

Savings, Subsidies and Sustainable Food Security: A Field Experiment in Mozambique

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Abstract

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

Introduction

Kenya, Malawi, Rwanda, Zambia and other sub-Saharan African countries have implemented large-scale fertilizer subsidy programs to boost food security and small farm productivity.

Motivated by the recent escalation in food prices, other countries in the region and around the world are also considering fertilizer subsidies, making it all the more important to shed light on the impacts that such programs have on both short- and longer-term farm output and household consumption. The recent implementation of a fertilizer subsidy program in Mozambique offers an important opportunity to learn about the efficacy of such programs—how to make them more effective, as well as whether alternative approaches to subsidizing farmers might work better.

While there are a number of reasons why subsidies might be needed to jump start the uptake of fertilizer and improved technologies¹, an open question is whether one-time or temporary provision of subsidized fertilizer can set households on a long-run positive growth path, or whether input utilization and farm output eventually return to previous levels after subsidies are phased out. This graduation question is especially important from the perspective of long-term poverty dynamics in Africa.

There is also very little evidence on how the impacts of fertilizer subsidy programs compare with programs that subsidize savings but leave farmers free to choose how accumulated savings are to be used.

New thinking on the constraints to savings suggests several kinds of interventions that should facilitate this transition from subsidies to sustained agricultural growth. To evaluate these interventions, we will use a combination of survey data and administrative information, such as savings balances, to assess their impacts.

This research project will ask three sets of interrelated questions:

- The impact of fertilizer subsidies: What is the impact of subsidized fertilizer provision to smallholder farmers?
- The impact of savings facilities and savings matches: What is the impact of offering savings facilities to smallholder farmers? How effective are higher interest rates (savings “matches”) at increasing savings? How do the impacts of such interventions compare in the long-term with the impacts of fertilizer vouchers?
- The interaction of fertilizer subsidies and savings: Can the long-run impacts of fertilizer subsidies be enhanced by the simultaneous provision of savings facilities?

¹ For example, farmers may be caught in a low income trap and lack the liquidity needed to finance adoption of fertilizer and fertilizer responsive varieties. Farmers may also have little experience and direct knowledge of the potential of these technologies, and a short term subsidy may be the nudge needed to induce the large scale adoption needed to achieve rapid learning and sustained uptake.

Key outcomes for impact assessment related to the above questions include farm output, household consumption, and other indicators of household well-being (such as nutrition, health, and child schooling) in both the short and longer term.

To isolate the impact of a particular intervention from other confounding factors, the statistical gold standard is to perform an experiment with randomized treatment and control groups. Each farmer club is randomly assigned to either a control group or one of several treatment groups as described below. Random assignment allows us to identify the *causal* effect of the interventions, as opposed to differences between farmers that are due to other factors.

Matched savings mechanism

The matched savings products offered will provide clients with bonus amounts as percentages of their average savings balances during a defined “match period”. The product design elements are as follows.

Match period: Interest earned is based on average balance from July 1 to Oct 31 inclusive.

Maximum match: For each farmer, up to MT3,000 will be matched at the assigned match rate. This amount allows each farmer to afford at least the amount of inputs provided in the FAO fertilizer package.

Rules for matched savings accounts (these do not apply to control group):

- Accounts must be opened by July 1 and must have a minimum balance of MT300 during the entire match period to earn the offered interest rate.
- Account opening fees are waived.
- MT300 minimum interest-earning account balance is paid by the project as an advance on interest earned during the match period. (BASIS will bear this cost for clients that do not save enough to earn this much interest.)
- Deposits and withdrawals can be made any time.
- The match is made via cash transfer into the account very shortly (within one week?) after the end of the match period.
- We would not require that the match be used for specific purposes (e.g., fertilizer). Farmers would be free to use the match for any purpose.

Match rates: see Treatment Groups below.

Sample

We will work with two samples of farmers. The first sample is the “main sample”. The main sample should be composed of farmers who have access to some type of extension service so that they have information on how to use fertilizer if they choose to do so. They may be farmers who are working with NGO or government extension agents.

- This sample will be created in conjunction with local NGOs and government extension workers.
- Farmers included in additional sample should be in groups of 15, with no more than one group per village.
- Because the savings product is designed to promote savings between the typical harvest and planting seasons (from ~June to ~November), farmers should be in areas that are dependent on rain for agriculture (irrigated areas should be excluded).
- Voucher recipients may be included in the additional sample, but there will be no attempt to oversample such individuals; they should be included in the additional sample in proportion to their share of the sampled population.

