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Grain today, gain tomorrow: Evidence from a storage experiment with savings clubs in Kenya☆

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ABSTRACT

Many farmers in the developing world lack access to effective savings and storage devices. Such devices might be particularly valuable for farmers since income is received as a lump sum at harvest but expenditures are incurred throughout the year, and because grain prices are low at harvest but rise over the year. We experimentally provided two saving schemes to 132 ROSCAs in Kenya, one designed around communally storing maize and the other around saving cash for inputs. About 56% of respondents took up the products. Respondents in the maize storage intervention were 23 percentage points more likely to store maize (on a base of 69%), 37 percentage points more likely to sell maize (on a base of 36%) and (conditional on selling) sold later and at higher prices. We find no effects of the individual input savings intervention on input usage, likely because baseline input adoption was higher than expected.

1. Introduction

Over one billion people are employed in agriculture worldwide (World Development Report, 2008), and like many of the world's poor, the vast majority of these farmers lack access to good savings instruments (Demirgüç-Kunt et al., 2015).[1] A spate of recent research studies has shown that providing households with savings accounts can increase cash savings, particularly among micro-enterpreneurs who generate cash income.[2] In contrast, research on the effect of providing savings services to farmers has been sparse.

However, there are several potential reasons to believe that farmers' saving challenges are unique and deserve attention. First, most farmers receive the bulk of their income as a single lump sum soon after harvest, and then need to gradually draw on this over the rest of the year to meet anticipated and unanticipated cash needs. This is a particularly daunting task in the absence of financial instruments and many farmers struggle. For instance, Mullainathan and Shafir (2014) document that sugarcane farmers in India have a 4% likelihood of having pawned something to meet cash needs in the month after harvest, and that this likelihood climbs up to 78% in the month just before harvest. Second, rural farmers, particularly in Africa, are part of kinship networks with

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[1] According to the 2014 Global Findex Report, about half of the world's farmers lack access to a basic bank account or mobile money account. In our study context of western Kenya, less than a quarter of the farmers in our sample have a bank account and two-thirds have a mobile money account.

[2] See Prina (2015) and Dupas et al. (2017,2018 for a review of recent savings studies.

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deeply embedded sharing norms (Collier and Garg, 1999; Baland et al., 2011), which can make saving challenging (Dupas and Robinson, 2013a; b).[3] Third, unlike cash, agricultural commodities display large price fluctuations over the season, from post-harvest lows to pre-harvest peaks,[4] implying that farmers would be better off saving grain instead of selling output at low prices soon after harvest. However, storing grain brings the additional challenge that it may be spoiled by pests or consumed.

In this paper, we evaluate the effect of a savings experiment geared towards addressing the special savings needs of farmers, and administered via farmers' existing savings clubs (Rotating Savings and Credit Associations or ROSCAs) in Kenya. The experiment was designed around two ideas. First, we designed a product to make it easier to store maize after harvest, which we called the Group Savings and Reinvestment Account (GSRA). We encouraged randomly selected ROSCAs to set aside maize together in communal bags, stored at a single member's house (usually the ROSCA treasurer). In order to facilitate this, we provided GSRA ROSCAs with storage supplies, namely triple-layered plastic bags capable of being hermetically sealed and designed specifically for the purpose of grain storage,[5] and a heavily subsidized wooden stand to keep the maize elevated from the ground (and less susceptible to pests and water damage). In order to enable record-keeping of maize deposits and withdrawals, we supplied a ledger book to log transactions, to be maintained by the ROSCA treasurer. We also provided encouragement that the stored maize be used for later sale, and the proceeds from the sale be used for reinvestment in the farm via input purchases. We hypothesized that moving the maize out of farmers' homes would make it less prone to being claimed by others or falling prey to temptation. Moreover, separating this portion of their maize-holding from the rest of the stock, and mentally allocating it to the purpose of "later sale for buying inputs" (i.e., labeling) might increase savings.[6] The GSRA intervention is thus an amalgam of the physical technology (bags and stand) aimed at minimizing spoilage, the mental accounting aspect from labeling, and the social or interpersonal channel due to the ROSCA storing grain as a collective.[7] The ultimate goal of this combined technology is to increase the amount of maize stored for later use and to increase cash income from maize sales at a time when maize prices have risen.

Second, we designed a cash savings product which was meant to take advantage of mental accounting through allocating the saved money to a pre-specified purpose. We called this the Individual Savings and Reinvestment Account (ISRA). This product was inspired by the health savings accounts held at ROSCAs in Dupas and Robinson (2013a), but was configured towards inputs. A recent paper by Carter et al. (2013) is also based on a similar idea of utilizing mental accounting for saving up for inputs, but through individual mobile money accounts, and therefore, does not harness the social commitment aspects of saving with the ROSCA. In each ROSCA, we provided guidance to people to set up an account with the ROSCA in which they could save cash towards a goal, and similar to the GSRA, we encouraged that the goal be farm reinvestment, i.e., input purchases. The treasurer kept a ledger of all transactions.

