

Commitments to Save: A Field Experiment in Rural Malawi*

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Abstract

We report the results of a field experiment that randomly assigned smallholder cash crop farmers formal savings accounts. In collaboration with a microfinance institution in Malawi, 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. Only the commitment treatment had statistically significant effects on subsequent outcomes. The effects were positive and large on deposits and withdrawals immediately prior to the next planting season, agricultural input use in that planting, crop sales from the subsequent harvest, and household expenditures in the period after harvest. Across the set of key outcomes, the commitment savings treatment had larger effects than the ordinary savings treatment. Additional evidence suggests that the positive impacts of commitment derive from keeping funds from being shared with one’s social network.

Keywords: savings, commitment, hyperbolic preferences, self-control, sharing norms

JEL codes: D03, D91, O16, Q14

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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, microfinance today (and microcredit in particular) is largely devoted to non-agricultural activities (Morduch 1999; Armendariz de Aghion and Morduch 2005). In addition, the recent studies that assess the impacts of microcredit programs find benefits that are more modest than donors and practitioners had previously believed (Kaboski and Townsend, forthcoming; Banerjee et al. 2010 and Karlan and Zinman, 2010). Finally, when measured properly, microcredit programs tend to have take-up rates that are much smaller than those of savings programs. As a result, many donors and academics (for example, Bill and Melinda Gates Foundation and Robinson, 2001) have emphasized the need for research on the potential beneficial impacts of formal savings.²

Indeed, low-income individuals have a hard time saving formally, although they do engage in more expensive and riskier ways to save informally (Rutherford, 2000 and Collins, Morduch, Rutherford and Ruthven, 2009). The alternatives to formal savings are cash held at home (subject to theft or fire) investments in durable assets with risky returns (such as livestock), participation in ROSCAs (rotating savings and credit associations), or use of deposit collectors (such as *susu* collectors in West Africa).

A number of explanations have been advanced for low levels of formal savings in developing countries. Transaction costs for formal savings may be high for a variety of reasons,

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 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.

including substantial distances to branches, costly and unreliable transport, and mistrust towards formal financial institutions. In addition, financial illiteracy may prevent households from opening accounts due to a lack of knowledge about the benefits of formal savings and lack of familiarity with account-opening procedures.

Other explanations focus on psychological factors, such as impatience (a strong preference for the present over the future) and issues of self-control (competing preferences that dictate different actions at different times). There is evidence from both developed and developing countries that self-aware individuals seek to limit their options in advance in anticipation of self-control problems in the future (see Ashraf, Karlan, and Yin, 2006 and Duflo, Kremer and Robinson, 2010).

Yet another potential explanation for low savings levels comes from the observation that in rural communities individuals are often obliged to share their income with relatives and friends (see, e.g., Platteau, 2000; Maranz, 2001; Anderson and Baland 2002; Ligon, Thomas, and Worall, 2002; Hoff and Sen, 2006; Baland, Guirkinger and Mali, forthcoming; Jakiela and Ozier, 2011). Sharing obligations may discourage individuals from exerting effort or accumulating assets and may encourage them to spend resources hastily before income is dissipated through demands from others. People who anticipate pressure to share cash with others in their social network may spend that money quickly in order to pre-empt requests for transfers (Goldberg, 2010).

In order to understand the impact of facilitating access to savings accounts and to examine the importance of these barriers for formal savings, we designed a field experiment among smallholder cash crop farmers in Malawi. In partnership with a local microfinance institution, we randomized offers of account-opening and deposit assistance for formal savings accounts. Because this can be viewed as greatly reducing transaction costs associated with opening and making initial deposits into bank accounts, this aspect of the intervention can shed light into the importance of transactions costs.³ In order to test the importance of individual self-control problems or pressure to share resources with others in the social network, treated farmers were randomly assigned to one of two types of savings interventions. The first group was offered an “ordinary” bank account with standard features. The second group was offered the ordinary account as well as a “commitment” savings account that allowed account holders to request that

³ The direct deposit may have helped farmers overcome loss aversion, since farmers with cash in hand may perceive putting off consumption as a loss (Kahneman and Tversky, 2000).

funds be frozen until a specified date (e.g., immediately prior to the planting season, so that funds could be preserved for farm input purchases). Other farmers were assigned to a control group that was surveyed but not offered assistance with opening either type of savings account. If offers of commitment accounts have greater impacts than offers of ordinary accounts, then self control or other-control problems are important.

