# Commitments to Save: A Field Experiment in Rural Malawi*

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**Abstract**

We report the results of a field experiment that randomly offered Malawian smallholder farmers formal savings accounts. We tested two primary treatments, offering either: 1) "ordinary" accounts, or 2) both ordinary and "commitment" accounts. Commitment accounts allowed customers to restrict access to their own funds until a future date of their choosing. A control group was not offered any account but was tracked alongside the treatment groups. Both types of savings account offers led to increases in deposits at the partner bank, and over the next agricultural year caused increases in agricultural input use, crop sales, and household expenditures. The effects of the commitment treatment are not due to literally "tying the hands" of farmers, since farmers in that treatment mostly saved in ordinary accounts (rather than commitment accounts).

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## 1. Introduction

Recent experimental studies have found high marginal returns to capital in developing countries in non-agricultural enterprises (de Mel, McKenzie and Woodruff, 2008; Fafchamps et al., 2011) as well as in agriculture (Duflo, Kremer and Robinson, 2008). These high returns stand in contrast to low utilization of modern inputs such as fertilizer in many low-income countries, particularly in sub-Saharan Africa (World Bank, 2008).

To raise input utilization in agriculture, many developing country governments and donors have implemented large-scale input subsidies. However, the scale of such programs takes a heavy toll on government budgets, casting doubt on their long-term sustainability.[1] Another popular response has been the introduction of microcredit programs. In 2009, the Microcredit Summit estimated that there were more than 3,500 microfinance institutions around the world with 150 million clients (Daley-Harris 2009). While these outreach numbers are impressive, microcredit today is largely devoted to non-agricultural activities (Morduch 1999; Armendariz de Aghion and Morduch 2005) due to the substantial challenges inherent in agricultural lending.[2] Given the limited supply of credit for agriculture, many donors and academics (for example, Deaton, 1990; Robinson, 2001 and more recently the Bill and Melinda Gates Foundation) have emphasized the potential for increasing access to formal savings.[3]

Moreover, there is growing interest in the use of savings accounts with features that self-aware individuals can use to limit their options in anticipation of future self-

[1] For example, the cost of Malawi's large-scale fertilizer subsidy program amounted to 11 percent of the total government budget in the 2010-11 fiscal year.

[2] Giné, Goldberg, and Yang (2012) find that imperfect personal identification leads to asymmetric information problems (both adverse selection and moral hazard) in the rural Malawian credit market.

[3] Aportela (1999) uses data from an expansion of branches set up in post offices in the end of 1993. He finds that the expansion resulted in an average increase in savings rate of 3 to 5 percentage points, with higher effects (up to 7 percentage points) for low-income individuals compared to other low-income households located in towns without the expansion. Burgess and Pande (2005) find that a policy-driven expansion of rural banking reduced poverty in India, and provide suggestive evidence that deposit mobilization and credit access were intermediating channels. Despite positive social effects, the program was discontinued in 2001 due to losses from defaults. Bruhn and Love (2009) examine the opening of bank branches in consumer durable stores in Mexico in 2002 and find an increase in the number of informal business owners by 7.6 percent, in total employment by 1.4 percent, and in average income by about 7 percent. The effects are concentrated among low income households and in municipalities with lower pre-existing bank penetration.

control problems. Ashraf, Karlan, and Yin (2006) investigate demand for and impacts of a commitment savings device in the Philippines and find that demand for such commitment devices is concentrated among women exhibiting present-biased time preferences. Duflo, Kremer and Robinson (2011) find that offering a small, time-limited discount on fertilizer immediately after harvest has an effect on fertilizer use that is comparable to that of much larger discounts offered later, around planting time. Giné et al. (2013) find that Malawian farmers with present-biased preferences are more likely to revise a plan about how to use future income, a result that supports the potential of commitment accounts to improve welfare for those with self-control problems.

In this paper, we study the effects of offering ordinary and commitment savings accounts on household savings and, importantly, on subsequent measures of household wellbeing. We first explore whether merely offering easy access to formal savings accounts improves savings and other household outcomes. Then, we consider whether such impacts are magnified when the savings accounts offered have commitment features, such as an option to voluntarily restrict one's own ability to make withdrawals for a defined period of time. We are interested in understanding the mechanisms through which commitment savings accounts may lead to larger improvements in outcomes than ordinary accounts, but as described later, we are ultimately limited in the conclusions we can draw about these mechanisms.

In partnership with a local microfinance institution, we implemented a field experiment among smallholder cash crop farmers in Malawi. This particular population stands to benefit from savings accounts because their income and investment opportunities are highly seasonal: they receive most of their cash income from the year soon after the harvest, and make most of their investments in agricultural inputs that are applied some months later, at planting time. In our experiment, we randomized offers of account-opening and deposit assistance for formal savings accounts. One randomly-selected group of farmers was simply offered assistance opening individual "ordinary" savings accounts with standard features. This treatment sheds light on the impact of simply facilitating access to savings accounts. To test the importance of offering accounts with commitment features, another randomly-selected group of farmers was offered a

"commitment" savings account that allowed account holders to request that funds be frozen until a specified date (e.g., until the next planting season, so that funds could be preserved for farm input purchases), *in addition* to the ordinary account. Other farmers were randomly assigned to a control group that was surveyed but not offered assistance with opening either type of savings account. This design allows us to test the relative impact of offering accounts with commitment features versus offering only ordinary savings accounts.

Commitment accounts may reduce self-control problems, or they may operate through other psychological or social mechanisms. We designed a sub-experiment in an attempt to shed light on one particular mechanism, the role of commitment accounts in shielding households from social pressure to share money with others. Among farmers who were offered the savings treatments, we cross-randomized an intervention that provided a public signal of individual savings account balances. If the public revelation of balances induces greater pressure to share, then saving balances may be lower.[4] However, the scope for impact of this public revelation treatment depends on households having sizeable balances in their accounts, a factor that becomes important when we interpret the results of this sub-experiment (see Section 4 below).

We find that being offered any savings treatment nonetheless had striking effects on household savings, agricultural outcomes, and measures of wellbeing. Being offered any savings account significantly increases the amount that households save; the amount they are able to withdraw prior to the next season's planting period; subsequent agricultural inputs, harvests, and profits; and household expenditures a full year after the intervention. We view the effects on these welfare outcomes as especially important, because much of previous research has focused on the effects of savings products only on financial outcomes such as savings balances. In all of our estimates, the effect of the commitment savings treatment is substantially larger (often twice as large) than the effect of the ordinary savings treatment, but we lack the statistical power to detect a significant difference between the two types of accounts.

[4] Flory (2011) conducts a field experiment in rural Malawi where households in treatment villages were encouraged to open savings accounts. He finds that transfers to poor households increase in treatment villages, perhaps because everyone in the village knew who had savings accounts and thus access to funds.

One of the key findings of this paper is that we can reject that the substantial impact from offering commitment savings accounts are driven by solving a self-control problem. Indeed, the vast majority (89.0%) of deposits among individuals offered commitment accounts were in ordinary, rather than commitment, accounts. This is largely because farmers did not earn enough revenue to trigger scheduled deposits into their commitment accounts. The average amount deposited in commitment accounts was about an order of magnitude smaller than the commitment treatment's later impact on input use. We conclude that the impacts of the commitment treatment could not have operated via literally "tying the hands" of farmers by preventing them from withdrawing money in the months prior to planting time.

The paper proceeds as follows. We explain the experimental design and our data sources in the next section. We describe the estimation strategy in Section 3 and the results in Section 4. Section 5 concludes.

## 2. Experimental design and survey data

The experiment was a collaborative effort between Opportunity International Bank of Malawi (OIBM), Alliance One, Limbe Leaf, the University of Michigan and the World Bank. Opportunity International is a private microfinance institution operating in 24 countries that offers savings and credit products; in Malawi, it has a full banking license that allows it to collect deposits and on-lend funds. Alliance One and Limbe Leaf are two large private agri-business companies that offer extension services and high-quality inputs to smallholder farmers via an out-grower tobacco scheme.[5] These two tobacco companies work with smallholder out-growers by organizing them geographically into clubs of usually 10-20 members who obtain tobacco production loans under group liability from OIBM. Tobacco clubs are organized geographically because members of a club meet regularly and sell the tobacco collectively to the auction floor. In

[5] Tobacco is central to the Malawian economy, as it is the country's main cash crop. About 70% of the country's foreign exchange earnings come from tobacco sales, and a large share of the labor force works in tobacco and related industries.

the central Malawi region we study, tobacco farmers have similar poverty and income levels to those of non-tobacco-producing households.[6]

While all farmers in the study were loan customers of OIBM at the start of the project, the loans provided a fixed input package that for the majority of farmers fell short of optimal levels of fertilizer use on their tobacco plots.[7] This is important because it suggests that there is room for savings to increase input utilization. In addition, while a minority of farmers was using optimal levels of fertilizer for the amount of land they were cultivating at baseline, even those farmers could use savings generated by the intervention to obtain additional inputs and expand land under tobacco cultivation, or shift land from other crops towards tobacco. Finally, the savings intervention could also affect use of fertilizer and other inputs on maize (the main staple crop in Malawi) and other crops.[8]

The experiment was designed to test the effects of two different types of financial products – ordinary savings accounts and commitment savings accounts – and to explore a specific mechanism through which the commitment accounts may operate. There are three components to the experiment. The first is a financial literacy training in which all respondents participated; it is not randomized and, therefore, not explicitly evaluated. The second was a savings treatment. Clubs of farmers are randomly assigned to one of three savings treatments: a control condition with no new financial products, an

[6] Based on authors' calculations from the 2004 Malawi Integrated Household Survey (IHS), individuals in tobacco farming rural households in central Malawi live on PPP$1.46/day on average, while the corresponding average for non-tobacco farmers is PPP$1.51/day. That said, the two groups are different in other ways. Tobacco farmers have somewhat larger households (6.68 persons compared to 4.94 persons for households not farming tobacco), higher levels of education of the household head (5.61 years compared to 4.63 years) and a higher share of school age kids (6-17 years) currently in school conditional on having school age children (88.1% compared to 77.9%).

[7] The input package was designed for a smaller cultivated area. As a result, 60.4% of farmers were applying less than the recommended amount of nitrogen on their tobacco plots at baseline. The figures for the two other key nutrients for tobacco are even more striking: 83.2% and 84.7% of farmers used less than the recommended amount of phosphorus and potassium, respectively. For each of the three nutrients, among farmers using less than recommended levels, the mean ratio of actual use to optimal use was about 0.7. Optimal use levels were determined by Alliance One and Limbe Leaf in collaboration with Malawi's Agricultural Research and Extension Trust (ARET), and are similar to nutrient level recommendations in the United States (Pearce et al. 2011).

[8] At baseline, 89.5% and 99.9% of farmers were applying less than the recommended amount of nitrogen and phosphorus, respectively, on their maize plots. Among farmers applying less than the recommended amount of nitrogen (phosphorus) on maize, the ratio of actual use to optimal use was 0.48 (0.14). Potassium is not recommended for maize cultivated in central Malawi. Nutrient recommendations are from Benson (1999).

"ordinary savings" condition that offered assistance setting up direct deposit into individual, liquid savings accounts, and a "commitment savings" condition that offered assistance setting up direct deposit into individual ordinary savings accounts *and* additional accounts with commitment features. The third arm varied participants' exposure to pressure to share income by distributing raffle tickets based on savings balances. This arm was cross-randomized with the savings treatments: clubs chosen for one of the two savings treatments were randomly allocated to receive no raffle tickets, raffle tickets distributed in public, or raffle tickets distributed privately. Randomization of the savings and raffle treatments is conducted at the club level (299 clubs, described in more detail below) in order to minimize cross-treatment contamination.[9] The experiment is thus designed to be able to test the main effects of the different savings treatments; the main effects of the public vs. private raffle treatment; and the interaction of the savings and raffle treatments.

Figure 1 presents the timing of the experiment with reference to the Malawian agricultural season. The baseline survey and interventions were administered in April and May 2009, immediately before the 2009 harvest. As a result, at the time of account opening farmers did not know how much revenues they would obtain from the sale of tobacco.

*Financial education*

After the baseline survey was administered, members of all clubs, including those assigned to the control group, attended a financial education session that reviewed basic elements of budgeting and explained the benefits of formal savings accounts, with an emphasis on how such accounts could be used to set aside funds for future consumption and investment. The full script of the financial education session can be found in Appendix A.

The same financial education session was deliberately provided to all clubs – including those subsequently assigned to the control group – so that treatment effects

[9] Prior to randomization, treatment clubs were stratified by location, tobacco type (burley, flue-cured or dark-fire) and week of scheduled interview. The stratification of treatment assignment resulted in 19 distinct location/tobacco-type/week stratification cells.

could be attributed solely to the provision of the financial products, abstracting from the effects of the sorts of financial education (for example, strategies for improved budgeting) that are implicitly provided during the product offer. For this reason, we can estimate neither the impact of the ordinary and commitment treatments without such financial education, nor the impact of the financial education alone.[10]

*Savings treatments*

Implementation of the savings treatments took advantage of the existing system of depositing crop sale proceeds into OIBM bank accounts. In the control group, the process adhered to the status quo, as follows. At harvest, farmers sold their tobacco to the company at the price prevailing on the nearest tobacco auction floor.[11] The proceeds from the sale were then electronically transferred to OIBM, which deducted the loan repayment (plus fees and surcharges) of all borrowers in the club, and then credited the remaining balance to a club account at OIBM. Club members authorized to access the club account (usually the chairman or the treasurer) came to OIBM branches and withdrew the funds in cash.

Farmers in the ordinary savings treatment were offered account opening assistance and the opportunity to have their harvest proceeds (net of loan repayment) directly deposited into individual accounts in their names (see Figure 2 for a schematic illustration of the money flows). These ordinary savings accounts are regular OIBM savings accounts with an annual interest rate of 2.5%. After their crop was sold, farmers traveled to the closest OIBM branch to confirm that funds were available at the club level, i.e. that club proceeds exceeded the club's loan obligation. Authorized members of the clubs (often accompanied by other club members) then filled out a sheet specifying the division of the balance of the club account between farmers. Funds were transferred

[10] Karlan et al. (In progress) conduct a field experiment in Ghana where eligible individuals who already have a savings account are allowed to open and *label* a second account. They find that savings in this group is 31 % larger. A subset of the individuals that opened the second account was asked to state a savings goal for this account, but they find that setting a savings goal had no impact on savings balance, suggesting that it was the opening of the second account and labeling it what was driving the results.

[11] The tobacco growing regions are divided among the two tobacco buyer companies. In their coverage area each buyer company organizes farmers into clubs and provides them with basic extension services.

into the individual accounts of club members who had opted to open them. Other club members received their share of the money in cash.

Farmers in clubs assigned to the ordinary savings treatment were offered only one (ordinary) savings account. Farmers assigned to the commitment treatment had the option of opening an additional account with commitment features. The commitment savings account had the same interest rate as the ordinary account, but allowed farmers to specify an amount to be transferred to this illiquid account, and a "release date" when the bank would allow access to the funds.[12] During the account opening process, farmers stated how much they wanted deposited in the ordinary and commitment savings accounts after the sale of their tobacco crops. For example, if a farmer stated that that he wanted MK 40,000 in an ordinary account and MK 25,000 in a commitment savings account, funds would first be deposited into the ordinary account until MK 40,000 had been deposited, then into the commitment savings account for up to MK 25,000, with any remainder being deposited back into the ordinary account. The choice of a "trigger amount" that had to flow into the ordinary account before any money would be deposited into the commitment account turns out to be important, because many farmers chose triggers higher than their eventual crop sale revenue, and therefore ended up without deposits into their commitment accounts. Opening only a commitment account was not an option, though farmers who wanted to deposit all of their proceeds into the commitment account and none into their ordinary account were free to do so. No fees were charged for the initial post-crop-sale deposits into the ordinary or commitment accounts. Further details on account features and fees can be found in Appendix A.