The second sample is the “voucher randomization sample” (VR sample for short), where farmers were randomized into and out of the FAO voucher program. This sample will allow the project to examine the interaction between voucher receipt and the savings incentives. Current estimates are that this sample will include 1,300 farmers, with roughly 15 farmers per group on average.

For the main sample, randomization into the control and treatment conditions will stratify by locality (posto administrativo) and week of initial visit. For the VR sample, an additional dimension of stratification will be voucher randomization status (randomized in or out of voucher receipt).

Treatment Groups

To avoid potential conflicts and objections if individuals in a village are offered different match rates, randomization will be carried out at the village level.

The control group is *Treatment 0*. Farmers are surveyed but not offered any saving facilities. However, they will not be prevented from opening accounts on their own at BOM service locations if they choose to do so.

The treatment groups are as follows:

Treatment 1: Offered savings match at standard BOM savings account interest rate.

Treatment 2: Offered 25% savings match

Treatment 3: Offered 50% savings match

Treatment 4: Offered savings match with group incentive: match rate rises in average account balance of the club.

- For balance below Threshold 1, all accounts earn regular interest rate
- For balance equal to or exceeding Threshold 1 and below Threshold 2, match rate is 25%
- For balance equal to or exceeding Threshold 2, match rate is 50%
- Threshold 1 is MT10,000, and Threshold 2 is MT20,000

To be clear, the “match rate” is the percentage of the average balance in the account that will be contributed by the project at the end of the match period; it is not an annual percentage rate. For example, for a 50% match rate, if the a study participant has maintained an average balance of MT2,000 over the match period, the project will add MT1,000 (50% of MT2,000) to the participant’s account at the end of the match period.

Treatment conditions for the main sample are simply Treatments 0 through 4 above.

Treatment conditions for the VR sample are stratified by whether the club or farmer was randomized into voucher receipt, and are as follows:

Table 1: Treatment Conditions for VR sample

	<i>No savings offered (savings education session only)</i>	<i>Offered match at regular savings rate</i>	<i>Offered savings with 50% match rate</i>
<i>Randomized into fertilizer voucher receipt</i>	Treatment Y0	Treatment Y1	Treatment Y3
<i>Not randomized into fertilizer voucher receipt</i>	Treatment N0	Treatment N1	Treatment N3

Treatment N0 is the overall control group, receiving neither vouchers nor savings account offers. Assessing the impact of vouchers alone will involve comparison of Treatments N0 and Y0. Assessing whether the offered savings programs are more effective when preceded by vouchers involves comparing Treatments N1 and Y1 (for the regular savings offer) or Treatments N3 and Y3 (for the 50% savings match offer).

Sample size considerations lead us to examine only the 50% match rate (and not the 25% match rate or the group incentive) in the VR sample. Therefore, we do not have Treatments Y2, N2, Y4, or N4.

Statistical power

The study must include a sufficient number of units so that outcomes across treatment groups can be statistically distinguished from one another.

We believe a main sample of 1,700, in combination with the VR sample of 1,300, provides sufficient statistical power. With a total of 3,000 farmers in groups of 15 farmers each on average, we will be working with 200 farmer groups in total.

We propose dividing farmers into treatment groups as in Table 2 below.

Table 2: Summary of sample sizes

	Treatment group					<u>Total</u>
	<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	
Match rate		3%	25%	50%	Varies*	
Farmers in main sample	340	340	340	340	340	1,700
Farmers in VR sample						
Voucher	289	289		289		867
No voucher	144	144		144		433
Total farmers	773	773	340	773	340	3,000
Total clubs	52	52	23	52	23	200
Percentage of sample	26%	26%	11%	26%	11%	100%

* Based on total savings in group.

Consider a continuous dependent variable such as savings, kilograms of fertilizer used, or per capita household income. We take the minimum effect size that we intend to distinguish from zero as 0.2 of a standard deviation at the 5% level of significance, assume an intraclass correlation coefficient of 0.05, and assume farmers are randomized in groups of 15.

Power is 0.85 for comparisons across treatment conditions with 52 groups each, such as between Treatment 0 (the control group) and Treatment 1 (regular savings rate), between Treatment 0 and Treatment 3 (50% match), or between Treatment 1 and Treatment 3.

(Need to do power calculations for the case where Treatments compared have unequal numbers of clubs, such as Treatment 0 vs. Treatment 2 or 4. A lower bound of power would be to assume that each treatment condition has just 23 clubs, in which case power under the above assumptions is 0.51. However, if we assume a treatment effect of 0.3, power is 0.84.)

Field Work

The project team will carry out the field work between March 15 and April 30, 2009. The field work has two components: 1) the baseline survey, and 2) the savings intervention.