We designed a sub-experiment to isolate the role of pressure to share with one's social group. Among farmers who were offered the savings treatments, we cross-randomized an intervention that provided a public signal of individual savings account balances. This public revelation of balances was done in the context of a raffle in the months immediately prior to the planting season (when savings would be used for input purchases). Farmers were given a number of raffle tickets that depended on their savings balances: one raffle ticket was given for each MK 1,000 (about US\$7) in savings. In this "public" raffle, tickets were distributed in front of other farming club members. As a result, everyone that attended the raffle distribution meeting was able to observe the number of raffle tickets received by other members in the club, providing a signal of individual savings balances.

Because the raffle itself may provide an incentive to save, the design of the experiment included a "private raffle" treatment, identical to the "public raffle" except that raffle tickets were distributed in private, and a "no raffle" treatment. If the "public raffle" led to lower savings and less investment in agricultural inputs compared to the "private raffle", it would have been interpreted as evidence that social pressure to share hinders savings insofar as savings balances are public. This effect would perhaps be largest among farmers more socially connected, because they would face pressure to share with more people. If, instead, social comparisons confer prestige or status, then the "public raffle" could have led to higher savings than the "private raffle." Finally, if the raffle fostered savings, we would expect to find higher balances in clubs offered any type of raffle compared to clubs in the "no raffle" treatment.⁴

Our findings are distinguished from those in the existing literature in two ways. First, we are the first to show impacts of commitment savings offers (as opposed to offers of ordinary accounts) on important economic outcomes beyond savings, such as inputs into productive

⁴ One could also argue that the raffle could have made savings salient or that it provided a reminder to save. Under this interpretation, the raffle would increase savings (see for example Karlan, McConnell, Mullainathan, Zinman, 2010 and Kast, Meier and Pomeranz, 2010).

activities, revenues from production, and household expenditures.⁵ Second, our results are suggestive that the effects of commitment account offers operate via helping individuals solve “other-control” problems (protecting funds from social network demands), rather than “self-control” problems.

To be specific, the commitment treatment had large positive effects on a range of outcomes of interest: deposits and withdrawals at our partner institution immediately prior to the next planting season, land under cultivation (an increase amounting to 9.8% of the control group mean), agricultural input use in that planting (26.2% increase over the control group mean), crop output in the subsequent harvest (22.0% increase), and household expenditures in the months immediately after harvest (17.4% increase). By contrast, ordinary treatment effects are uniformly smaller than those of the commitment treatment, and are never statistically significantly different from zero. A joint hypothesis test finds that the impact of the commitment account offer on the set of key agricultural and expenditure outcomes is statistically significantly larger than the effect of the ordinary account offer.

Patterns of heterogeneity in take-up and treatment effects suggest that the positive impacts of commitment derive from keeping funds from one’s social network. The first piece of evidence is the fact that the bulk (89%) of the savings among individuals offered commitment accounts was kept in ordinary as opposed to commitment accounts, and that the average amount saved in commitment accounts was about an order of magnitude smaller than the commitment treatment’s impact on input use on the farm. Clearly, the commitment treatment did not have its effect on input use via “tying the hands” of farmers in the months prior to planting time. Rather, it is likely that the existence of the accounts allowed farmers to credibly claim that their funds were inaccessible when faced with social network demands. This is consistent with commitment savings accounts helping farmers address an “other-control” problem rather than a “self-control” problem.