Farmers in the control group and the "ordinary" treatment group who might have learned about and requested commitment accounts were not denied those accounts, but they were not given information about or assistance in opening them.[13]

[12] By design, funds in the commitment account could not be accessed before the release date. In a small number of cases OIBM staff allowed early withdrawals of funds when clients presented evidence of emergency needs, e.g. health or funeral expenditures.

[13] During the baseline interaction with study participants, no farmers in the control group expressed to our survey staff a desire for either ordinary or commitment accounts, and none in the ordinary treatment group requested commitment accounts. According to OIBM administrative records, seven individuals in the control group (1.7%) and 52 farmers in the ordinary treatment group" (3.7%) had commitment accounts by

*Raffle Treatments*

To study the impact of public information on savings and investment behavior, we implemented cross-cutting randomization of a savings-linked raffle. Participants in each of the two savings treatments were randomly assigned to one of three raffle conditions (members of the control group were not eligible for raffle tickets, because the tickets were based on savings account balances). These raffles provided a mechanism for revealing individual savings balances in public. We distributed tickets for a raffle to win a bicycle or a bag of fertilizer (one of each per participating branch), where the number of tickets each participant received was determined by his or her savings balance as of pre-announced dates that fell before big expenditures (like fertilizer purchases) were likely to deplete savings balances. Every MK 1,000 in an OIBM account (in total across ordinary and commitment savings accounts) entitled a participant to one raffle ticket. Ticket allocations would be on the basis of average balances from July 1 to August 1 (first distribution) and from September 1 to October 1 (second distribution). By varying the way in which tickets were distributed, we sought to exogenously vary the information that club members had about each other's savings balances.

Because the raffle itself could provide an incentive to save or could serve as a reminder to save (Karlan, McConnell, Mullainathan, Zinman, 2012; Kast, Meier and Pomeranz, 2012), one third of all clubs assigned to either ordinary or commitment savings accounts was randomly determined to be ineligible to receive raffle tickets (and was not told about the raffle). Another one third of clubs with savings accounts was randomly selected to have raffle tickets distributed privately. Study participants were called to a meeting for raffle ticket distribution but were handed their tickets out of view of other study participants. The final third of clubs with savings accounts was randomly selected for public distribution of raffle tickets. In these clubs, each participant's name and the number of tickets received was announced verbally to everyone that attended the raffle meeting.

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the end of October 2009 (these were opened without our assistance or encouragement). None of these farmers had any transactions in the accounts.

A feature of the simple formula for determining the number of tickets was that farmers in clubs where tickets were distributed publicly could easily estimate other members' savings balances. Private distribution of tickets, though, did not reveal information about individuals' account balances. The raffle scheme was explained to participants at the time of the baseline survey with a participatory demonstration. Members were first given hypothetical balances, and then given raffle tickets in a manner that corresponded to the distribution mechanism for the treatment condition to which the club was assigned. In clubs assigned to private distribution, members were called up one by one and given tickets in private (out of sight of other club members). In clubs assigned to public distribution, members were called up and their number of tickets was announced to the group. Since real tickets based on actual account balances were distributed twice during the experiment, the first distribution also functioned as an additional demonstration. (As reported in Section 4 below, however, substantial withdrawals from both the ordinary and commitment accounts occurred soon after funds were deposited, and as a result, this public revelation treatment was likely to have had little effect.)

*Sample*

Table 1 presents summary statistics of baseline household and farmer club characteristics. All variables expressed in money terms are in Malawi Kwacha (MK145/USD during the study period). Baseline survey respondents own an average of 4.7 acres of land and are mostly male (only six percent were female). Respondents are on average 45 years old. They have an average of 5.5 years of formal education, and have low levels of financial literacy.[14] Sixty three percent of farmers at baseline had an account with a formal bank (mostly with OIBM).[15] The average reported savings balance

[14] In particular, 42% of respondents were able to compute 10% of 10,000, 63% were able to divide MK 20,000 by five and only 27% could apply a yearly interest rate of 10% to an initial balance to compute the total savings balance after a year.

[15] This number includes a number of "payroll" accounts opened in a previous season by OIBM and one of the tobacco buyer companies as a payment system for crop proceeds, and which do not actually allow for savings accumulation. Our baseline survey unfortunately did not properly distinguish between these two types of accounts.

in bank accounts at the time of the baseline was MK 2,083 (USD 14), with an additional MK 1,244 (USD 9) saved in the form of cash at home.

*Balance of baseline characteristics across treatment conditions*

The design of the project includes two cross-cutting interventions that, with the control group, result in seven treatment conditions: a pure control condition without savings account offers or raffles; ordinary savings accounts with no raffles, with private distribution of raffle tickets, and with public distribution of raffle tickets; and commitment savings accounts with no raffles, with private distribution of raffle tickets, and with public distribution of raffle tickets (see Table 2). In the next section, we explain how the analysis uses pooled and disaggregated cells to estimate the effects of the various treatments.

To examine whether randomization across treatments achieved balance in pre-treatment characteristics, Table 3 presents the differences in means of 17 baseline variables in the same format as used for the subsequent analysis. Panel A checks for balance between the control group and the treatment group, the latter pooled across all of the savings and raffle treatments. Panel B looks for differences between the control group, the ordinary savings group, and the commitment savings group, but still pools across raffle treatments. Finally, Panel C breaks out each treatment arm, comparing the six cells to the control group.

With a few exceptions, the sample is well balanced. We test balance for 17 baseline variables. In Panel A, respondents assigned to the savings treatment are four percentage points more likely to be female and two percentage points less likely to be married than those assigned to the control group. At baseline, they report spending nearly MK 4,000 more in cash on agricultural inputs, a difference that is statistically significant at the 90 percent confidence level.

In Panel B, we find only marginal differences (significant at the 90 percent level) between the ordinary and commitment savings treatments. Those assigned to the commitment savings treatment are slightly more likely to have hyperbolic discount rates; less likely to be patient now but impatient later; and receive slightly smaller transfers

from their social network. The differences in spending on agricultural inputs relative to the control group that we observed in Panel A is concentrated among those assigned to the ordinary savings treatment; the difference in spending between respondents in the ordinary and commitment groups is not statistically significant.

Finally, in Panel C, we see that while the qualitatively small but statistically significant gender differences between control and treatment groups are spread across all six treatment cells, idiosyncratic differences in only two cells largely account for differences in baseline cash spending on agricultural inputs. Those in the ordinary, private raffle group spend MK 5,300 more than the control group; those in the commitment, private raffle group spent MK 8,800 more. Overall, of the 102 coefficients we test in Panel C, there are statistically significant differences for 10 coefficients at the 95 percent confidence level and 16 coefficients at the 90 percent level. Using joint hypothesis tests reported at the bottom of Table 3, we cannot reject the null that the 17 baseline covariates are jointly not different from zero between the control group and five of the six treatment groups; the p-value associated with the test of the control group compared to the ordinary, public raffle treatment cell is 0.099.

To alleviate any remaining concern that baseline imbalance may be driving our results, we follow Bruhn and McKenzie (2009) and include the full set of baseline characteristics in Table 3 as controls in the main regressions, in addition to the stratification cell fixed effects.[16]

## 3. Estimation strategy

We study the effects of our experimental interventions on three sets of outcomes: deposits into and withdrawals from savings accounts, agricultural outcomes from the next year's growing season and household expenditure following that season, and households' financial interactions with others in their network and future use of financial products. These data come from an endline survey administered after the 2010 harvest, and from

[16] Results turn out to be very similar when only stratification cell fixed effects are included. See Appendix Tables 2, 3 and 4.

administrative data about bank transactions and account balances collected throughout the project.

Since the experiment was designed to test the effects of two different types of financial products – ordinary savings accounts and commitment savings accounts – and to explore a specific mechanism through which the commitment accounts may operate, we focus on three regression specifications reported as separate panels in the main results tables. The first tests the effect of being offered any savings product, relative to being assigned to the control group. In Panel A of the subsequent tables, we run regressions of the form

$$Y_{ij} = \delta + \alpha Savings_j + \beta' \mathbf{X}_{ij} + \varepsilon_{ij} \quad (1)$$

$Y_{ij}$ is the dependent variable of interest for farmer *i* in club *j*. $Savings_j$ is an indicator variable for club-level assignment to either of the two savings treatment groups. The coefficient $\alpha$ measures the effect of being offered direct deposit into an individual savings account (either ordinary savings accounts only or ordinary plus commitment accounts). $\mathbf{X}_{ij}$ is a vector that includes stratification cell dummies and the 17 household characteristics measured in the baseline survey prior to treatment, and summarized in Table 3, and $\varepsilon_{ij}$ is a mean-zero error term. Because the unit of randomization is the club, standard errors are clustered at this level (Moulton 1986).

In Panel B we compare the impact of direct deposit into ordinary accounts only to the impact direct deposit into ordinary plus commitment accounts. We continue to pool across the raffle treatments, running regressions of the form

$$Y_{ij} = \delta + \gamma_1 Commitment_j + \gamma_2 Ordinary_j + \beta' \mathbf{X}_{ij} + \varepsilon_{ij} \quad (2)$$

where $Y_{ij}$ and $\mathbf{X}_{ij}$ are defined as above. $Ordinary_j$ is an indicator for club-level assignment to the ordinary savings treatment, and $Commitment_j$ is an indicator for assignment to the commitment savings treatment. The coefficient $\gamma_1$ represents the effect of eligibility for direct deposit into ordinary accounts only, relative to the control group. $\gamma_2$ captures the analogous effect for eligibility for direct deposit into ordinary accounts *and* automatic transfers into commitment savings accounts. The difference between those two coefficients, then, captures the marginal effect of the commitment savings

account relative to direct deposit into the ordinary account. The p-value for the test of the null hypothesis that $\gamma_1 = \gamma_2$ is reported at the bottom of each Panel B.

Finally, Panel C incorporates the full cross-cutting randomization. The regressions include dummy variables for assignment to each of the six treatment groups:

$$\begin{aligned} Y_{ij} = \delta & \\ & + \theta_1 Com\_no\_raffle_j + \theta_2 Com\_pub\_raffle_j + \theta_3 Com\_priv\_raffle_j \\ & + \theta_4 Ord\_no\_raffle_j + \theta_5 Ord\_pub\_raffle_j + \theta_6 Ord\_priv\_raffle_j \\ & + \beta' \mathbf{X}_{ij} + \varepsilon_{ij} \end{aligned} \quad (3)$$

The indicator variables represent assignment to the commitment savings treatment and no raffle tickets; the commitment savings treatment and public distribution of raffle tickets; the commitment savings treatment and private distribution of raffle tickets; the ordinary savings treatment and no raffle tickets; the ordinary savings treatment and public distribution of raffle tickets; and the ordinary savings treatment and private distribution of raffle tickets. Recall that those assigned to the control group with no savings accounts were not eligible for raffle tickets.

Each coefficient represents the effect of belonging to a treatment cell relative to the control group. The difference between $\theta_1$ and $\theta_2$ captures the marginal effect of the public raffle for farmers in clubs offered the commitment savings treatment; and the difference between $\theta_1$ and $\theta_3$ captures the analogous marginal effect of the private raffle. The p-values for the appropriate hypothesis tests that the marginal effects of the two raffle types were zero in the commitment and ordinary savings groups are presented at the bottom of Panel C, and allow us to test whether ordinary or commitment accounts are more effective in the face of public information about savings balances.

Throughout the analysis, we focus on intent-to-treat (ITT) estimates because not every club member offered account opening assistance decided to open an account. We do not report average treatment on the treated (TOT) estimates because it is plausible that members without accounts are influenced by the training script itself or by members who do open accounts in the same club, either of which would violate the Stable Unit Treatment Value Assumption (SUTVA) (Angrist, Imbens and Rubin, 1996).

## 4. Empirical results

We first examine the effects of our experimental interventions on formal savings: the flow of funds into and out of accounts, and account balances. In and of themselves, however, these transactions are not measures of wellbeing. Therefore, we also analyze impacts on agricultural input use, farm output, household expenditures, and other household behaviors.

*Impacts on savings transactions and balances*

The first question of interest is whether the experimental treatments changed use of individual savings accounts. Table 4, Panel A presents estimates of equation (1) for outcomes from administrative data about account transactions. Nineteen percent of respondents in clubs eligible for either the ordinary or commitment savings treatment had money directly deposited into an individual savings account; on average, they deposited MK 17,609 (USD 121.44) more than those assigned to the control group and are subsequently able to withdraw more money from their accounts. The vast majority of deposits were into ordinary savings accounts; the average respondent assigned to one of the two treatment groups deposited less than MK 700 into a commitment account, but that figure averages across members of clubs offered the commitment savings accounts and members of clubs offered ordinary accounts only.

In Panel B, we estimate equation (2) to compare the effects of the ordinary and commitment savings treatments, pooling across the raffle treatments. While both groups use individual bank accounts in ways that are significantly different from the control group, there are no statistically significant or economically meaningful differences between the ordinary and commitment savings groups in the probability of having money directly deposited into an individual account or in the total amounts deposited into any individual account or specifically into ordinary, liquid accounts. Roughly equal total deposits into any savings account is what would be expected given the direct deposit component of the design: for there to be differences in total deposits between the ordinary and commitment savings groups, members of the two groups who took up their

respective offers would have had to have different total proceeds from the 2009 tobacco harvest. Since the account offers took place just before that harvest, the treatment should not have had an immediate effect on proceeds because the vast majority of investments in the tobacco crop had already been made. Any effect of the treatment on the administrative data related to savings accounts should either reflect the efficacy of the encouragement design in promoting use of commitment savings accounts among the group assigned to that treatment, or be on net deposits, which are a function of withdrawals as well as deposits.

Indeed, those are the margins along which we observe some statistically significant differences between respondents assigned to the ordinary and commitment savings treatments. Respondents in the commitment savings group deposit approximately MK 1,400 more into commitment accounts than those in the ordinary savings group, which demonstrates that the encouragement design had the intended effect of increasing use of illiquid savings instruments. While these impacts on commitment savings balances are positive and statistically significant, it is clear commitment savings deposits are substantially lower than deposits into ordinary accounts by farmers offered the commitment treatment.

Effects of the savings treatments on withdrawals in the pre-planting period are nearly as large as effects on deposits. That said, enough funds remained in total across both types of accounts so that there are statistically significant effects on net deposits (deposits minus withdrawals.) Respondents in the commitment savings treatment had higher net deposits during the pre-planting season (column 7), followed by net withdrawals that exceeded those in the ordinary savings group by about MK 600 during the planting season (column 8). The timing corresponds to the release dates of the commitment savings accounts, which center around the planting season (November and December 2009).[17] These results are consistent with the commitment accounts helping farmers to preserve some funds between the harvest and planting seasons.

Table 4, Panel C estimates equation (3) to analyze the effects of the savings and raffle treatments on savings outcomes. Significant differences between the savings

[17] See Figure 5 for the distribution of release dates of study participants' commitment accounts.

treatments and the control group persist in this fully interacted specification. The key finding here is that the public raffle has no effect on the impact of either the ordinary or commitment savings treatment on any of the savings outcomes in the table: statistical tests that the effects of the savings treatments combined with the raffle are equal to the effects with no raffle nearly all fail to achieve significance at conventional levels. Similarly, the impact of the commitment treatment with private raffle is not statistically significantly different from the commitment (no raffle) treatment.