Baseline survey

Surveys will be administered to all members of farmer groups prior to the savings orientation meeting. To save on transport costs, the savings intervention (see below) would ideally occur while the survey team is still at the village, immediately after completion of surveys for that group.

A list of farmers that we seek to interview and include in the study should be provided to the farmer group in advance of the project team visit.

The project team will attempt to survey all farmers that are in the predetermined list, but will be allowed to find substitute farmers if the farmers on the original list could not be located.

The household survey will measure our key outcome variables (by which we measure success of the interventions) as well as control variables that will increase the precision of the analysis. The following will be key outcome variables:

- Per-capita income and expenditures (a measure of household economic well-being)
- Maize yields and use of seed varieties and fertilizers
- Creation and use of savings accounts

Design of the survey will take into account feedback from our key collaborators (IFDC, BOM, and the Manica Department of Agriculture). We will also draw upon past surveys that have been implemented in Mozambique and elsewhere, such as the Ministry of Agriculture/Michigan State TIA (Trabalho De Inquérito Agrícola) surveys and the INE's IOF (Inquérito Aos Agregados Familiares Sobre Orçamento Familiar) surveys. We anticipate being able to use core modules from these surveys, adding in additional modules needed for our work. A likely survey structure is as follows:

- Precise location [using GPS]
- Family demographic structure, educational attainment, etc. [TIA or IOF]
- Maize Technology Use, Production and Sales [simplified version of TIA]
- Households Expenditures and their composition, including sub-modules to measure frequent purchases as well as less frequent purchases, value of housing, etc. [IOF]
- Assets
- Savings Module [new module/based on Malawi study]
- Social Networks [new module/based on Malawi study]
- Discount rates and attitudes toward risk [new module/based on Malawi study]

Use of the IOF consumption module should allow comparability between our results and the national per-capita expenditure distribution. This comparability will allow us to say something about the targeting of the voucher and savings

Savings orientation meeting

Only farmers who complete the baseline survey will be invited to participate in the savings orientation meeting.

- In all groups (treatment as well as control), farmers are given a presentation and led in group discussion about the importance of savings. The orientation emphasizes the importance of saving part of one's harvest proceeds for fertilizer and other agricultural inputs in the next harvest season. Farmers are also given specific information about and a strong recommendation to use the FAO fertilizer package for maize.
- Farmers are also given information on BOM savings services and told the location (and, if relevant, scheduled Bancomovil service days) of the nearest BOM service point.
- Accounts are offered in a farmer group meeting after all farmers have completed the baseline survey.
- The meeting will be run by BASIS project staff (in collaboration with BOM and extension agents should their schedules permit).
- Project staff will assist interested farmers in filling out account opening forms, which farmers then need to bring to a BOM branch or Bancomovil with their initial deposit.
- For farmers offered savings accounts, a simple table will be provided giving several examples of amounts one might save and the match provided at the end of the match period. The table will also illustrate the effect on one's match of withdrawing savings before the end of the match period, or of depositing late (after the beginning of the match period).
- To maximize farmers' comfort with the accounts, they should be invited to the BOM branch and/or Bancomovil location on a specific date approximately one week later so that they can open accounts and experiment with them prior to match period. Project representatives will be at the branch/Bancomovil on these prespecified days to assist clients with account opening and answer questions.
 - o To minimize cross-treatment contamination, groups with different match rates should be invited to this session on different dates when possible. (This may only be easy to do for farmers who are served by a physical BOM branch.) From week to week, the day of the week should also be randomized for all those in the same treatment group (e.g., the 25% match rate treatment group should not always be invited on Tuesdays; this will eliminate day-of-week effects).

Schedule of Project Activities

Under the project, we anticipate a sequence of at least three surveys: one at baseline, one after each of years 1 and 2. Consumption in rural areas shows significant seasonal variation, so it would be preferable to always undertake our surveys at the same time of the year.

Sep 2009	Farmers in VR sample randomized into various treatment conditions that determine receipt or non-receipt of fertilizer subsidies.
Oct 2009	Vouchers distributed.
Nov – Dec 2009	Develop detailed project plan, savings product designs, and savings educational materials. Reach agreement among all key partners.
Jan – Feb 2010	BOM modifies I.T. and other systems to handle new savings facilities.
Feb 2010	Training of BOM and field staff in new savings facilities.
Mar – Apr 2010	Baseline survey of all study households. Savings interventions administered.
May – Jul 2010	Crop sales. Farmers make deposits into bank accounts.
Jul 1 – Oct 31, 2010	Savings match period.
Nov 2010 (exact date TBD)	Savings matches deposited into accounts of study participants.
Mar – Apr 2011	1 st follow-up household socioeconomic survey.
Mar – Apr 2012	2 nd follow-up household socioeconomic survey.