In addition, contrary to Ashraf, Karlan, and Yin (2006) we find no evidence that take-up or impact of commitment accounts is related to baseline measures of hyperbolic preferences. Instead, the impacts of the commitment treatment are larger for households with higher assets at baseline. This may reflect the fact that higher-asset households are more likely to face social network demands to share resources.

⁵ As a follow-up to Ashraf, Karlan, and Yin (2006), Ashraf, Karlan, and Yin (2010) show impacts of commitment account offers on female empowerment in the same Philippine experimental sample.

The results from the cross-randomized public and private raffle treatments are inconclusive. Effects of either type of raffle are mostly not statistically significantly different from zero, and the few statistically significant coefficients are inconsistently signed across regressions. For this reason we focus this paper's attention on interpreting the effects of the "no raffle" savings treatments.

This paper contributes to the burgeoning literature on the effects of formal savings accounts and in this sense is related to the field experiments of Dupas and Robinson (2010) and Atkinson et al. (2010). Dupas and Robinson (2010) offer ordinary savings accounts with de facto negative interest rates to Kenyan urban entrepreneurs, finding positive impacts on investment and income for women. In this paper, by contrast, we explicitly test whether impacts of commitment savings offers are larger than impacts of ordinary savings offers. We also use a very different sample, (mostly) male farmers in rural Malawi. Atkinson et al. (2010) offer microcredit borrowers in Guatemala savings accounts with different features, including reminders about a monthly commitment to save and a default of 10% of loan repayment as a suggested monthly savings target. They find that both features increase savings balances substantially. However, they use administrative records from the lender which restricts the number of observable outcomes and limits analysis of the mechanisms that lead to changes in savings behavior. Our paper is also related to Dupas and Robinson (2011) in seeking to understand the relative importance of various barriers to savings. Dupas and Robinson (2011) do so in the context of ROSCAs, while we provide formal savings facilities.

The remainder of this paper is organized as follows. Section 2 explains the study design and briefly describes the characteristics of the sample. Section 3 explains the estimation strategy. Section 4 presents the main empirical results. Section 5 discusses heterogeneous effects and the mechanisms through which savings accounts may have affected savings and other outcomes. Section 6 concludes.

2. Experimental design and survey data

The experiment was a collaborative effort of 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. Alliance One and Limbe Leaf are two large private agribusiness companies that offer extension services and high-quality inputs to smallholder farmers

via an out-grower tobacco scheme.⁶ Farmers in the study were organized by the tobacco companies into clubs of 10-15 members and all had group liability production loans from OIBM prior to enrollment in the study.

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: 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.

Sixty three percent of farmers at baseline had an account with a formal bank (mostly with OIBM).⁷ The average reported savings balance at the time of the baseline in bank accounts was MK 2,083 (USD 14), with an additional MK 1,244 (USD 9) saved in the form of cash at home.

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.

Financial Education Session

After the baseline was administered, all clubs (treatment as well as control) attended a financial education session that reviewed basic elements of budgeting and explained the benefits of formal savings accounts, in particular how they could be used to set aside funds for the future (such as for school fees or agricultural inputs). The full script of the financial education session can be found in Appendix A.

The financial education session was deliberately provided to both treatment and control groups so that treatment effects could be attributed solely to the provision of the financial products, abstracting from the effect of financial education (for example, strategies for improved budgeting) implicitly provided during the product offer. For this reason, we can estimate neither

⁶ 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.

⁷ 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.

the impact of the ordinary and commitment treatments without such financial education, nor the impact of the financial education alone.

Ordinary and Commitment Treatments

Farmers were randomly assigned to one of three savings treatment conditions. The first experimental group was the control group and only received the financial education session described above.

Implementation of the savings treatment took advantage of the existing system of depositing crop sale proceeds into OIBM bank accounts. Production loans provided by OIBM were repaid directly to the lender via garnishing of farmers' tobacco sale proceeds. In the control group, the process followed the status quo, as follows. At harvest, farmers sold their tobacco to the company that had organized them as clubs at the price prevailing on the nearest tobacco auction floor. 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 then divided up the cash among members of the club. In the treatment groups, farmers were offered the opportunity to have their crop sale proceeds deposited directly into individual savings accounts, as we now describe.