There is one notable exception to the absence of an effect of the raffle: those assigned to the ordinary savings treatment with private distribution of raffle tickets have substantially lower total deposits and total withdrawals than the other five treatment groups, and are not significantly different from the control group. Since there is no theoretical or practical reason for the private raffle treatment to have reduced the deposits of farmers assigned to the ordinary savings treatment, and the treatment groups were well balanced at baseline, we conclude that this anomalous finding is simply due to random variation.

*Time patterns of deposits and withdrawals*

Table 4 documents that both deposits into and withdrawals from OIBM accounts in the 2009 pre-planting period were substantial for both the commitment and ordinary treatments. An open question is whether most funds remained deposited in the accounts until the planting period. As it turns out, in many cases funds in ordinary accounts were withdrawn relatively quickly after the initial deposit of crop proceeds was made. About 22 percent of the initial deposits into ordinary accounts were followed by withdrawals on the same day of nearly equal amounts.[18] On average, only 26 percent of the original balance remained in an ordinary savings account two weeks after it was initially deposited.

Figure 3 presents average deposits into and withdrawals from ordinary and other (non-commitment) accounts, by month, from March 2009 to April 2010.[19] The sample in Figure 3.a includes all individuals in a commitment treatment, while the samples for

[18] See Appendix B for details about the construction of deposit spells underlying these calculations.
[19] The data presented are the sum of the dependent variables in columns 4 and 6 of Table 4.

Figure 3.b include all individuals in an ordinary treatment. For comparison, the sample used in Figure 3.c includes all individuals in the control group.

The figures indicate that peak deposits occurred in June, July, and August 2009, coinciding with the peak tobacco sales months. Average deposits in every month for individuals in both the commitment and ordinary treatments are quite similar in magnitude to average withdrawals, indicating that the majority of deposited funds were withdrawn soon thereafter. As a result, savings balances during the pre-planting period were much lower than deposited amounts, explaining why most farmers did not participate in the raffle.[20]

One likely reason why funds in the ordinary accounts were withdrawn at once soon after they had been deposited has to do with transactions costs. Farmers lived on average 20 kilometers away from the bank branch and would typically travel by foot, bus, or bicycle.[21] In addition to the commuting time, farmers report a median waiting time at the branch to withdraw money of one hour.

In contrast to the time pattern of the ordinary accounts, funds into commitment accounts do stay in accounts for longer periods of time. Figure 4 displays average deposits into and withdrawals from commitment accounts, by month, for all individuals in a commitment treatment. For deposits, the peak months are June, July, and August, coinciding with the peak deposit months for the ordinary accounts. But withdrawals from the commitment accounts are delayed substantially, occurring in October, November, and December, coinciding with the key months when agricultural inputs must be purchased and applied on fields.

This time pattern of withdrawals from commitment accounts is consistent with the release dates chosen by users of commitment accounts. Figure 5 presents the histogram of commitment account release dates (when commitment account funds would be "unlocked" and funds made available to farmers) that farmers chose during account opening. About 60% of farmers chose release dates in the months of October to December while others chose to have access to the funds in January and February, during

[20] The pattern is similar for individuals in the control group, but levels are much lower owing to the fact that direct deposit from the tobacco auction floor into farmer accounts was not enabled for that group.
[21] The median round-trip bus fare is MK 400 for a two hour ride one way.

the lean or "hungry" season.

*Impacts on agricultural outcomes and household expenditure*

In Table 5, we turn to the impacts of the treatments on land cultivation, input use, crop output, and household expenditures. Results in panel A show that being assigned to direct deposit into individual accounts had positive, statistically significant effects on all six outcomes related to the next growing season: respondents in clubs assigned to one of the savings treatments had, on average, 0.30 acres more land under cultivation; MK 8,000 greater use of agricultural inputs; almost MK 20,000 higher proceeds from their crop sales, MK 24,000 higher value of total crop output, and MK 20,000 more profits from crops; and over MK 1000 more in expenditures in the month before the follow up survey, more than a year after the interventions. The impacts are economically meaningful as well as statistically significant: for example, agricultural inputs increased by 13 percent relative to the control group mean (column 2) and farm profits rose by 18 percent (column 5). The increase in household expenditure represents 11 percent of the control group mean (column 6). The MK 8,000 increase in agricultural inputs is about half the value of the increased deposits (relative to the control group) generated by the savings treatments, as shown in Table 4, column 2. These results show strong, consistent effects of individual savings accounts on measures with clear welfare implications.

In Panel B, we look separately at the effects of ordinary and commitment savings accounts. For each of the outcomes, the magnitude of the effect of the commitment savings treatment is larger than the magnitude of the effect of the ordinary savings treatment. While the pattern is strikingly consistent, with magnitudes of the commitment savings effects nearly double of those of the ordinary savings effects, differences between the ordinary and commitment savings treatments are not significant at standard confidence levels for five of the six outcomes, and significant at the 10% level for proceeds from crop sales. The effect of the savings treatments on agricultural and expenditure outcomes appears to be driven by the commitment treatment, but we cannot rule out that the ordinary and commitment treatments had the same effect.

In Panel C, we see that one of the six treatments – commitment savings treatment with no raffle tickets – shows consistently significant effects on agricultural outcomes and household expenditures. Respondents who were offered commitment accounts and no raffle planted 0.42 acres more than members of the control group; they used MK 16,500 more inputs in following harvest; their proceeds from crop sales were nearly MK 23,000 higher and the value of their agricultural output was MK 34,000 higher than realized by members of the control group; and these respondents spent nearly MK 1,900 more in the week leading up to the endline survey than those in the control group. All of these differences between outcomes in the commitment savings, no raffle group and the control group are statistically significant. In addition, the commitment savings, no raffle group also realized farm profits of MK 19,000 more than the control group, but that effect is not significant at standard confidence levels.

We cannot reject that these positive effects of commitment savings accounts without a raffle are the same as the effect of the commitment savings accounts with either the public or private raffle. Recall that we originally hypothesized that the public raffle treatment might reduce any positive impact of the savings treatments, since revealing savings balance information might increase demands for sharing from one's social network. The findings in Panel C of Table 5 could be taken as evidence against that hypothesis.

That said, our raffle randomization does not in practice provide a particularly powerful test of the hypothesis, because at the time of raffle ticket distribution, savings balances in were low in both types of accounts. As we discussed above, many withdrawals from ordinary accounts occurred soon after initial harvest deposits, and balances in commitment accounts were relatively low to begin with.

During the first raffle ticket distribution only 17 percent of respondents in a raffle treatment group received any ticket; during the second distribution the corresponding figure was 12 percent. Across both raffles, an average of 1.14 tickets were given out (5.06 tickets conditional on receiving any ticket), representing an average value of MK 1,140 in balances. The number of tickets was similar across public and private raffle treatment groups: 1.06 vs. 1.22 tickets, respectively (difference not statistically

significant). Since the raffles themselves ultimately generated little variation in public information about financial assets, we are limited in the conclusions we can draw regarding the importance of demands for sharing from one's social network as a mechanism through which the effects of savings accounts operate.

The magnitude of the commitment savings effect on input use (see Panel B) is substantially larger than the value of commitment savings balances.[22] As shown in Table 4, on average, those in the commitment savings group had approximately MK 1,500 in their commitment accounts just before planting season, but they apparently increased their input use by almost seven times more than they saved in commitment savings accounts. Thus, the increase in input use cannot be attributed to use of funds from the commitment savings accounts alone. Contrary to one to one of the key hypotheses motivating this experiment, the commitment treatment did not have its effects on agricultural and other outcomes via solving farmers' self-control problems by "tying their hands" (preventing access to funds) in the months between harvest and planting time.

*Impacts on other outcomes*

Our final set of results attempts to explore mechanisms through which the savings treatments may have operated. We first look at changes in household size and transfers between households. Changes in household size are relevant because households may share risk and resources by accepting new members or sending family members to live elsewhere. We also consider three direct measures of transfers between households (transfers made, transfers received, and net transfers). Transfers sent and received are of particular interest because the commitment treatment may have been more effective at helping study participants resist demands from the social network. Although net balances in the commitment accounts were small, the existence of the account may have provided an excuse to turn down requests for assistance from the social network by claiming that

[22] When expenditures in inputs are disaggregated into different input categories (results not shown) we find statistically significant differences in cash expenditures on seed (p-value 0.084) and fertilizer (p-value 0.105) between farmers with access to the commitment account relative to those with only access to the ordinary account. Expenditures on hired labor and transportation, which members of a club may procure collectively, are not different.

savings were inaccessible.[23] We find no effect of either intervention in any of these outcomes, however. If anything, there is a small positive effect on net transfers (Panel C).[24]

Another possible explanation for the increase in total expenditure on inputs for the savings treatment group could be larger loan sizes, rather than investments funded from savings.[25] Column 5 examines the size of loans provided by a lender to the tobacco club in the subsequent season, and shows that this is not the case.[26]

Finally, we present data on subsequent ownership of fixed deposit accounts (column 6) at the time of the endline survey. Fixed deposit accounts are accounts in which the depositor accepts lower liquidity (an agreement not to withdraw) for a certain specified time period, in return for a higher interest rate.[27] Such accounts could be seen as providing a similar commitment function to the commitment savings accounts we offered in the experiment. In Panel A, we see that being assigned to a savings treatment group increased the probability of owning a fixed-deposit account over a year later by 0.03 percentage points, a statistically significant increase of 75 percent relative to the control group mean of 0.039. As we might expect, this effect is concentrated among those offered commitment savings accounts: results reported in Panel B show a 0.05 percentage point increase for those in the commitment savings treatment, an effect that is statistically different from that of being offered an ordinary savings account. In Panel C, the effect of the commitment savings treatment on subsequent fixed-deposit account ownership does not vary by raffle sub-treatment.

The increased take-up of fixed deposit accounts one year after the intervention suggests that those who were introduced to commitment savings accounts through the

[23] The distribution of funds across ordinary and commitment accounts was not public knowledge because the cross-randomized raffle treatments awarded raffle tickets on the basis of total funds across all accounts, so even the public raffle did not reveal how little was saved in commitment accounts.

[24] Net transfers span the pre-planting to post-harvest period, however. Therefore, one explanation consistent with this result is lower transfers during the pre-planting season, when commitment accounts were active and therefore could serve as a valid excuse for reducing transfers, followed by higher transfers after the harvest, when farmers with commitment accounts realized larger revenues. Unfortunately, we lack the data needed to examine the timing of transfers.

[25] Loans from informal lenders and friends and family account for a small fraction of total borrowing. At any rate, conducting this analysis for total credit instead of just tobacco credit yields very similar results.

[26] Similarly, we find no difference across treatment and control groups in the probability of accessing a loan (results not shown).

[27] They are also known as time deposit or term deposit accounts in other countries.

experiment found something of value in the product. This is consistent with the finding that commitment savings accounts improved agricultural outcomes and household expenditures, though it does not help explain the mechanism through which the accounts operated.

## 5. Conclusion

Savings accounts are appealing tools for increasing the use of agricultural inputs by households in developing countries. Unlike subsidies, they do not require major government budget commitments, and while the supply of credit for agricultural inputs is often constrained, banks are eager to attract new savings customers. The results of our field experiment among cash crop farming households in Malawi show that offering access to individual savings accounts not only increases banking transactions, but also has statistically significant and economically meaningful effects on measures of household wellbeing, such as investments in inputs and subsequent agricultural yields, profits, and household expenditure. Ours is one of the first studies of savings accounts to illustrate effects on these sorts of welfare measures, especially captured a year after the intervention. While both ordinary and commitment accounts lead to improvements in input use and outcomes and in most cases we cannot reject that the effects of the two types of accounts are equal, only the commitment savings treatment led to statistically significant improvements, and the magnitudes are roughly twice as large for commitment accounts as for ordinary accounts alone. Further research, with a larger sample size, may be able to conclusively demonstrate larger impacts from commitment accounts than ordinary accounts alone.

While our study provides clear evidence that savings accounts have positive effects on meaningful household outcomes, the evidence about the mechanism through which accounts improve investments in agricultural inputs is less clear. Money is withdrawn rapidly from ordinary savings accounts, and most puzzlingly, the large effects of the commitment treatment are obtained despite very little money ever being deposited into commitment accounts. The commitment treatment increases agricultural

investments without solving individual self-control problems by preventing households from accessing their funds for some period of time. We find no evidence that the commitment treatment operates through shielding households from social pressure to share income, though our test of this hypothesis is severely hampered by the low balances in all accounts (which meant there was little information to reveal in the public revelation treatments). Further research to understand the mechanisms through which both the ordinary and commitment treatments operate can not only help explain the patterns observed in these data, but also facilitate the design of new financial products and other policy tools to use these mechanisms to their greatest advantage.

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**Figure 1: Project timing**

