms (ag and emergencies)** to the fair. They are also asked to contact savings participants listed on the **treasurer forms** and remind them to come to the fair to collect the money in their account from the treasurer and their interest payment from the experimenters (IFPRI's representatives). Savings participants should also be reminded to bring their individual **pass card**.

Introduction of T4+

Group treasurers are informed about the extension of T4 for another three months and asked if they are willing to carry out the additional task.

Supplier

The input supplier is contacted to ensure delivery of inputs demanded by participants (at least) and reconfirm fair schedule and participation of one of its sales agents.

EXPERIMENTAL FOLLOW-UP AT THE FAIR

Participants coming to the fair will first collect their time preference payment(s) and follow the procedure outlined below according to the treatment (T1, T2, T3, or T4) they were assigned:

Meeting with Treasurers

Treasurers are read the **T4+ instructions to treasurers** form, and their participation is confirmed. Also, we check that they have the money and the records for the accounts.

Payment of Time Preferences

A **time payment form** contains the names and ID codes for all participants and the amount that is due to them for questions A 13 and A 14 of the baseline survey. Participants are paid and acknowledge payment of what they are owed by signing the same form.

Procedure for Each Treatment

T1 participants proceed directly to counter (C).

T2 participants turn in their envelope. Whether the seal is broken or not is recorded on the fair experimental record. They then proceed to (C).

T3 participants close their savings account and receive, from the treasurer, the money left on the account:

Check records.

That the amount on the pass card and the treasurer form (ag) match.

That no amount was added either on the pass card or the treasurer form (ag).

Record amount left on the account.

The amount left on the account, which is paid out by the treasurer, is recorded on the fair experimental record.

Pay interest due and record.

Participants are paid the village-relevant interest rate on the amount left in the account. That payment is also recorded on the fair experimental record.

Sign receipt on fair experimental record.

They then proceed to (C).

T4 participants do as T3 participants, but in addition they are offered the possibility to leave any amount, up to what they still have in their savings, for an additional three months and receive an additional three months' worth of interest (conditions of early withdrawal and no deposits are same as in T4). See T4+ instructions to treasurer form:

If they don't take on T4+, the payments they receive are recorded on the fair experimental record; proceed as in T3. These do not receive a T4+ pass card and are not recorded on the T4+ treasurer form.

If they do take on T4+, the first interest payment (the one due at the fair) is made and recorded on the fair experimental record as in T3. Their decision regarding T4+ is recorded on the fair experimental record in two parts: (1) how much they want to put in the extension T4+ savings account, up to what was left in the T4 account, and (2) as in T3, how much they are withdrawing that day from this account. (1) + (2) = what was left in their T4 account.

Additionally, the new account information is recorded on the T4+ pass card and the T4+ treasurer form.

They then proceed to (C).

Access to the Fair

Each participant in the baseline survey and information session is given a **token** (or card) confirming they get priority access to fair supplies if they make their purchase immediately. Forty such **tokens** will be generated for each village, with the name of the village and date of the fair. They are only valid on the day of the fair at a given village (and thus cannot be used at another village).

INPUT FAIR ITSELF

Once all participants have completed the steps above, have received a **token**, and have been given the appropriate time to complete their purchase, only **token**-holding people can purchase inputs from the supplier salesperson.

The location of the salesperson is away from the location where information is recorded is performed. An experimental assistant next to the sales point collects **tokens** before participants interact with the salesperson, but no experimental person is involved in the purchase itself. The physical position of the experimental assistant must reflect his or her separation from the sale itself.

MIDLINE SURVEY

Participant Postfair Survey

This is a 15- to 20-minute survey of all participants attending the fair, after they have completed their purchases. It should not look like the survey team is checking what people have purchased but, rather, that they are checking how things might have changed in the participants' households since the baseline survey. It might be a good idea (although maybe not a practical one) to match enumerators with people they surveyed before.

If time allows, the survey team will also try to survey selected nonattending participants; otherwise, this will be completed after the fairs.

Nonparticipant Survey

Ten nonparticipants from the groups selected at baseline in each village (5 each group if there are two groups in a village) will be randomly selected, following the same random procedure as in the baseline.

Survey Itself

This is a 30- to 45-minute survey. It should be given after nonparticipants have completed their purchase, if any. People who are not attending the fair may be tracked later.

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