Farmers in the savings treatment groups were given the same financial education session provided to the control group but were also given account opening assistance and offered 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 money flows). After their crop was sold, farmers traveled to the closest OIBM branch to confirm that positive proceeds net of repayment were available at the club level. Authorized members of the clubs (often together with other club members) then filled out a sheet specifying the division of the total amount between farmers. Depending on whether a club member had opted for the individual accounts or not, funds were then either transferred to the individual's account(s) or paid out in cash.

There were two savings treatment conditions. In the first, farmers were offered only an ordinary savings account (the "ordinary" treatment). In the second, farmers were offered both an ordinary and a commitment savings account (the "commitment" treatment). Farmers in the control group and the "ordinary" treatment group who may have learned about and requested

commitment accounts were not denied those accounts, but they were not given information about or assistance in opening them.⁸

An ordinary savings account is a regular OIBM savings account with an annual interest rate of 2.5%. The commitment savings account has the same interest rate but allows farmers to specify an amount and a “release date” when the bank would allow access to the funds.⁹ Farmers who chose to open a commitment savings account were also required to have an ordinary account where uncommitted funds would be deposited.

During the account opening process, farmers stated how much they wanted in the ordinary and commitment savings accounts after their tobacco crops would be sold. For example, if a farmer stated that that he wanted MK 5,000 in an ordinary account and MK 10,000 in a commitment savings account, funds would first be deposited into the ordinary account until MK 5,000 had been deposited, then into the commitment savings account for up to MK 10,000, with any remainder being deposited back into the ordinary account.¹⁰

Raffle Treatments

To study the impact of public information on savings and investment behavior, we implemented a cross-cutting randomization of a savings-linked raffle. Participants in each of our two savings treatments were randomly assigned to one of three savings-linked raffle conditions. These raffles provided a mechanism for randomizing information about each other’s savings balances. We distributed tickets for a raffle to win a bicycle, where the number of tickets each participant received was determined by his savings balance as of pre-announced dates. Every MK 1,000 saved with OIBM (in total across ordinary and commitment savings accounts) entitled a participant to one raffle ticket. Tickets were distributed twice. The first distribution took place in early September, and was based on savings as of August 19. The second distribution took place in November, and was based on savings as of October 22. By varying the way in which tickets were distributed, we sought to manipulate the information that club members had about

⁸ Among farmers in the control group, nobody requested an ordinary or a commitment account during the savings training at baseline. According to OIBM administrative records, eight farmers in the control group had commitment accounts by the end of October 2009 (opened without our assistance or encouragement), but none of these had any transactions in the accounts.

⁹ By design, funds in the commitment account could not be accessed before the release date. In a small number of cases OIBM staff allowed premature withdrawals of funds when clients presented evidence of emergency needs, e.g. health or funeral expenditures.

¹⁰ Notice that members could have revised the initial allocation of funds made during the initial account opening process when they visited the bank after the crop sale. However, we find no evidence of this behavior in practice (analysis not reported) using data from the club funds allocation sheets.

each other's savings. One third of clubs that was 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. 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 he received was announced to everyone that attended the raffle meeting.

Because of the simple formula for determining the number of tickets, farmers in clubs where tickets were distributed publicly could easily estimate how much other members of the club had saved. 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 using a simulation. 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.

Thus, the final design of the project includes 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).

The randomization was carried out at the club level. The list of tobacco clubs in central Malawi (all of which had existing production loans with OIBM) was provided by OIBM in cooperation with the two tobacco buyer companies. Prior to randomization, treatment clubs were stratified by location¹¹, 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.

¹¹ "Locations" are the tobacco buying companies' geographically-defined administrative units within which extension services and contract buying activities are coordinated.