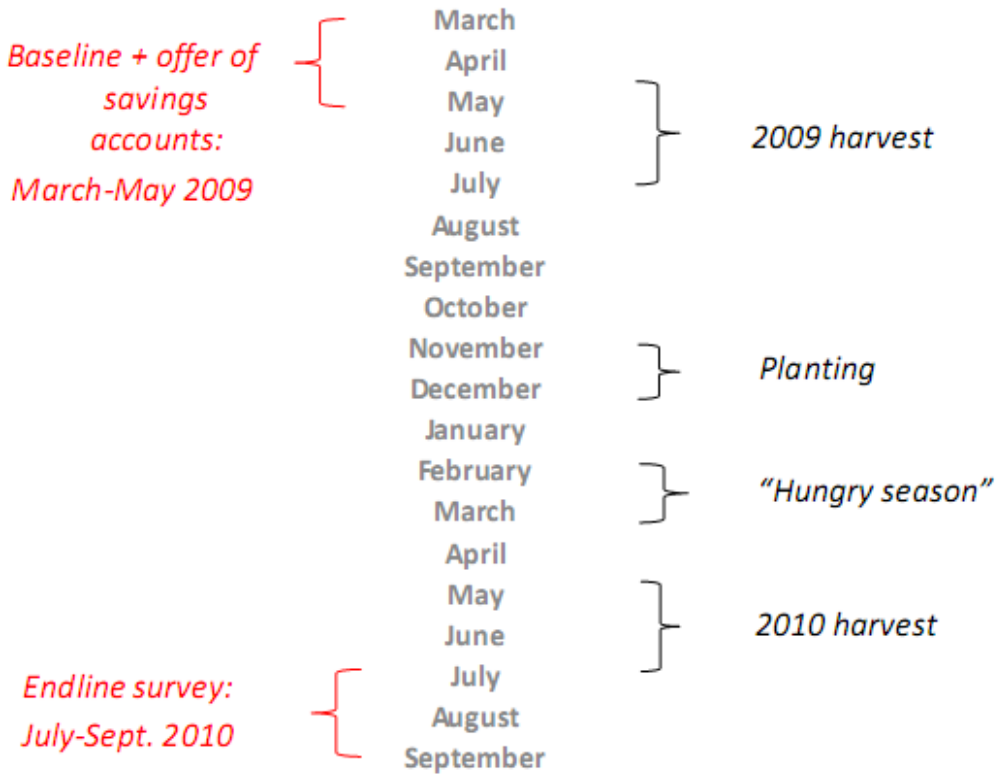



**Figure 2: Tobacco Sales and Bank Transactions**

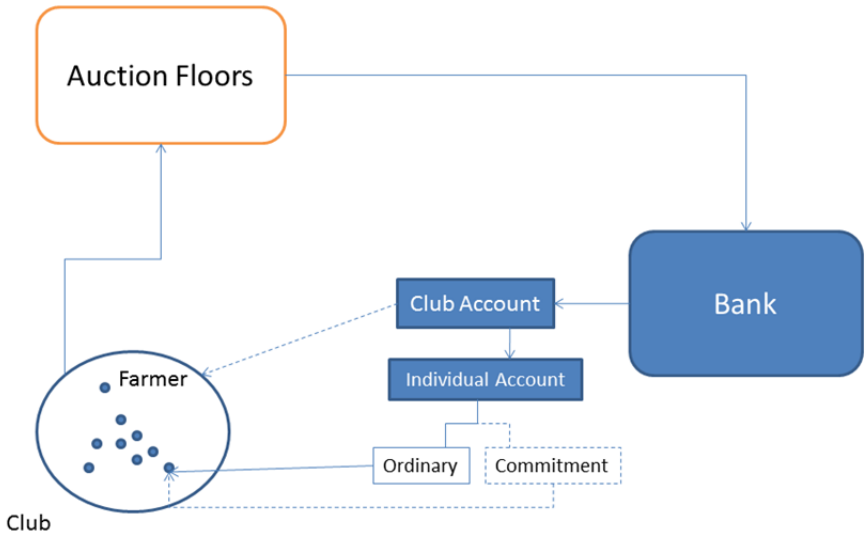
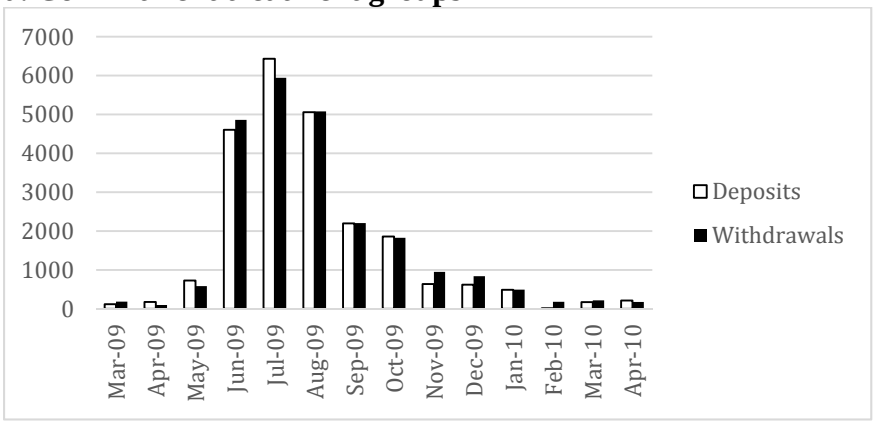
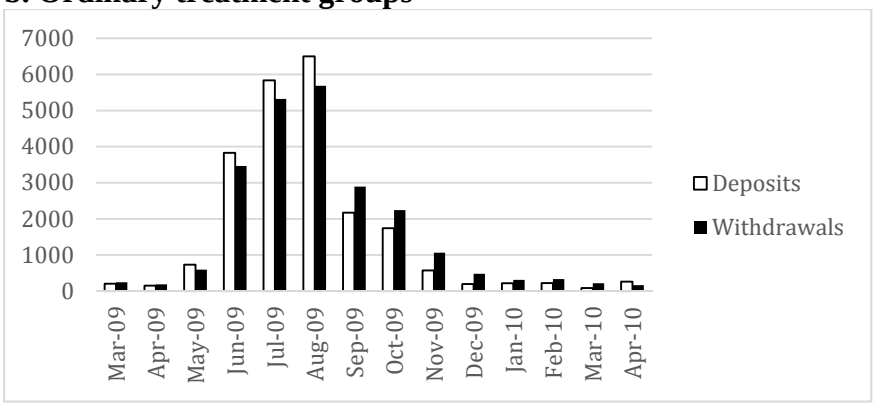


**Figure 3: Deposits into and withdrawals from ordinary accounts**

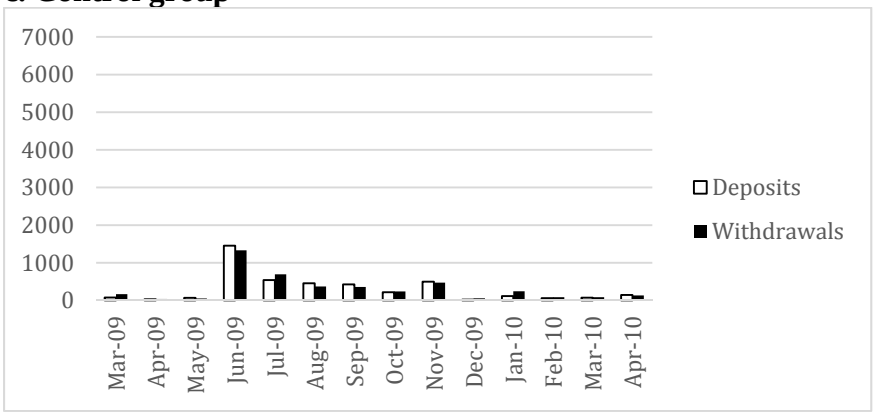
**a. Commitment treatment groups**




**b. Ordinary treatment groups**

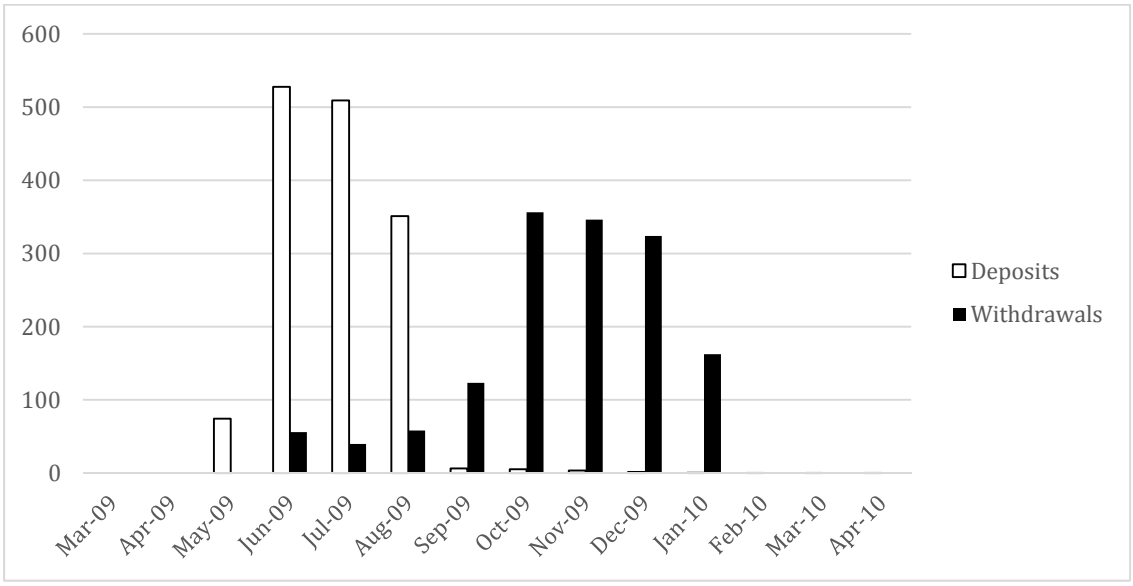



**c. Control group**




Notes: Commitment treatment groups include no-raffle, private raffle, and public raffle treatments. Ordinary treatment groups include no-raffle, private raffle, and public raffle treatments. Deposits and withdrawals are denominated in Malawi kwacha (MK). All figures include transactions in ordinary accounts opened as part of the intervention as well as other non-commitment accounts owned by study participants (sum of dependent variables in columns 4 and 6 of Table 4).

**Figure 4: Deposits into and withdrawals from ordinary accounts**




Notes: Data presented is for deposits into and withdrawals from commitment accounts, for all individuals in commitment treatment groups (including no-raffle, private raffle, and public raffle treatments). Deposits and withdrawals are denominated in Malawi kwacha (MK).

**Figure 5: Distribution of commitment savings release dates grouped by month**

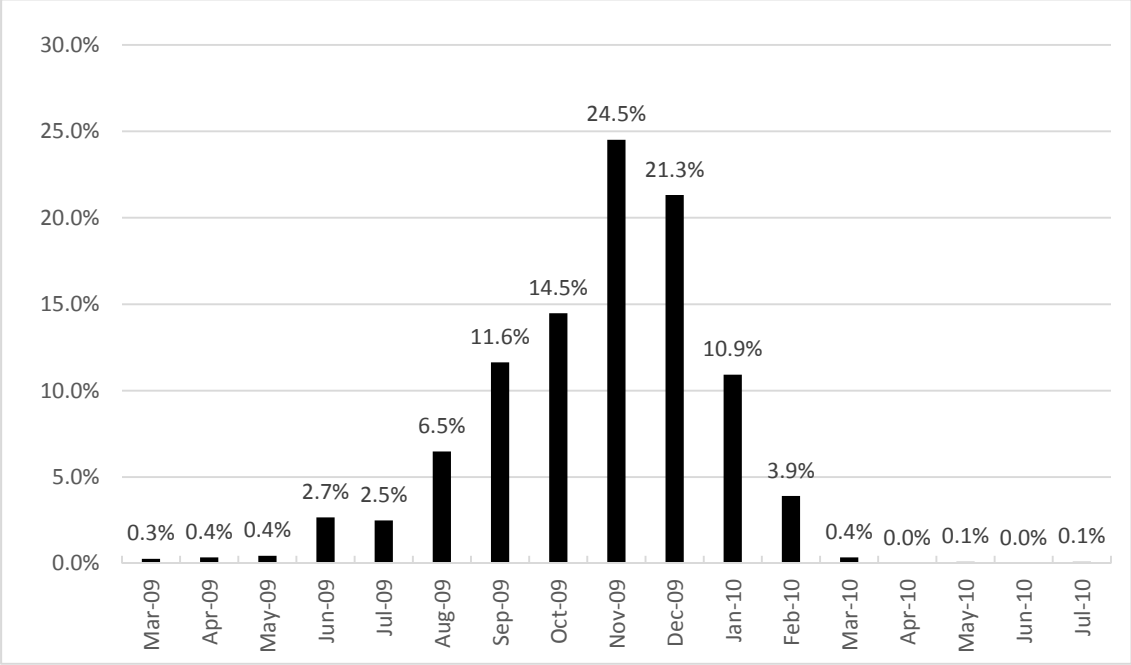


**Table 1: Summary Statistics**

| | Mean | Standard Deviation | 10th Percentile | Median | 90th Percentile | Observations |
|---|---|---|---|---|---|---|
| ***Treatment conditions*** | | | | | | |
| Control group | 0.135 | 0.341 | | | | 3,150 |
| Panel A | | | | | | |
| Savings | 0.865 | 0.341 | | | | 3,150 |
| Panel B | | | | | | |
| Commitment Savings | 0.417 | 0.493 | | | | 3,150 |
| Ordinary Savings | 0.448 | 0.497 | | | | 3,150 |
| Panel C | | | | | | |
| Commitment, no raffle | 0.136 | 0.342 | | | | 3,150 |
| Commitment, priv. raffle | 0.142 | 0.349 | | | | 3,150 |
| Commitment, pub. raffle | 0.139 | 0.346 | | | | 3,150 |
| Ordinary, no raffle | 0.146 | 0.354 | | | | 3,150 |
| Ordinary, priv. raffle | 0.149 | 0.356 | | | | 3,150 |
| Ordinary, pub. raffle | 0.153 | 0.360 | | | | 3,150 |
| ***Baseline Characteristics*** | | | | | | |
| Number of members per club | 13.88 | 6.44 | 9.00 | 11.00 | 23.00 | 299 |
| Female | 0.063 | 0.243 | | | | 3,150 |
| Married | 0.955 | 0.208 | | | | 3,150 |
| Age [years] | 45.02 | 13.61 | 28.00 | 44.00 | 64.00 | 3,150 |
| Years of education | 5.45 | 3.53 | 0.00 | 6.00 | 10.00 | 3,150 |
| Household size | 5.79 | 1.99 | 3.00 | 6.00 | 9.00 | 3,150 |
| Asset index | -0.02 | 1.86 | -1.59 | -0.67 | 2.46 | 3,150 |
| Livestock index | -0.03 | 1.15 | -1.00 | -0.36 | 1.37 | 3,150 |
| Land under cultivation [acres] | 4.67 | 2.14 | 2.50 | 4.03 | 7.50 | 3,150 |
| Cash spent on inputs [MK] | 25,169 | 41,228 | 0 | 10,000 | 64,500 | 3,150 |
| Proceeds from crop sales [MK] | 125,657 | 174,977 | 7,000 | 67,000 | 300,000 | 3,150 |
| Has bank account | 0.634 | 0.482 | | | | 3,150 |
| Savings in cash at home [MK] | 1,244 | 3,895 | 0 | 0 | 3,000 | 3,150 |
| Savings in bank accounts [MK] | 2,083 | 8,265 | 0 | 0 | 3,000 | 2,949 |
| Hyperbolic | 0.102 | 0.303 | | | | 3,117 |
| Patient now, impatient later | 0.304 | 0.460 | | | | 3,117 |
| Net transfers made in past 12m [MK] | 1,753 | 7,645 | -2,990 | 500 | 8,100 | 3,150 |
| Missing value for formal savings and cash | 0.064 | 0.244 | | | | 3,150 |
| Missing value for time preferences | 0.010 | 0.102 | | | | 3,150 |
| ***Transactions with Partner Institution*** | | | | | | |
| Any transfer via direct deposit | 0.154 | 0.361 | | | | 3,150 |
| Deposits into ordinary accounts, pre-planting [MK] | 18,472 | 82,396 | 0 | 0 | 38,907 | 3,150 |
| Deposits into commitment accounts, pre-planting [MK] | 615 | 5,367 | 0 | 0 | 0 | 3,150 |
| Deposits into other accounts, pre-planting [MK] | 296 | 3,804 | 0 | 0 | 0 | 3,150 |
| Total deposits into accounts, pre-planting [MK] | 19,383 | 84,483 | 0 | 0 | 40,694 | 3,150 |
| Total withdrawals from accounts, pre-planting [MK] | 18,600 | 82,744 | 38,600 | 0 | 0 | 3,150 |
| Net of all transactions, pre-planting [MK] | 762 | 13,857 | 0 | 0 | 649 | 3,150 |
| Net of all transactions, Nov-Dec [MK] | -848 | 6,870 | 0 | 0 | 2 | 3,150 |
| Net of all transactions, Jan-Apr [MK] | -269 | 4,032 | 0 | 0 | 4 | 3,150 |
| ***Endline Survey Outcomes*** | | | | | | |
| Land under cultivation [acres] | 4.52 | 2.66 | 2.00 | 4.00 | 8.00 | 2,835 |
| Cash spent on inputs [MK] | 21,632 | 32,853 | 500 | 11,000 | 51,500 | 2,835 |
| Total value of inputs [MK] | 68,046 | 84,014 | 1,500 | 43,750 | 157,272 | 2,835 |
| Proceeds from crop sales [MK] | 109,604 | 162,580 | 0 | 56,000 | 270,000 | 2,835 |
| Value of crop output (sold & not sold) [MK] | 177,747 | 201,131 | 27,480 | 115,582 | 387,203 | 2,835 |
| Farm profit (output-intput) [MK] | 110,703 | 156,747 | 0 | 70,372 | 264,953 | 2,835 |
| Total expenditure in last 30 days [MK] | 11,905 | 13,219 | 2,250 | 7,500 | 26,000 | 2,835 |
| Household size | 5.80 | 2.15 | 3.00 | 6.00 | 9.00 | 2,835 |
| Total transfers made [MK] | 3,152 | 5,099 | 0 | 1,300 | 8,000 | 2,835 |
| Total transfers received [MK] | 2,204 | 4,377 | 0 | 500 | 6,050 | 2,835 |
| Total net transfers made [MK] | 939 | 5,896 | -3,000 | 350 | 5,750 | 2,835 |
| Tobacco loan amount [MK] | 40,787 | 77,962 | 0 | 0 | 130,000 | 2,835 |
| Has fixed deposit account | 0.067 | 0.250 | | | | 2,835 |
| Not interviewed in follow-up | 0.100 | 0.300 | | | | 3,150 |

Data based on two surveys conducted in February to April 2009 (baseline) and July to September 2010 (endline), and on administrative records of our partner institution. "MK" is Malawi kwacha (MK145 = US$1 during study period). Withdrawals presented as negative numbers. See Appendix B for variable definitions.