The final feature of the experimental design was the provision of coupons for discounts on inputs at the local agricultural input retailer. In every ROSCA, enumerators distributed coupons which could be redeemed at their local shop. The price of the coupon was randomized (from 10 to 90% discount), at the ROSCA level. The rationale for this intervention was to spur fertilizer investment, and to be able to examine the effect of the savings interventions on input usage through administrative data on redemption alone.[8]

We have five main findings. First, take-up of both the GSRA and the ISRA was high: records kept by the ROSCA treasurers suggest that 57 percent of respondents in the GSRA treatment and 56 percent of respondents in the ISRA treatment made at least 1 deposit.[9] Second, individuals in the GSRA were 23 percentage points more more likely to store maize (which we defined as saving maize for at least a month after harvest), compared to a base of 69 percent in the control group. Third, GSRA farmers were 37 percentage points more likely to have sold maize in the market by endline, compared to only 36% in the control group. Conditional on selling, treatment farmers sold later: sales in the GSRA group were on average 1 month later than in the control group, and fetched 6 percent higher prices. Fourth, though respondents used the ISRA, we find no consistent effects of the ISRA on downstream outcomes. Since the ISRA was not designed around maize storage, we did not expect to find effects on storage or on sales. Surprisingly, however, we find an increase in maize stored at home in our main specification. This result is surprising and not entirely robust and so we do not wish to read too much into it, but we conjecture that it may be possible that the savings intervention triggered respondents to think about savings more generally, and to choose to save maize. However, we find no effect on other outcomes like sales, nor on our expected outcome of input usage. This last result may be attributable to the fact that baseline input usage was already surprisingly high (89% of control farmers used hybrid seeds and fertilizer, much higher than earlier studies in this part of Kenya, i.e. Duflo et al., 2011).

Fifth, using our coupon redemption information, we are able to plot a demand curve for agricultural inputs. We find near-universal coupon redemption among those who received a 90% discount, but redemption rate falls to 10% for those who receive a 10% discount. However, in this context in which baseline input usage is high, much of this redemption was simply reshuffling of purchases that would have happened anyway. We do not find differential rates of coupon redemption between the treatment and control groups.

Our paper makes several contributions. First, it is an addition to the literature which examines the reasons due to which large intertemporal arbitrage gains are not exploited. So far, this literature has mainly focused on financial constraints, namely credit constraints (Stephens and Barrett, 2011; Bergquist et al., 2017), or liquidity constraints (Lee and Sawada, 2010; Sun et al., 2013; Dillon, 2016), or high alternative returns to capital (Nash and McCloskey, 1984). An older literature has looked at price risk as a potential explanation

[3] Saving may also be difficult if farmers are present-biased (see Duflo et al., 2011).

[4] See Gilbert et al. (2017) and Bergquist et al. (2017) for recent evidence summarizing price gaps across multiple countries. This phenomenon is particularly severe in rural areas of developing countries due to the spatially fragmented nature of markets.

[5] Specifically, we provided them with the Purdue Improved Crop Storage (PICS) bags: https://ag.purdue.edu/ipia/pics/Pages/home.aspx. These bags have been found so effective at arresting post-harvest losses that a USAID initiative in Kenya has projected that if a million farmers in Kenya adopt them by 2019, domestic supply of maize would increase by 450,000 tons (https://www.fintrac.com/sites/default/files/HST_A3_11.16.pdf).

[6] See Thaler (1999) on mental accounting, and Dupas and Robinson (2013a) for evidence on labeling savings in Kenya.

[7] While the idea of harnessing mental accounting and peer pressure through communal grain storage is novel, storing grain communally has precedent. Historically, many communities have had such systems, largely to ensure food security for everyone. In the 1970s, several NGOs sponsored the setting up of communal grain storage geared towards weathering poor market conditions, especially in West Africa and the Sahel. More recently, the Millennium Villages project also supported cereal banks with a similar objective (World Bank, 2011).

[8] Participants were not told beforehand that they would receive coupons as part of this study. Further, coupons were distributed much later in the season, so the coupon discount amounts were not known to participants at the time when storage decisions were being made (see Web Appendix Fig. A1 for the full timeline of events).

[9] The take-up of the GSRA at the ROSCA-level was nearly universal – 96 percent of treatment ROSCAs agreed to participate in the study and paid the subsidized price for the wooden stand.