The sample consists of 299 clubs with 3,150 farmers surveyed at baseline, and 298 clubs with 2,835 farmers surveyed at endline.¹² Attrition from the baseline to the endline survey was 10.0% and does not vary substantially by treatment status (as shown in Appendix Table 1). While attrition is uncorrelated with treatment assignment for five out of the six treatment groups, farmers in the ordinary (private raffle) treatment group have a three percentage point lower rate of attrition from baseline to endline survey, compared to the control group, and this difference is statistically significant at the 10% level (p-value 0.085 in the specification with full baseline controls). Since the focus of the paper is on the impacts of ordinary and commitment (no raffle) treatments, and the difference is very small, we do not view this as an important concern.

Balance of baseline characteristics across treatment conditions

To examine whether randomization across treatments achieved balance in pre-treatment characteristics, Table 3 presents the differences in means of 17 baseline variables for the six treatment groups vis-a-vis the control group. For statistical inference about the differences in means we estimate the following regression for farmer i in club j for each baseline variable Y_{ij} :

$$(1) Y_{ij} = \delta + \alpha_1 \text{Ordinary}_j + \alpha_2 \text{Ord_PrivRaf}_j + \alpha_3 \text{Ord_PubRaf}_j \\ + \alpha_4 \text{Commitment}_j + \alpha_5 \text{Com_PrivRaf}_j + \alpha_6 \text{Com_PubRaf}_j + \beta' S_{ij} + \varepsilon_{ij}$$

Ordinary_i is an indicator variable for assignment to the ordinary treatment and Commitment_i is an indicator variable for assignment to the commitment treatment. Ord_PrivRaf_j and Ord_PubRaf_j are indicator variables for the assignment to the ordinary treatment *and* the private or public raffle treatment, respectively. Com_PrivRaf_j and Com_PubRaf_j are defined similarly, indicating assignment to the commitment treatment *and* either the private or the public raffle treatment condition. These indicators are essentially interactions of Ordinary_j and Commitment_j , respectively, with variables indicating assignment to the private or public raffle treatment conditions. S_{ij} is a vector that includes stratification cell dummies. ε_{ij} is a mean-zero error and because the unit of randomization is the club, standard errors are clustered at this level (Moulton 1986).

Coefficients α_1 and α_4 measure the difference in means of the dependent variable between

¹² 60 clubs in two locations had to be excluded from the sample because of serious implementation irregularities. Clubs in Kasungu Central were discovered to contain substantial numbers of “ghost” (nonexistent) club members and served as vehicles for larger landowners to fraudulently obtain very large loans from our partner institution; survey data collected for these individuals is thus likely to be fictitious. Clubs in Mndolera were excluded because of clerical and communications errors that led to ambiguity in treatment assignment. In the two locations subject to these issues, we excluded all clubs (amounting to three stratification cells) from the sample. Because entire stratification cells were excluded, inference among the remaining stratification cells yields internally valid results.

the ordinary treatment and the commitment treatment, respectively (without additional raffle treatments) vis-à-vis the control group. The difference ($\alpha_4 - \alpha_1$) represents the difference in means between the ordinary treatment and the commitment treatment (each without layered-on raffle treatments). The coefficient α_2 measures the difference in means between the ordinary treatment group without raffle and the ordinary treatment combined with additional private raffle treatment. Similarly, α_3 measures the difference in means between the ordinary treatment group without raffle and the ordinary treatment combined with additional public raffle treatment. The coefficients α_5 and α_6 measure the same differences in means for the commitment treatment groups.

With a few exceptions, baseline variables for the ordinary and commitment (without raffle) treatment groups are well balanced with the control group. The exceptions are that individuals in the ordinary group are more likely to be female (column 1), less likely to be married (column 2), and less likely to be “patient now, impatient later” (column 14); and individuals in the commitment group are more likely to be female. Overall, however, for both the ordinary and commitment (no raffle) groups we cannot reject the null that means of all 17 baseline variables are jointly equal to those in the control group (see p-values of F-tests at the bottom of Table 3).