**Table 2: Assignment of clubs to treatment conditions**

| | No savings intervention | Savings intervention: ordinary accounts offered | Savings intervention: ordinary and commitment accounts offered |
|---|---|---|---|
| No raffle | Group 0: 42 clubs | Group 1: 43 clubs | Group 4: 42 clubs |
| Public distribution of raffle tickets | N/A | Group 2: 44 clubs | Group 5: 43 clubs |
| Private distribution of raffle tickets | N/A | Group 3: 43 clubs | Group 6: 42 clubs |

**Table 3: Test of Balance in Baseline Characteristics**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dependent variable:** | Female | Married | Age [years] | Years of edu-cation | House-hold size | Asset index | Live-stock index | Land under culti-vation [acres] | Pro-ceeds from crop sales [MK] | Cash spent on inputs [MK] | Has bank account | Savings in accounts and cash [MK] | Hyper-bolic | Patient now, im-patient later | Net transfers made in past 12m [MK] | Missing val.: formal savings and cash | Missing val.: time prefe-rences |
| ***PANEL A*** | | | | | | | | | | | | | | | | | |
| Savings | 0.044*** | -0.018** | -1.42 | 0.14 | -0.03 | 0.08 | -0.07 | -0.01 | 6,997 | 3,918* | -0.021 | 371 | 0.012 | -0.054 | 72 | -0.002 | 0.001 |
| | (0.012) | (0.009) | (0.93) | (0.20) | (0.13) | (0.11) | (0.09) | (0.14) | (8,891) | (2,027) | (0.029) | (550) | (0.017) | (0.034) | (452) | (0.013) | (0.005) |
| P-values of F-tests for joint significance of baseline variables: | | | | | 0.1481 | | | | | | | | | | | | |
| ***PANEL B*** | | | | | | | | | | | | | | | | | |
| Commitment savings | 0.045*** | -0.019* | -1.39 | 0.09 | -0.04 | 0.07 | -0.06 | -0.05 | 5,604 | 3,337 | -0.039 | 376 | 0.024 | -0.076** | -195 | -0.004 | 0.003 |
| | (0.013) | (0.010) | (0.97) | (0.22) | (0.13) | (0.12) | (0.09) | (0.15) | (9,779) | (2,357) | (0.032) | (612) | (0.019) | (0.036) | (476) | (0.014) | (0.005) |
| Ordinary savings | 0.042*** | -0.018* | -1.45 | 0.19 | -0.02 | 0.09 | -0.07 | 0.02 | 8,294 | 4,459** | -0.005 | 367 | 0.000 | -0.034 | 320 | 0.000 | 0.000 |
| | (0.013) | (0.010) | (0.98) | (0.22) | (0.13) | (0.12) | (0.09) | (0.15) | (9,639) | (2,209) | (0.031) | (588) | (0.018) | (0.037) | (475) | (0.015) | (0.005) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.790 | 0.912 | 0.924 | 0.557 | 0.857 | 0.825 | 0.936 | 0.549 | 0.731 | 0.592 | 0.219 | 0.985 | 0.083 | 0.110 | 0.094 | 0.730 | 0.661 |
| P-values of F-tests for joint significance of baseline variables: | | | | | | | | | | | | | | | | | |
| Commitment savings | | | | | 0.6168 | | | | | | | | | | | | |
| Ordinary savings | | | | | 0.8851 | | | | | | | | | | | | |
| Mean Dep Var in Control | 0.024 | 0.972 | 46.23 | 5.31 | 5.81 | -0.11 | 0.03 | 4.67 | 117,495 | 21,798 | 0.658 | 3,235 | 0.095 | 0.352 | 1,655 | 0.066 | 0.009 |
| Number of observations | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 2,949 | 3,117 | 3,117 | 3,150 | 3,150 | 3,150 |

**Table 3 (Cont.): Test of Balance in Baseline Characteristics**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dependent variable:** | Female | Married | Age [years] | Years of edu-cation | House-hold size | Asset index | Live-stock index | Land under culti-vation [acres] | Pro-ceeds from crop sales [MK] | Cash spent on inputs [MK] | Has bank account | Savings in accounts and cash [MK] | Hyper-bolic | Patient now, im-patient later | Net transfers made in past 12m [MK] | Missing val.: formal savings and cash | Missing val.: time prefe-rences |
| ***PANEL C*** | | | | | | | | | | | | | | | | | |
| Commitment, no raffle | 0.035* | -0.017 | -1.17 | 0.38 | -0.08 | 0.13 | -0.02 | -0.01 | 11,742 | 2,233 | -0.042 | 770 | 0.029 | -0.055 | -314 | -0.007 | 0.012 |
| | (0.019) | (0.015) | (1.09) | (0.24) | (0.16) | (0.15) | (0.12) | (0.18) | (13,191) | (3,415) | (0.045) | (885) | (0.025) | (0.047) | (541) | (0.019) | (0.010) |
| Commitment, private raffle | 0.038** | -0.009 | -1.05 | -0.01 | 0.21 | 0.17 | -0.04 | 0.24 | 9,648 | 5,285* | 0.010 | 460 | 0.035 | -0.096** | -162 | 0.015 | -0.001 |
| | (0.018) | (0.013) | (1.10) | (0.29) | (0.16) | (0.16) | (0.12) | (0.18) | (11,700) | (3,099) | (0.041) | (828) | (0.026) | (0.039) | (558) | (0.018) | (0.006) |
| Commitment, public raffle | 0.063*** | -0.030** | -1.94 | -0.08 | -0.25 | -0.09 | -0.12 | -0.36** | -4,403 | 2,360 | -0.084** | -75 | 0.009 | -0.074* | -113 | -0.021 | -0.003 |
| | (0.017) | (0.014) | (1.24) | (0.28) | (0.16) | (0.13) | (0.11) | (0.17) | (12,891) | (3,231) | (0.042) | (712) | (0.022) | (0.044) | (597) | (0.017) | (0.006) |
| Ordinary, no raffle | 0.048*** | -0.032** | -0.93 | 0.03 | -0.11 | 0.24 | -0.04 | 0.11 | 7,888 | 2,316 | 0.014 | 200 | 0.003 | -0.084* | 82 | -0.009 | 0.001 |
| | (0.016) | (0.013) | (1.25) | (0.28) | (0.16) | (0.16) | (0.10) | (0.20) | (12,765) | (2,626) | (0.042) | (731) | (0.021) | (0.050) | (547) | (0.019) | (0.008) |
| Ordinary, private raffle | 0.048*** | -0.002 | -1.50 | 0.17 | 0.07 | 0.15 | -0.05 | -0.02 | 11,512 | 8,791** | -0.005 | 199 | 0.003 | -0.012 | 267 | 0.000 | 0.004 |
| | (0.018) | (0.011) | (1.20) | (0.27) | (0.16) | (0.15) | (0.10) | (0.16) | (11,298) | (3,403) | (0.039) | (718) | (0.022) | (0.041) | (591) | (0.020) | (0.008) |
| Ordinary, public raffle | 0.031* | -0.019 | -1.90* | 0.36 | -0.02 | -0.11 | -0.10 | -0.04 | 5,689 | 2,266 | -0.023 | 714 | -0.005 | -0.006 | 604 | 0.008 | -0.003 |
| | (0.017) | (0.013) | (1.07) | (0.26) | (0.15) | (0.14) | (0.10) | (0.18) | (12,461) | (2,733) | (0.042) | (723) | (0.020) | (0.045) | (541) | (0.021) | (0.005) |
| P-val. of F-tests: | | | | | | | | | | | | | | | | | |
| Com.: priv. raffle vs. no raffle | 0.894 | 0.637 | 0.903 | 0.141 | 0.054 | 0.809 | 0.833 | 0.186 | 0.879 | 0.436 | 0.278 | 0.760 | 0.816 | 0.324 | 0.760 | 0.306 | 0.208 |
| Com.: pub. raffle vs. no raffle | 0.178 | 0.460 | 0.494 | 0.061 | 0.247 | 0.156 | 0.322 | 0.049 | 0.269 | 0.975 | 0.407 | 0.342 | 0.450 | 0.685 | 0.709 | 0.511 | 0.123 |
| Ord.: priv. raffle vs. no raffle | 0.984 | 0.023 | 0.641 | 0.607 | 0.281 | 0.627 | 0.884 | 0.456 | 0.777 | 0.073 | 0.681 | 0.998 | 0.988 | 0.128 | 0.729 | 0.677 | 0.747 |
| Ord.: pub. raffle vs. no raffle | 0.366 | 0.366 | 0.376 | 0.220 | 0.543 | 0.024 | 0.443 | 0.427 | 0.872 | 0.986 | 0.448 | 0.482 | 0.686 | 0.125 | 0.275 | 0.469 | 0.609 |
| P-values of F-tests for joint significance of baseline variables: | | | | | | | | | | | | | | | | | |
| Commitment, no raffle | | | | | 0.9279 | | | | | | | | | | | | |
| Commitment, private raffle | | | | | 0.3273 | | | | | | | | | | | | |
| Commitment, public raffle | | | | | 0.1738 | | | | | | | | | | | | |
| Ordinary, no raffle | | | | | 0.7313 | | | | | | | | | | | | |
| Ordinary, private raffle | | | | | 0.4927 | | | | | | | | | | | | |
| Ordinary, public raffle | | | | | 0.0993 | | | | | | | | | | | | |
| Mean dep. var. in Control group | 0.024 | 0.972 | 46.23 | 5.31 | 5.81 | -0.11 | 0.03 | 4.67 | 117,495 | 21,798 | 0.658 | 3,235 | 0.095 | 0.352 | 1,655 | 0.066 | 0.009 |
| Number of observations | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 2,949 | 3,117 | 3,117 | 3,150 | 3,150 | 3,150 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification-cell fixed effects. For variable definitions, see Appendix B. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commit.: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below. F-tests of joint significance: test of joint significance in regression of respective treatment dummies on all 17 baseline variables.

**Table 4: Impact of Treatments on Deposits and Withdrawals**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent variable:** | Any transfer via direct deposit (take-up) | Total deposits into accounts [MK] | Total with-drawals from accounts [MK] | Deposits into ordinary accounts [MK] | Deposits into commit-ment accounts [MK] | Deposits into other accounts [MK] | Net deposits [MK] | Net deposits [MK] | Net deposits [MK] |
| **Time period:** | Mar 2009 - Apr 2010 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Nov-Dec 2009 | Jan-Apr 2010 |
| ***PANEL A*** | | | | | | | | | |
| Savings | 0.194*** | 17,609*** | -16,761*** | 16,807*** | 668*** | 134 | 848** | -952*** | -120 |
| | (0.036) | (3,910) | (3,819) | (3,773) | (224) | (163) | (389) | (278) | (175) |
| ***PANEL B*** | | | | | | | | | |
| Commitment savings | 0.207*** | 18,801*** | -17,511*** | 17,021*** | 1,490*** | 290 | 1,290*** | -1,238*** | -189 |
| | (0.039) | (4,360) | (4,235) | (4,137) | (358) | (202) | (474) | (346) | (198) |
| Ordinary savings | 0.181*** | 16,513*** | -16,071*** | 16,611*** | -88 | -9 | 442 | -690** | -56 |
| | (0.040) | (4,840) | (4,745) | (4,743) | (181) | (163) | (516) | (294) | (189) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.432 | 0.642 | 0.764 | 0.931 | 0.000 | 0.074 | 0.169 | 0.088 | 0.411 |
| ***PANEL C*** | | | | | | | | | |
| Commitment, no raffle | 0.214*** | 21,861*** | -20,740*** | 19,464*** | 1,994** | 403 | 1,121* | -1,066*** | -256 |
| | -0.046 | (6,885) | (6,829) | (6,282) | (789) | (348) | (669) | (398) | (352) |
| Commitment, private raffle | 0.245*** | 16,529*** | -15,356*** | 15,011*** | 1,295*** | 223 | 1,173 | -1,196** | -176 |
| | -0.055 | (5,744) | (5,425) | (5,469) | (484) | (254) | (743) | (580) | (215) |
| Commitment, public raffle | 0.162*** | 18,244*** | -16,671*** | 16,792*** | 1,200*** | 252 | 1,573** | -1,451*** | -136 |
| | -0.049 | (5,927) | (5,649) | (5,786) | (396) | (217) | (753) | (463) | (209) |
| Ordinary, no raffle | 0.164*** | 21,596*** | -20,968*** | 21,367*** | -100 | 329 | 628 | -942* | 56 |
| | -0.049 | (7,073) | (6,751) | (6,962) | (235) | (278) | (1,027) | (481) | (298) |
| Ordinary, private raffle | 0.170*** | 6,977 | -6,002 | 7,233 | -99 | -157 | 975** | -507 | -296 |
| | -0.05 | (4,843) | (4,762) | (4,709) | (231) | (162) | (464) | (383) | (242) |
| Ordinary, public raffle | 0.209*** | 20,898*** | -21,158*** | 21,148*** | -54 | -196 | -260 | -618* | 65 |
| | -0.055 | (7,941) | (7,941) | (7,875) | (212) | (161) | (1,037) | (349) | (201) |
| P-val. of F-tests: | | | | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.590 | 0.497 | 0.476 | 0.536 | 0.444 | 0.623 | 0.957 | 0.842 | 0.823 |
| Commit.: pub. raffle vs. no raffle | 0.313 | 0.655 | 0.606 | 0.724 | 0.351 | 0.670 | 0.628 | 0.442 | 0.726 |
| Ordinary: priv. raffle vs. no raffle | 0.916 | 0.048 | 0.034 | 0.053 | 0.996 | 0.074 | 0.756 | 0.426 | 0.283 |
| Ordinary: pub. raffle vs. no raffle | 0.439 | 0.940 | 0.983 | 0.981 | 0.839 | 0.042 | 0.533 | 0.527 | 0.976 |
| Mean dep. var. in Control group | 0.000 | 3,281 | -3,256 | 3,107 | 0 | 174 | 25 | -10 | -148 |
| Number of observations | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects and the following baseline variables: Dummy for male respondent; dummy for married; age in years; years of completed education; number of household members; asset index; livestock index; land under cultivation; proceeds from tobacco and maize sales during the 2008 season; cash spent on inputs for the 2009 season; dummy for ownership of any formal bank account; amount of savings in bank or cash (with missing values replaced with zeros); dummy for hyperbolic (missing values replaced with zeros); dummy for "patient now, impatient later" (missing values replaced with zeros); net transfers made to social network over 12 months; dummy for missing value in savings amount; dummy for missing value in hyperbolic and "patient now, impatient later". For complete variable definitions, see Appendix B. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below. Planting season is Nov-Apr. Fertilizer application occurs in Nov-Dec. Fertilizer purchases occur in both pre-planting period (Oct and before) and start of planting season (Nov-Dec). Net deposits are deposits minus withdrawals.

**Table 5: Impact of Treatments on Agricultural Outcomes in 2009-2010 Season and Household Expenditure after 2010 Harvest**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **Dependent variable:** | Land under cultivation [acres] | Total value of inputs [MK] | Proceeds from crop sales [MK] | Value of crop output (sold and not sold) [MK] | Farm profit (output-input) [MK] | Total expenditure in 30 days prior to survey [MK] |
| ***PANEL A*** | | | | | | |
| Savings | 0.30** | 8,023* | 19,595** | 23,921** | 16,927* | 1,151* |
| | (0.15) | (4,131) | (8,996) | (11,529) | (9,117) | (601) |
| ***PANEL B*** | | | | | | |
| Commitment savings | 0.33** | 10,297** | 26,427*** | 31,259** | 21,369** | 1,442** |
| | (0.16) | (4,563) | (9,979) | (12,510) | (10,064) | (656) |
| Ordinary savings | 0.27* | 5,946 | 13,358 | 17,223 | 12,872 | 885 |
| | (0.16) | (4,504) | (9,518) | (12,204) | (9,577) | (650) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.614 | 0.246 | 0.086 | 0.117 | 0.246 | 0.283 |
| ***PANEL C*** | | | | | | |
| Commitment, no raffle | 0.42** | 16,534** | 22,963** | 33,968** | 19,205 | 1,860** |
| | (0.20) | (6,394) | (11,614) | (15,115) | (12,399) | (857) |
| Commitment, private raffle | 0.29 | 8,026 | 34,667** | 33,031** | 22,252* | 1,328* |
| | (0.19) | (6,068) | (13,683) | (15,914) | (13,064) | (799) |
| Commitment, public raffle | 0.28 | 6,645 | 21,158* | 26,690* | 22,436* | 1,151 |
| | (0.20) | (5,390) | (12,114) | (14,929) | (12,011) | (907) |
| Ordinary, no raffle | 0.05 | 8,521 | 10,306 | 7,844 | 1,888 | 413 |
| | (0.19) | (6,273) | (11,935) | (14,806) | (11,195) | (876) |
| Ordinary, private raffle | 0.30 | 1,184 | 10,720 | 17,331 | 17,260 | 691 |
| | (0.21) | (5,473) | (11,717) | (15,151) | (12,048) | (849) |
| Ordinary, public raffle | 0.47** | 8,408 | 18,928 | 26,528* | 19,323 | 1,568** |
| | (0.19) | (5,686) | (12,156) | (15,218) | (12,323) | (795) |
| P-val. of F-tests: | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.478 | 0.239 | 0.396 | 0.953 | 0.821 | 0.550 |
| Commit.: pub. raffle vs. no raffle | 0.476 | 0.133 | 0.880 | 0.622 | 0.791 | 0.470 |
| Ordinary: priv. raffle vs. no raffle | 0.229 | 0.265 | 0.973 | 0.532 | 0.191 | 0.777 |
| Ordinary: pub. raffle vs. no raffle | 0.032 | 0.987 | 0.495 | 0.217 | 0.143 | 0.216 |
| Mean dep. var. in Control group | 4.28 | 60,372 | 91,747 | 155,685 | 95,210 | 10,678 |
| Number of observations | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects and the following baseline variables: Dummy for male respondent; dummy for married; age in years; years of completed education; number of household members; asset index; livestock index; land under cultivation; proceeds from tobacco and maize sales during the 2008 season; cash spent on inputs for the 2009 season; dummy for ownership of any formal bank account; amount of savings in bank or cash (with missing values replaced with zeros); dummy for hyperbolic (missing values replaced with zeros); dummy for "patient now, impatient later" (missing values replaced with zeros); net transfers made to social network over 12 months; dummy for missing value in savings amount; dummy for missing value in hyperbolic and "patient now, impatient later". For complete variable definitions, see Appendix B. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below.

**Table 6: Impact of treatments on household size, transfers and fixed deposit demand**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **Dependent variable:** | Household size | Total transfers made [MK] | Total transfers received [MK] | Total net transfers made [MK] | Tobacco loan amount [MK] | Has fixed deposit account |
| ***PANEL A*** | | | | | | |
| Savings | 0.14 | 215 | -301 | 477 | 3,158 | 0.032*** |
| | (0.09) | (249) | (248) | (322) | (4,583) | (0.012) |
| ***PANEL B*** | | | | | | |
| Commitment savings | -0.004 | 304 | -316 | 568 | 3,418 | 0.050*** |
| | (0.019) | (275) | (258) | (347) | (4,897) | (0.014) |
| Ordinary savings | -0.010 | 134 | -288 | 394 | 2,920 | 0.016 |
| | (0.019) | (267) | (262) | (342) | (5,068) | (0.012) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.748 | 0.431 | 0.856 | 0.483 | 0.899 | 0.008 |
| ***PANEL C*** | | | | | | |
| Commitment, no raffle | 0.06 | 278 | -490* | 724* | 3,686 | 0.062*** |
| | (0.11) | (331) | (290) | (405) | (5,706) | (0.024) |
| Commitment, private raffle | 0.18 | 375 | -484 | 845* | 7,471 | 0.040** |
| | (0.12) | (378) | (298) | (434) | (6,601) | (0.017) |
| Commitment, public raffle | 0.13 | 257 | 28 | 131 | -1,053 | 0.049** |
| | (0.11) | (332) | (301) | (410) | (5,897) | (0.019) |
| Ordinary, no raffle | 0.05 | 491 | -206 | 642 | 4,508 | 0.033** |
| | (0.11) | (352) | (322) | (436) | (6,809) | (0.017) |
| Ordinary, private raffle | 0.18 | -66 | -251 | 196 | -649 | -0.000 |
| | (0.11) | (296) | (314) | (422) | (6,282) | (0.013) |
| Ordinary, public raffle | 0.21* | -20 | -407 | 345 | 4,930 | 0.018 |
| | (0.11) | (345) | (307) | (385) | (6,465) | (0.016) |
| P-val. of F-tests: | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.279 | 0.799 | 0.981 | 0.764 | 0.564 | 0.389 |
| Commit.: pub. raffle vs. no raffle | 0.497 | 0.949 | 0.045 | 0.138 | 0.410 | 0.624 |
| Ordinary: priv. raffle vs. no raffle | 0.249 | 0.097 | 0.886 | 0.315 | 0.474 | 0.037 |
| Ordinary: pub. raffle vs. no raffle | 0.134 | 0.171 | 0.500 | 0.460 | 0.955 | 0.432 |
| Mean dep. var. in Control group | 5.72 | 2,872 | 2,492 | 418 | 40,147 | 0.039 |
| Number of observations | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects and the following baseline variables: Dummy for male respondent; dummy for married; age in years; years of completed education; number of household members; asset index; livestock index; land under cultivation; proceeds from tobacco and maize sales during the 2008 season; cash spent on inputs for the 2009 season; dummy for ownership of any formal bank account; amount of savings in bank or cash (with missing values replaced with zeros); dummy for hyperbolic (missing values replaced with zeros); dummy for "patient now, impatient later" (missing values replaced with zeros); net transfers made to social network over 12 months; dummy for missing value in savings amount; dummy for missing value in hyperbolic and "patient now, impatient later". For complete variable definitions, see Appendix B. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below.

## Appendix A: Account details and full text of training script

*Savings account details*

We offered farmers training and account opening assistance for two types of accounts depending on treatment status (control, ordinary savings or commitment savings). The "ordinary" account referred to in the main text is OIBM's Kasupe account. Kasupe accounts had an account opening fee of MK500, no monthly fee, three free withdrawals transactions via ATM per month, and a MK25 fee per ATM withdrawal thereafter (all withdrawals at the teller were free). The minimum balance for Kasupe accounts was MK500 and there was an account closing fee of MK1,000. Kasupe accounts paid an interest rate of 2.5% p.a. with interest accruing quarterly. Deposit transactions into Kasupe accounts were free.

Farmers were given the option to have their proceeds directly deposited into an existing account if they already had a savings account with OIBM. Another type of savings account not actively marketed in this experiment but part of OIBM's product portfolio was standard savings accounts with the following fee structure: an opening fee of MK500; a monthly fee of MK75; no withdrawal fees; minimum balance of MK1,000; a closing fee of MK1,000; an interest rate of 6.5% p.a. with quarterly accrual. This less common account type is included in the category "ordinary" accounts together with Kasupe accounts.

The "commitment" account referred to in the main text was an account newly developed for the project called "SavePlan." SavePlan accounts paid the same interest rate as Kasupe accounts, but had no minimum balance requirement. SavePlan accounts also had no account opening or closing fees. Deposit transactions into SavePlan accounts were free. The only withdrawals permitted for SavePlan accounts were transfers to ordinary (Kasupe or other) savings accounts, for which no fee was charged.

*Scripts for savings training, account offers, and raffle training*
*(Scripts were administered in club meeting immediately following administration of baseline survey. Malawian research project staff played the roles of Persons 1 and 2.)*

**Section 1: Savings Accounts (All Clubs)**

*Person 1:* Saving money in an individual bank account is a very smart way to protect your money and improve your wellbeing. As you know, OIBM has Kasupe accounts that are easy and affordable to use.

*Person 2:* But I already have a savings account with my club. What is better about this Kasupe account?

*First ask the group to list things that are good about the Kasupe account. When the group has come up with several suggestions, move on to the next line:*

*Person 1:* The Kasupe account is yours alone. You don't share it with the rest of your club members. You are the only one who can take money out of the account and the only one who knows how much money you have saved in the account.

*Person 2:* What are the details of the account? How much does it cost, and what is the interest?

*Person 1:* MK 500 for smartcard, MK 500 for initial deposit, no monthly charge, MK 25 transaction charge (ATM fee, withdrawal fee).

*Person 2:* But I can just keep money at home. What are some of the benefits of saving my money in a Kasupe account instead of at home?

*Let the group make suggestions. After several things have been suggested, agree with the group and then move on to the next line.*

*Person 1:* Money is safer in a bank account than at home. If you keep your money at home, it could be stolen or lost in a fire. If you keep it at the bank, it is protected. Also, if you keep money at home, you may feel obligated to give money to your family or friends if they ask for it. If your money is in the bank, you can say that you don't have any money to give.

*Person 2:* That is interesting, but I think my money is safe at home.

*Ask the group: "Do you think money is safe at home?" Let the group come up with answers, then move on.*

*Person 1:* There are other reasons to keep money in the bank, too. Keeping money in a bank account can help you save for the future. If you have money at home, it is easy to be tempted to spend it on food or drinks or household items. If you have money in the bank, you will think twice about taking it out to spend. Instead, you can leave it in the bank to save for important purchases like school fees or buying fertilizer or accumulating the deposit for a new loan. Also, you can be sure to put away money in case you have an emergency in the future, like someone gets sick and needs to go to the hospital.

**Section 2: Saving for the future (All Clubs)**

*Person 2:* It would be good to save for the future, but I have many needs now. How can I afford to save?

*Person 1:* It is important to make a plan for how to spend your money. One way to do this is to divide the money you will have after selling your tobacco and paying your loans into two amounts. One amount is to use now, and the other amount is to use in the future. Then, you can commit to keeping the future amount safe, and not touching it now.

*Person 2:* How can I do that?

*Person 1:* Think about how much money you will have after you sell your tobacco and repay your loan to OIBM. Then, think about expenses you have immediately.

*Have the group list things they need to spend money on immediately. Get a list of 5-6 things, then move on.*

*Person 2:* Yes, I will have to pay someone who has done weeding for me. Also, I need to buy some soap and other household goods. My children need new clothes, too.

*Person 1:* Yes, these are the kinds of things you need to spend money on right away, when you get paid. But now think of things you will need to spend money on in the future. What do you want to be absolutely sure you can afford?

*Ask the group to list things they want to save for in the future. Make sure they are thinking of long-term things or expenses that will happen in a few months. Get the group to list 5-6 things, then move on.*

*Person 2:* I can think of many things. I will need to pay school fees. Also, I want to make sure I can buy fertilizer for my maize. And I want to have money for food next year during the hungry season.

*Person 1:* These are important expenses. You should plan to protect some of your money so that it is available for those expenses. You can do that by committing to locking it away until a date in the future, when you will need it. What is a date that makes sense? Choose a time that is close to when you will need the money for the reasons you just described, so that you aren't tempted to spend it on other things.

*Ask the group: "When do you think you want to access money you would save for the future?" Let the group discuss several dates. Make sure they consider purchasing inputs, and also food during the hunger season.*

*Person 2:* Hmmm. November 1 is probably a good time. That will be in time for me to buy fertilizer and pay my loan deposit.

*Person 1:* Now that you have chosen a date, you have to decide how to divide your money between things you will buy before that date, and the things you are saving for in the future. This is an important choice. You have to make sure that you have enough money for your immediate needs and things you will have to buy before the date you have chosen. You also have to estimate how much money you will need for the things you want to buy in the future. Start with money you need soon. Of the money you will have after you sell your tobacco and repay your loan, how much do you need to have available for spending before November 1, which is the date you have chosen?

*Have the group suggest amounts of money they will spend on immediate expenses.*

*Person 2:* Well, I need to pay someone for ganyu. And I need to buy clothes, and some household items right away. I will also need to spend some money after the harvest season on small things like soap. I will need to spend MK 25,000 between when I get money and November 1.

*Person 1:* Ok. How much do you want to make sure to have for the future, after that date you have chosen?

*Person 2:* I will need MK 4,500 for fertilizer, and MK 3,000 for a deposit on a new loan. Also, I want to keep MK 2,000 for food in the hungry season. That is MK 9,500 total.

*Person 1:* So in total, your plan is to spend at least MK 25,000 now, and MK 9,500 in the future. That is MK 34,500. Do you think you will have at least that much profit after selling your tobacco and repaying your loan?

*Person 2:* Yes, I think I will have about MK 40,000.

*Person 1:* Good. If you earn that much, then the extra money can be available immediately. Then you can commit to saving MK 9,500 for the future, and keep your other money available to spend sooner. You don't have to spend it all before your date of November 1, of course, but it will be available while you are committing to lock away MK 9,500 until then. You made three decisions: You decided how much money you needed immediately, you decided how much money to lock away for the future, and you decided when you needed to access that locked away money.

*Person 2:* Yes. Those weren't hard decisions. But let's demonstrate how it would work if I had chosen different options.

**Section 3: Account Allocation Demonstration (All Clubs)**

*In this section, the two enumerators will work together to do a demonstration with bottle caps. You will need 12 bottle caps for this demonstration. Draw two big circles in the dirt, and make sure everyone can see them.*

These circles represent money available for use immediately *(point at one circle)* and money committed to be saved for the future *(point at the other circle).* These bottle caps represent money. Think of each cap as MK 1,000. So, the 12 caps I have here represent MK 12,000 that someone has after selling his crop and repaying his loan.