The situation is similar for the coefficients on the interactions between the savings and raffle treatments – most outcomes are balanced vis-à-vis the corresponding “no raffle” savings treatment, with a scattering of statistically significant differences that are not too different from what would likely have arisen by chance. Again, for none of the raffle sub-treatments can we reject the null at conventional levels that the full set of baseline variables is jointly equal to the mean for the corresponding “no raffle” treatment.

To alleviate any 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 our main regressions, in addition to the stratification cell fixed effects.¹³

3. Estimation strategy

A number of dependent variables are of interest, such as deposits and withdrawals prior to the next planting season, inputs used in the next planting, crop output and sales in the next planting, and household expenditures after the next harvest.

¹³ Results turn out to be very similar when only stratification cell fixed effects are included. See Appendix Tables 2, 3 and 4.

To estimate the impact of the treatments we estimate the following regression analogous to equation 1 above:

$$(2) Y_{ij} = \delta + \alpha_1 \text{Ordinary}_j + \alpha_2 \text{Ord_PrivRaf}_j + \alpha_3 \text{Ord_PubRaf}_j \\ + \alpha_4 \text{Commitment}_j + \alpha_5 \text{Com_PrivRaf}_j + \alpha_6 \text{Com_PubRaf}_j + \beta' X_{ij} + \varepsilon_{ij}$$

Y_{ij} is the dependent variable of interest for farmer i in club j . The savings treatment indicators Ordinary_i and Commitment_i and the respective interactions with the raffle treatment indicators Ord_PrivRaf_j , Ord_PubRaf_j , Com_PrivRaf_j and Com_PubRaf_j are defined as in equation 1. X_{ij} is a vector that includes stratification cell dummies and control variables measured in the baseline survey, prior to treatment (the 17 baseline variables in Table 3). Following closely the interpretation of equation 1 above, the coefficients on the treatment indicators (α_1 and α_4) reflect the impact on the dependent variable of the ordinary treatment and the commitment treatments, respectively, without additional raffle treatments vis-à-vis the control group, as well as the differential impacts of the savings treatments when combined with the private raffle (α_2 and α_3) or public raffle treatments (α_5 and α_6).

We focus on intent-to-treat (ITT) estimates because not every club member offered account opening assistance decided to open the account. We do not report average treatment on the treated (TOT) estimates. 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 SUTVA (Rubin, 1974).

4. Empirical results: impact of treatments

To understand the impacts of access to formal savings, we first study the extent to which funds flowed into and out of the savings accounts in the pre-planting and planting periods. Then we examine impacts on agricultural inputs, farm output, household expenditures and other household outcomes.

A. Savings transactions (deposits and withdrawals)

Table 4 presents regression results from estimation of equation 1. The first column presents results in which the dependent variable is an indicator variable for whether any transfers were made from the club account to the farmer's individual account after the group loan had been repaid. Columns 2 to 8 present results for three types of savings behaviors: total deposits (separately for ordinary, commitment and other accounts, as well as the sum across all accounts),

total withdrawals, and net deposits into OIBM accounts in different time periods. The “pre-planting” period, from March 2009 to October 2009, is the period when funds are accumulated from the previous season’s harvest in preparation for purchasing inputs for the 2009-2010 growing season. The “planting” period, from November 2009 to April 2010, includes the time of year when farmers purchase inputs and tend their crops prior to the 2010 harvest. This period includes the February to March 2010 “hungry” season when households may have depleted stocks of maize from the previous season’s harvest and have not yet harvested crops or received payments for the 2010 harvest. These data were obtained from OIBM administrative records.

Results from column 1 show that while none of the farmers in the control group transferred money via direct deposit into an OIBM account (since they were not offered direct deposit or account opening assistance), 16% of farmers in the ordinary account, no raffle treatment did transfer money. This percentage is somewhat larger at 21% for farmers in the commitment savings treatment without raffle. There are no statistically significant effects of either the public or private raffle on farmers assigned to either of the savings treatment conditions.

Figure 3 shows a histogram of commitment account release dates (when commitment account funds would be “unlocked” and transferred into ordinary accounts) that farmers chose during account opening. In accordance with their stated savings goals, 60% of farmers chose release dates in the months of October to December when most input purchases occur, immediately prior to or at the start of the planting season. Some farmers also chose to have access to the funds in January and February, during the lean or “hungry” season.