Now, if I need MK 3,000 now and commit to saving MK 5,000 for the future, then the first MK 3,000 I earn goes in this circle, for use immediately *(put 3 bottle caps in the immediate use circle).* Then, the next MK 5,000 I earn gets locked away for the future (*put 5 bottle caps in the future circle).* Any extra money is available for use in the future, even though I don't have to spend it immediately it is not locked away (*put the remaining 8 bottle caps in the immediate use circle).*

(*Collect all of the bottle caps).* Think of this like a debt. I owe the ordinary account 3 bottle caps, and I owe the commitment account 5 bottle caps. I must pay the ordinary account first, before I pay the commitment account. Suppose I get 10 bottle caps after I sell my tobacco and repay my loans. *(Hold up 10 caps).*

First, I put 3 for immediate use. (*Put 3 caps in the immediate use circle*.) Next, I lock 5 away for use in the future. (*Put 5 caps in the future use circle*.) Then, since I've met the targets for immediate use and future use, I put all the other caps in the immediate use circle. *(Put the remaining 2 caps in the immediate use circle*.)

What if I only get 3 caps? (*Have someone come up to demonstrate. Give the person 3 caps. See where he puts them. All 3 should go in the immediate circle, and none in the future circle. If he gets this wrong, ask if anyone has a different idea. Explain if necessary.)*

*(Enumerator, if farmers don't understand the demonstration you just performed, please skip back to the start of the demonstration and explain the bottle caps idea again.)*

What if I get 6 caps? (*Have a volunteer come up and give him 6 caps. Correct answer: 3 in immediate, 3 in future.)*

What if you get 12 caps? (*Have another volunteer come up, etc. Correct answer: first put 3 in immediate, then 5 in future, then 4 more in immediate. Total is 7 immediate, 5 in future*.)

Dividing the bottle caps between the two circles is just like the spending plan you made before. You decide how much money you need to have available for immediate use. When you get money, it is first made available for immediate use, up to the goal you set. (*Point at the immediate use circle).* Then, you decide how much to save for the future. After making sure you have money for immediate use, you protect money for the future. (*Point at the future use circle).* Then, if there is money left after you meet both your immediate and future goals, that extra money remains available for use whenever you choose. (*Point at the immediate use circle).* This way, you can make a plan for how to divide your money between money you need now, and money you can commit to saving for the future, even when you don't know exactly how much you will earn.

**Section 4: Offer of Kasupe (Ordinary) Accounts (All Clubs Except Group 0)**

*Person 1:* We have talked a lot about how to make a budget that gives you enough money for immediate needs and commits you to saving money for the future. Also, we've discussed why saving at the bank is useful.

*Person 2:* Yes. I can make a plan about the amount of money I need for the short term, an amount I want to be sure to save for the future, and a date in the future when I will want that money. But how am I to use the bank?

*Person 1:* Usually, when you are paid for your tobacco, money is put into your group account. Then, the club officers give you your share of the cash. You leave it in the group account if you want. Or, you can save it at the bank, but to do that, you have to take your cash to the bank and deposit it into your individual account.

*Person 2:* Yes. It is inconvenient to have to take the money back to the bank, and often, I am tempted to spend the money as soon as I receive it.

*Person 1:* This season, we are offering you a new option. You can sign up to have your money transferred directly into your own Kasupe account. That means that when your bales of tobacco clear the auction floor, OIBM would automatically put the money you have earned after repaying your loan into your own Kasupe account.

*Person 2:* How would OIBM know which money was mine and which money belongs to others in my club?

*Person 1:* You would have to agree that OIBM could get a copy of your seller sheet from Auction Holdings. OIBM would use the information on the seller sheet to figure out how much money should go into your account.

*Person 2:* So if I agree to this, what do I have to do?

*Person 1:* The first thing to do is to open a Kasupe account, if you don't already have one. We can help with filling out the forms. The next thing to do is to sign a form authorizing the direct deposit. You can do both of those things today.

*Person 2:* That's all I have to do?

*Person 1:* Yes. It is very easy. If you open an account or already have one, and fill out the form for direct deposit, then your money will be put into your individual account automatically when your tobacco is sold and your loan has been recovered.

*Ask the group if there are any questions about how to sign up for direct deposit.*

*Person 2:* What if I decide I don't want to try this system and I would rather have my money go into the club account?

*Person 1:* You can still open a Kasupe account. Just don't fill out the [BLUE] form. Then, you will continue to get your money from the club officers, who will withdraw it from the club account for you. But if you do choose to have the money sent directly to your individual account, then ALL of your money for tobacco this season will go to the individual account. You can't change your mind part way through the season.

*Person 2:* Ok. I think I want the direct deposit. If I sign up for that, how do I get my cash?

*Person 1:* You can withdraw cash from the bank. You can either use your smartcard, or make the withdrawal by talking to a teller. You can do this at the branch or kiosk, or when the mobile bank comes to town. The closest place to make a withdrawal is _____.

*Person 2:* So I can take money out whenever I want?

*Person 1:* Yes, you can, but you should remember the commitment you thought about to save money for a date in the future.

**Section 5: Offer of SavePlan (Commitment) Accounts (Commitment Clubs Only)**

*Person 2:* Is there a way that OIBM can help me keep that commitment?

*Person 1:* Yes. You can open a special "SavePlan" account in addition to your Kasupe account.

*Person 2:* How would that work?

*Person 1:* Opening a SavePlan just tells the bank to follow the plan you made before. You will fill out a form with the three decisions you made earlier: how much money you need to have available for immediate use, the amount of money you want to lock away for the future, and the date you want that money released.

*Person 2:* That is easy. It's just writing down decisions I've already thought about. What happens after I fill out the form?

*Person 1:* Once you fill out the form, OIBM will use it to put the money you are saving for the future in a special, individual, commitment account. You won't be able to take money out of that account until the date you have chosen, and you can't change your mind about the date or the amount of money.

*Person 2:* Do I earn interest on money in this special account?

*Person 1:* Yes. You earn the same interest on money in the commitment account as in the ordinary Kasupe account. The only difference is that the money in the commitment account is locked away until the date you have chosen.

*Person 2:* What if I earn more or less money than I thought I would have?

*Person 1:* It works just like the bottle caps. After the loan is recovered, money first goes into your ordinary Kasupe account, up to the amount you said you needed to have available immediately. Then, money goes to the SavePlan to be locked away for the future. When you have reached your target for saving for the future, extra money earned after that amount goes back to the ordinary Kasupe account.

*Person 2:* So if I don't earn as much as I thought, I will still have money available immediately?

*Person 1:* Yes. Money goes to the Kasupe account first, and you can withdraw from that whenever you want. It only goes to the special commitment account when you have reached your target for immediate spending.

*Person 2:* So this form just tells the bank to stick to the commitment I made to myself about how much to save for the future, and when I can use that money.

*Person 1:* That's right. You can choose any amount and date you want, and OIBM will hold it for you so that you stick to the plan. We can help you fill out the form if you would like to use this special account in addition to the regular Kasupe account.

**Section 6: Raffle (All Raffle Clubs)**

As an extra incentive to save money, there will be a raffle draw where some farmers in this project may have a chance to win a prize. You have to save to have a chance to win, and the more you save, the better your chance to win. There will be two prizes in each district. The first prize will be a new bicycle, and the second prize will be a 50 kg bag of D-compound.

The raffle tickets will be based on the amount of money you save in your bank account. The prizes will be awarded in November. The raffle tickets will be given out at two times before then. The first time will be in August when we will come back and give you tickets based on the money you have saved between July

1 and August 1. OIBM will calculate the average balance in your savings account for those 30 days and the number of tickets you will get will be based on this amount. The second time we hand out tickets will be in October. OIBM will calculate your average balance from September 1 to October 1, and give you additional tickets based on that balance. Each person will get individual tickets based on their account balance. The prize is for individuals and not for the club.

You can increase your chance of winning by saving more money and saving it for a longer time. You will get one ticket for every MK 1000 in your average balance. If you put MK 10000 in your account by July 1 and keep it there until at least August 1, then you will get 10 tickets. If you don't have any money in your account from July 1 to July 14, and then put MK 10000 into your account on July 15 and keep it there until at least August 1, you will only get five tickets. If anyone here has two accounts with OIBM, we will add up the balance in both accounts. Money saved with other banks will not count for the raffle, though.

**Section 7A: Public Raffle (Public Raffle Clubs Only)**

We will hand out the raffle tickets in August and October during group meetings like the one we are having today. We will give out the tickets in front of others, so your friends will know how many tickets you are getting.

I will demonstrate how tickets will be handed out. I am going to hand you a piece of paper with a number on it. Pretend that is your average account balance from July 1 to August 1. No one but you and OIBM knows this number, so don't tell anyone!

*(Distribute the papers with fake account balances to 5 volunteers)*

Now, I will give you the number of raffle tickets you get for that balance. Come up one at a time and show me your piece of paper, so I can give you your tickets.

*(Have the farmers come up one at a time. Look at the paper and hand out tickets. Make sure to say out loud for every farmer how many tickets he gets. Make sure that the other farmers are paying attention to this.)*

When we hand out tickets in August and October, it will work the same way. You will each be called up one at a time to receive tickets based on the amount you have saved, and your club will see how many tickets you receive.

**Section 7B: Private Raffle (Private Raffle Clubs Only)**

We will hand out the raffle tickets in August and October during group meetings like the one we are having today. We will give out the tickets one at a time, so no one will know how many tickets you are getting.

I will demonstrate how tickets will be handed out. I am going to hand you a piece of paper with a number on it. Pretend that is your average account balance from July 1 to August 1. No one but you and OIBM knows this number, so don't tell anyone!

*(Distribute the papers with fake account balances to 5 volunteers)*

Now, I will give you the number of raffle tickets you get for that balance. Come up one at a time and show me your piece of paper, so I can give you your tickets.

*(Have the farmers come up one at a time. Look at the paper and hand out tickets. Make sure no one sees how many tickets you hand to each person.)*

When we hand out tickets in August and October, it will work the same way. You will each be called up one at a time to receive tickets based on the amount you have saved, and no one will know how many tickets you have received.

## Appendix B: Variable definitions

Data used in this paper come from two surveys as well as from administrative records of our partner financial institution (OIBM). We conducted a baseline survey from March to April 2009 and an endline survey from July to September 2010.
All variables that are created from survey data are top coded at the 99th percentile for variables with a positive range and bottom and top coded at the 1st and 99th percentile respectively for variables with a range that spans both negative and positive values. All figures in money terms are in Malawi Kwacha (MK).

Baseline characteristics (from baseline survey):

*Number of members per club* is the number of listed club members per information provided by the buyer companies (Alliance One and Limbe Leaf). Not all club members were interviewed.
*Female* equals 1 for female respondents and 0 for male respondents.
*Married* equals 1 for married respondents and 0 for respondents who are single, widowed, or divorced.
*Age* is respondent's age in years.
*Years of education* is the respondent's years of completed schooling.
*Household size* is the number of people counted as members of the respondent's household at the time of the baseline survey.
*Asset index* is an index based on the first principal component of the number of items owned of 14 common non-financial, non-livestock assets and indicators of presence of 4 major types of housing characteristics (iron sheet roof, glass windows, concrete floor, electricity connection).
*Livestock index* is an index based on the first principal component of the number of animals owned of 7 common types of livestock.
*Land under cultivation* is the total of area of land under cultivation, measured in acres, for the late-2008 planting season.
*Proceeds from crop sales* is the sum of sales from the two main cash crops, maize and tobacco, in the 2008 harvest.
*Cash spent on inputs* is the total amount of cash spent – excluding the value of input packages that are part of a loan -- on seeds, fertilizer, pesticides, and hired labor for the 2008-2009 planting season
*Has bank account* is 1 if a household member has an account with a formal financial institution, and 0 if not.
*Savings in accounts and cash* is the sum of current savings with formal institutions and in cash at home.

*Hyperbolic* is 1 if the respondent exhibited strictly more patience in one month, hypothetical monetary trade-offs set 12 months in the future than in the same trade-offs set in the present, and 0 otherwise. See section 5 above for more details.
*Patient now, impatient later* is 1 if the respondent exhibited strictly *less* patience in one month, hypothetical monetary trade-offs set 12 months in the future than in the same trade-offs set in the presence and 0 otherwise.
*Net transfers made in past 12m* is the total of transfers made to the social network minus the sum of transfers received from the social network, summed across six categories (social events, health shocks, education of children, agricultural inputs, hired labor and 'other').
*Missing value for formal savings and cash* is 1 if the variable "*Savings in accounts and cash"* is missing and 0 if it has valid values.
*Missing value for time preferences* is 1 if the respondent has missing values for the time preferences variables ("*Hyperbolic*" and "*Patient now, impatient later*") is missing, and 0 if these variables have valid values.

Transactions with Partner Institution (from internal records of OIBM):

*Any transfer via direct deposit* is 1 if the respondent receives any deposit from his or her tobacco club's account to his or her individual savings account, and 0 if not.
*Deposits into ordinary accounts, pre-planting* is the sum of (positive) transactions into the respondent's OIBM ordinary savings accounts during the period of March to October 2009.
*Deposits into commitment accounts, pre-planting* is the sum of (positive) transactions into the respondent's OIBM commitment savings accounts during the period of March to October 2009.
*Deposits into other accounts, pre-planting* is the sum of (positive) transactions into the respondent's OIBM non-ordinary, non-commitment savings accounts during the period of March to October 2009.
*Total deposits into accounts, pre-planting* is the sum of transactions into the respondent's OIBM accounts (sum across all accounts) during the period of March to October 2009.
*Total withdrawals from accounts, pre-planting* is the sum of transactions out of the respondent's OIBM accounts (sum across all accounts) during the period of March to October 2009.
*Net deposits, pre-planting* is the difference between all deposits and withdrawals in the respondent's OIBM accounts during the period of March to October 2009.
*Net deposits, Nov-Dec* is the difference between all deposits and withdrawals in the respondent's OIBM accounts during the period of November and December 2009.
*Net deposits, Jan-Apr* is the difference between all deposits and withdrawals in the respondent's OIBM accounts during the period of January through April 2010.

Construction of deposit spells used to calculate the share of deposits withdrawn on same day and the share of initial deposit amount remaining in account after two weeks

For these calculations we only consider deposits into ordinary accounts that are greater than MK 500 to avoid small positive transactions like interest payments to count as deposits. A deposit is considered fully withdrawn when the cumulative net transactions are within MK 400 of the initial deposit or 99% has been withdrawn, whichever is greater. This is to avoid considering deposits not withdrawn for a long time when respondents left a very small amount in the account (absolute or relative to the initial deposit). However, the calculations of the share of deposits withdrawn on same day and the average share of initial deposit amount remaining in accounts after two weeks are robust to decreasing these "buffer" amounts. The deposit and withdrawal "spells" are coded as non-overlapping: as long as the initial deposit is not withdrawn the spell is considered active. That means when another deposit is made before the initial deposit was fully withdrawn the second deposits is added to the cumulative net transactions, i.e. reduces the amount considered withdrawn. Only spells with initial deposits after March 1, 2009 are considered. Spells with initial deposits that are not counted as fully withdrawn by August 31, 2010 are set to end on that date.