Turning to dependent variables related to deposits, both ordinary and commitment treatments led to higher total deposits as well as higher total withdrawals during the pre-planting period compared to the control group. Coefficients on both types of savings treatments are positive and statistically significantly different from zero for deposits (column 2), and negative and statistically significantly different from zero for withdrawals (column 3). The coefficient on the commitment (no raffle) treatment is virtually identical to the coefficient on the ordinary (no raffle) treatment.

To further explore the impact on deposits, we separately examine impacts on three different components of deposits in the pre-planting period: deposits into ordinary accounts (column 4), commitment accounts (column 5), and other accounts not set up by the project (column 6). It is clear that most of pre-planting deposits go into ordinary accounts, even among farmers in the commitment (no raffle) treatment. The relative sizes of the coefficients on the commitment (no raffle) treatment in columns 4 and 5 indicate that 89% of pre-planting deposits (MK 19,431.76

out of total deposits of MK 21,829.20) resulting from the commitment (no raffle) treatment actually were into the ordinary savings accounts set up by the project, rather than the commitment accounts.

This finding that the most of the savings in the commitment (no raffle) treatment were actually deposited in ordinary accounts is one of the key results of the paper, and casts light into the mechanism behind the finding (to be discussed in the next subsection) that the commitment treatment led to increases in input use. The fact that the commitment (no raffle) treatment led to increases in input use that are on average several times the amounts deposited into commitment accounts is highly suggestive that increases in input use did not derive from “tying the hands” of farmers by mechanically restricting their access to their own funds before the planting season. This result makes quite implausible the hypothesis that commitment accounts help by overcoming farmers’ self-control problems in this context, and makes it more plausible that the key savings constraint being overcome has to do with “other control” problems.

Finally, we turn to net deposits (column 7), defined as the difference between deposits and withdrawals across all accounts during the pre-planting period. The commitment savings (no raffle) treatment led to a small and statistically significant increase on net deposits, while the effect of the ordinary (no raffle) treatment was not statistically different from zero. The difference in coefficients between ordinary and commitment treatments is not statistically significantly different from zero, however.

In the last column of Table 4 we examine net deposits during the planting season, November 2009 to April 2010. Column 8 indicates that the commitment (no raffle) treatment, on net, led to higher withdrawals during the planting season, whereas there is a smaller and not statistically significant effect of the ordinary (no raffle) treatment on net transactions during this period. This result suggests that the commitment treatment led to more access to resources during the annual lean or “hungry” season. While we do not have consumption data for this period, these withdrawals may have led to smoother hungry season consumption for affected households.

By and large, public distribution of raffle tickets did not appear to affect savings behavior. Nearly all of the coefficients on the interaction terms between the savings treatments and the raffle dummies are not statistically significantly different from zero across the columns of the table. An anomalous result is that among those farmers assigned to the ordinary savings account treatment, the private raffle led to lower deposits and lower withdrawals when compared to

farmers in the ordinary (no raffle) treatment. We have no good explanation for this result, and believe it may be simply due to sampling variation.¹⁴

B. Inputs, crop sales, and expenditures

We now turn to impacts of the treatments on inputs, crop sales, and expenditures in Table 5. Across the seven dependent variables the commitment (no raffle) treatment has large positive and statistically significant impacts. In comparison, the coefficients on the ordinary savings treatment are never statistically significantly different from zero at conventional levels. While these coefficients are also mostly positive they are substantially smaller in magnitude relative to the commitment treatment coefficients. For several of the outcomes, discussed below, we can reject that the coefficients on the ordinary and commitment treatment are equal. The effects of either the public or private raffle are generally not statistically significant and when the effects are significant, there is no consistent pattern across outcomes. This is puzzling but suggests that we should not over-interpret individual coefficients on the raffle variables.