Agricultural outcomes, household expenditure, and other variables, from endline survey (all planting and harvest variables refer to the 2009-2010 planting season):

*Land under cultivation* is the total area of land under cultivation, measured in acres.
*Cash spent on inputs* is the total amount of cash spent – excluding the value of input packages that are part of a loan – on seeds, fertilizer, pesticides, and hired labor for the 2009-2010 planting season.
*Total value of inputs* is the sum of cash spent on agricultural inputs plus the value of inputs included in-kind in loan packages for the 2009-2010 planting season. Input categories include seeds, pesticides, fertilizer, hired labor, transport and firewood (for curing tobacco).
*Proceeds from crop sales* is the sum of sales from the two main crops, maize and tobacco for the 2009-10 planting season.
*Value of crop output (sold & not sold)* is the sum of revenue from crop sales and the value of the unsold crop for seven main crops (maize, burley tobacco, dark fire tobacco, flue-cured tobacco, ground nuts, beans, soya). Value of harvest not sold equals the kilograms of crops not sold multiplied by the price/kilogram, summed across the seven main crops. Price/kilogram for each crop is obtained by calculating crop-specific revenue/kilogram for each observation in the sample and then taking the sample average.
*Farm profit (output - input)* is the difference between "Value of crop output" and "Total value of inputs" defined above.
*Total expenditure in last 30 days* is the sum of three categories household expenditures (food, non-food household items and transport) over the last 30 days prior to the endline survey.
*Household size* is the number of people counted as members of the respondent's household at the time of the endline survey.
*Total transfers made* is the total of transfers made to the social network over the 12 months prior to the endline interview, summed across six categories (social events, health shocks, education of children, agricultural inputs, hired labor and 'other').

*Total transfers received* is the total of transfers received from the social network over the 12 months prior to the endline interview, summed across six categories (social events, health shocks, education of children, agricultural inputs, hired labor and 'other').
*Total net transfers made* is the difference between "Total transfers made" and "Total transfers received" defined above.
*Tobacco club loan* is the total amount owed as part of a tobacco club loan for the 2009-2010 planting season.
*Not interviewed in endline* is 1 if the respondent was not interviewed and is 0 if the respondent was interviewed during the endline.

**Appendix Table 1: Attrition from baseline to endline survey**

| | (A) *Including Baseline Controls* | (B) *No Baseline controls* |
|---|---|---|
| **Dependent variable:** | Not interviewed during endline survey | Not interviewed during endline survey |
| ***PANEL A*** | | |
| Savings | -0.007 | -0.003 |
| | (0.018) | (0.018) |
| ***PANEL B*** | | |
| Commitment savings | -0.004 | 0.001 |
| | (0.019) | (0.019) |
| Ordinary savings | -0.010 | -0.007 |
| | (0.019) | (0.019) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.619 | 0.596 |
| ***PANEL C*** | | |
| Commitment, no raffle | 0.002 | 0.008 |
| | (0.025) | (0.025) |
| Commitment, private raffle | -0.006 | -0.008 |
| | (0.021) | (0.022) |
| Commitment, public raffle | -0.006 | 0.003 |
| | (0.022) | (0.023) |
| Ordinary, no raffle | -0.005 | 0.000 |
| | (0.025) | (0.026) |
| Ordinary, private raffle | -0.037* | -0.035* |
| | (0.021) | (0.021) |
| Ordinary, public raffle | 0.010 | 0.015 |
| | (0.024) | (0.024) |
| P-val. of F-tests: | | |
| Commitment: priv. raffle vs. no raffle | 0.717 | 0.504 |
| Commitment: pub. raffle vs. no raffle | 0.727 | 0.856 |
| Ordinary: priv. raffle vs. no raffle | 0.181 | 0.146 |
| Ordinary: pub. raffle vs. no raffle | 0.570 | 0.577 |
| Mean dep. var. in Control group | 0.099 | 0.099 |
| Number of observations | 3,150 | 3,150 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. Regressions include stratification cell fixed effects. Column A also includes the following baseline variables: Dummy for male respondent; dummy for married; age in years; years of completed education; number of household members; asset index; livestock index; land under cultivation; proceeds from tobacco and maize sales during the 2008 season; cash spent on inputs for the 2009 season; dummy for ownership of any formal bank account; amount of savings in bank or cash (with missing values replaced with zeros); dummy for hyperbolic (missing values replaced with zeros); dummy for "patient now, impatient later" (missing values replaced with zeros); net transfers made to social network over 12 months; dummy for missing value in savings amount; dummy for missing value in hyperbolic and "patient now, impatient later". For variable definitions, see Appendix B. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below. Planting season is Nov-Apr. Fertilizer application occurs in Nov-Dec. Fertilizer purchases occur in both pre-planting period (Oct and before) and start of planting season (Nov-Dec). Net deposits are deposits minus withdrawals.

**Appendix Table 2: Impact of Treatments on Deposits and Withdrawals**
**Regressions with stratification cell fixed effects but without additional baseline controls**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| **Dependent variable:** | Any transfer via direct deposit (take-up) | Total deposits into accounts [MK] | Total with-drawals from accounts [MK] | Deposits into ordinary accounts [MK] | Deposits into commit-ment accounts [MK] | Deposits into other accounts [MK] | Net deposits [MK] | Net deposits [MK] | Net deposits [MK] |
| **Time period:** | Mar 2009 - Apr 2010 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Mar-Oct 2009 | Nov-Dec 2009 | Jan-Apr 2010 |
| ***PANEL A*** | | | | | | | | | |
| Savings | 0.194*** | 18,971*** | -18,108*** | 18,167*** | 673*** | 131 | 863** | -978*** | -154 |
| | (0.036) | (3,881) | (3,792) | (3,742) | (217) | (160) | (411) | (271) | (173) |
| ***PANEL B*** | | | | | | | | | |
| Commitment savings | 0.206*** | 19,772*** | -18,463*** | 18,007*** | 1,477*** | 288 | 1,309*** | -1,244*** | -217 |
| | (0.039) | (4,461) | (4,313) | (4,231) | (353) | (201) | (480) | (342) | (201) |
| Ordinary savings | 0.183*** | 18,226*** | -17,777*** | 18,316*** | -74 | -16 | 449 | -731** | -95 |
| | (0.040) | (4,868) | (4,797) | (4,774) | (173) | (160) | (562) | (292) | (186) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.493 | 0.768 | 0.893 | 0.951 | 0.000 | 0.075 | 0.185 | 0.122 | 0.476 |
| ***PANEL C*** | | | | | | | | | |
| Commitment, no raffle | 0.215*** | 23,455*** | -22,350*** | 21,061*** | 1,982** | 411 | 1,104 | -1,091*** | -276 |
| | (0.047) | (7,191) | (7,098) | (6,545) | (793) | (352) | (675) | (411) | (356) |
| Commitment, private raffle | 0.249*** | 19,336*** | -18,054*** | 17,744*** | 1,321*** | 272 | 1,282* | -1,292** | -228 |
| | (0.055) | (5,523) | (5,191) | (5,232) | (482) | (274) | (758) | (576) | (221) |
| Commitment, public raffle | 0.154*** | 16,820*** | -15,298** | 15,479** | 1,152*** | 188 | 1,522** | -1,343*** | -144 |
| | (0.049) | (6,305) | (6,028) | (6,183) | (386) | (216) | (750) | (449) | (204) |
| Ordinary, no raffle | 0.168*** | 23,180*** | -22,507*** | 22,928*** | -77 | 330 | 673 | -966* | 51 |
| | (0.050) | (7,845) | (7,525) | (7,744) | (230) | (263) | (1,034) | (492) | (296) |
| Ordinary, private raffle | 0.171*** | 9,385** | -8,404* | 9,662** | -104 | -173 | 981** | -589 | -376 |
| | (0.051) | (4,636) | (4,571) | (4,498) | (220) | (157) | (432) | (364) | (239) |
| Ordinary, public raffle | 0.210*** | 22,150*** | -22,454*** | 22,374*** | -25 | -199 | -304 | -632* | 36 |
| | (0.055) | (8,179) | (8,262) | (8,105) | (205) | (162) | (1,081) | (347) | (196) |
| P-val. of F-tests: | | | | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.561 | 0.605 | 0.576 | 0.648 | 0.467 | 0.717 | 0.854 | 0.755 | 0.892 |
| Commit.: pub. raffle vs. no raffle | 0.244 | 0.436 | 0.395 | 0.484 | 0.334 | 0.542 | 0.658 | 0.624 | 0.700 |
| Ordinary: priv. raffle vs. no raffle | 0.947 | 0.088 | 0.069 | 0.097 | 0.914 | 0.045 | 0.779 | 0.480 | 0.184 |
| Ordinary: pub. raffle vs. no raffle | 0.472 | 0.920 | 0.996 | 0.957 | 0.823 | 0.031 | 0.500 | 0.522 | 0.960 |
| Mean dep. var. in Control group | 0.000 | 3,281 | -3,256 | 3,107 | 0 | 174 | 25 | -10 | -148 |
| Number of observations | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 | 3,150 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below. Planting season is Nov-Apr. Fertilizer application occurs in Nov-Dec. Fertilizer purchases occur in both pre-planting period (Oct and before) and start of planting season (Nov-Dec). Net deposits are deposits minus withdrawals.

**Apendix Table 3: Impact of Treatments on Agricultural Outcomes in 2009-2010 Season and Household Expenditure after 2010 Harvest**

**Regressions with stratification cell fixed effects but without additional baseline controls**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **Dependent variable:** | Land under cultivation [acres] | Total value of inputs [MK] | Proceeds from crop sales [MK] | Value of crop output (sold and not sold) [MK] | Farm profit (output-input) [MK] | Total expenditure in 30 days prior to survey [MK] |
| ***PANEL A*** | | | | | | |
| Savings | 0.31* | 10,004** | 23,460** | 28,502** | 19,777** | 1,454** |
| | (0.17) | (4,282) | (9,055) | (11,467) | (9,098) | (656) |
| ***PANEL B*** | | | | | | |
| Commitment savings | 0.32* | 11,324** | 28,675*** | 33,388** | 22,699** | 1,658** |
| | (0.18) | (4,883) | (10,520) | (13,063) | (10,368) | (732) |
| Ordinary savings | 0.31* | 8,790* | 18,658* | 24,003* | 17,086* | 1,265* |
| | (0.18) | (4,721) | (9,636) | (12,221) | (9,593) | (696) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.936 | 0.560 | 0.259 | 0.377 | 0.493 | 0.488 |
| ***PANEL C*** | | | | | | |
| Commitment, no raffle | 0.46** | 18,561** | 28,808** | 41,143** | 24,496* | 2,260** |
| | (0.23) | (7,552) | (13,661) | (17,983) | (13,773) | (1,006) |
| Commitment, private raffle | 0.39* | 11,110* | 39,885*** | 40,141** | 26,726** | 1,882** |
| | (0.22) | (6,509) | (14,628) | (16,711) | (13,365) | (862) |
| Commitment, public raffle | 0.10 | 4,718 | 17,087 | 19,107 | 16,824 | 859 |
| | (0.21) | (5,973) | (13,699) | (16,910) | (13,438) | (1,011) |
| Ordinary, no raffle | 0.11 | 10,923 | 15,407 | 15,223 | 7,219 | 832 |
| | (0.22) | (7,049) | (12,993) | (15,828) | (11,711) | (956) |
| Ordinary, private raffle | 0.36 | 5,521 | 17,839 | 26,475 | 22,379* | 1,231 |
| | (0.23) | (5,928) | (12,713) | (16,299) | (12,765) | (899) |
| Ordinary, public raffle | 0.45** | 10,292* | 22,718* | 30,467* | 21,521* | 1,755** |
| | (0.22) | (5,954) | (12,487) | (15,505) | (12,452) | (808) |
| P-val. of F-tests: | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.773 | 0.391 | 0.504 | 0.960 | 0.883 | 0.716 |
| Commit.: pub. raffle vs. no raffle | 0.127 | 0.090 | 0.457 | 0.271 | 0.616 | 0.222 |
| Ordinary: priv. raffle vs. no raffle | 0.305 | 0.481 | 0.867 | 0.529 | 0.252 | 0.702 |
| Ordinary: pub. raffle vs. no raffle | 0.131 | 0.934 | 0.609 | 0.373 | 0.269 | 0.336 |
| Mean dep. var. in Control group | 4.275 | 60,372 | 91,747 | 155,685 | 95,210 | 10,678 |
| Number of observations | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below.

**Appendix Table 4: Impact of treatments on household size, transfers and fixed deposit**
**Regressions with stratification cell fixed effects but without additional baseline controls**

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| **Dependent variable:** | Household size | Total transfers made [MK] | Total transfers received [MK] | Total net transfers made [MK] | Tobacco loan amount [MK] | Has fixed deposit account |
| ***PANEL A*** | | | | | | |
| Savings | 0.10 | 368 | -295 | 610** | 2,806 | 0.033*** |
| | (0.14) | (238) | (242) | (304) | (4,591) | (0.012) |
| ***PANEL B*** | | | | | | |
| Commitment savings | 0.07 | 427 | -318 | 682** | 2,954 | 0.049*** |
| | (0.15) | (275) | (251) | (339) | (4,940) | (0.014) |
| Ordinary savings | 0.12 | 315 | -273 | 545* | 2,669 | 0.017 |
| | (0.15) | (253) | (259) | (322) | (5,121) | (0.012) |
| P-val. of F-test: Commitment savings = Ordinary savings | 0.675 | 0.618 | 0.782 | 0.599 | 0.945 | 0.011 |
| ***PANEL C*** | | | | | | |
| Commitment, no raffle | -0.01 | 470 | -459 | 875** | 3,835 | 0.062** |
| | (0.16) | (336) | (284) | (420) | (5,924) | (0.024) |
| Commitment, private raffle | 0.33* | 591 | -464 | 1,031** | 8,393 | 0.040** |
| | (0.19) | (391) | (286) | (439) | (6,733) | (0.017) |
| Commitment, public raffle | -0.11 | 220 | -34 | 142 | -3,413 | 0.047** |
| | (0.18) | (353) | (300) | (425) | (5,874) | (0.019) |
| Ordinary, no raffle | -0.04 | 651* | -194 | 779* | 4,210 | 0.035** |
| | (0.19) | (344) | (321) | (418) | (7,004) | (0.017) |
| Ordinary, private raffle | 0.19 | 190 | -228 | 408 | -615 | -0.001 |
| | (0.18) | (285) | (320) | (409) | (6,431) | (0.013) |
| Ordinary, public raffle | 0.19 | 106 | -405 | 456 | 4,543 | 0.019 |
| | (0.18) | (325) | (299) | (367) | (6,653) | (0.016) |
| P-val. of F-tests: | | | | | | |
| Commit.: priv. raffle vs. no raffle | 0.040 | 0.773 | 0.983 | 0.734 | 0.510 | 0.404 |
| Commit.: pub. raffle vs. no raffle | 0.529 | 0.509 | 0.102 | 0.108 | 0.227 | 0.590 |
| Ordinary: priv. raffle vs. no raffle | 0.213 | 0.170 | 0.916 | 0.399 | 0.523 | 0.027 |
| Ordinary: pub. raffle vs. no raffle | 0.192 | 0.144 | 0.479 | 0.423 | 0.965 | 0.403 |
| Mean dep. var. in Control group | 5.72 | 2,872 | 2,492 | 418 | 40,147 | 0.039 |
| Number of observations | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 | 2,835 |

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. USD 1 is ca. MK 145. All regressions include stratification cell fixed effects. F-test of Panel B: "Commitment savings = Ordinary savings" tests the equality of means in commitment and ordinary treatment groups. F-tests of Panel C: "Commitment: priv. raffle vs. no raffle" tests the equality of means in commitment treatment groups with private raffle and without raffle; similarly for the five tests following below.