The first two columns of the table reveal that the commitment (no raffle) treatment had a large positive and statistically significant effect on both land under cultivation and the total value of inputs used (which include seed, fertilizer, pesticides, hired labor, transport and firewood for curing) in the late-2009 planting. Farmers in the commitment group cultivated on average 0.42 more acres of land than the control group (which had 4.28 acres of land under cultivation). The commitment coefficient is statistically significantly different (p-value 0.057) from the ordinary coefficient of 0.05 (which in turn is not statistically significantly different from zero). Compared to MK59,252 in inputs used by control group farmers on average, commitment treatment farmers used MK15,508 (or 26.2%) more. By contrast, while the coefficient on the ordinary (no raffle) treatment is also positive, it is only about half the magnitude of the commitment (no raffle) treatment coefficient and it is not statistically significantly different from zero. The difference in the coefficients on the two treatments in column 2, however, is not statistically different from zero at conventional levels.

The increase in input use due to the commitment (no raffle) treatment is 7.7 times the impact on deposits in commitment accounts in the pre-planting period (15,508.62 from column 2 of Table 5 divided by 1,994.26 from column 5 of Table 4). The bulk of funds used to purchase

¹⁴ In subsequent results tables for other dependent variables, this negative coefficient on the “Ordinary x Private Raffle” variable does not reappear, which we see as further evidence that this result is anomalous.

inputs were therefore available to farmers during the pre-planting period, instead of physically being locked away at the bank. This result is much more consistent with the commitment accounts helping to solve an “other control” problem rather than a self-control problem. It is likely that the offer of the commitment accounts simply allowed farmers to credibly claim to others in their social network that their funds were locked away. Even though most of farmers’ funds were in ordinary accounts, this could have been a credible claim because the division of an individual’s funds between ordinary and commitment accounts was not directly observable to others.¹⁵

Columns 3, 4 and 5 indicate that the larger input use caused by the commitment treatment resulted in higher total crop output in the 2010 harvest. The coefficient on the commitment treatment is large and statistically significantly different from zero at the 10% level for proceeds from crop sales (column 3) and for the value of crop not sold (column 4). The coefficient on the commitment (no raffle) treatment on the value of sold and unsold output (column 5, the sum of the dependent variables in the previous two columns) is statistically significantly different from zero at the 1% level. The increase in total value of crop output (MK 33,418) amounts to 22% of mean crop value in the control group. The coefficient on the ordinary (no raffle) treatment in column 5 is also positive but its magnitude is only around 20% of that on the commitment treatment, and is not statistically significantly different from zero. The difference between the ordinary (no raffle) and commitment (no raffle) coefficients in column 5 is statistically different from zero at the 10% level (p-value 0.074).

Column 6 of Table 5 shows the impact of the treatments on farm profits, defined as the difference between the total value of crop output (dependent variable of column 5) and the total value of inputs used (dependent variable of column 2). The coefficient on the commitment treatment is large in economic terms and marginally statistically significant (p-value 0.11). The coefficient for the ordinary account is small and not statistically significant, and the difference vis-a-vis the commitment account is marginally significant (p-value 0.11).

Column 7 examines the impact of the treatments on total household expenditures in the endline (post-harvest) survey. The commitment (no raffle) treatment coefficient is positive and statistically significantly different from zero at the 5% level, while the coefficient on the ordinary (no raffle) treatment is substantially smaller and not statistically significantly different from zero.

¹⁵ To be clear, the public raffle treatments provided a signal of only an individual’s *total* balances at OIBM, not how those savings were split between ordinary and commitment accounts.

The commitment (no raffle) treatment effect represents a 17% increase total expenditures over the last 30 days compared to the control group.

In order to examine further whether the commitment accounts treatment had a differential impact vis-a-vis the ordinary accounts across the full set of outcomes in Table 5, we follow Kling, Liebman and Katz (2007) and present p-values of two F-tests at the bottom of Table 5 that are based on seemingly unrelated regressions (SUR) estimation. We simultaneously estimate equation 1 with the dependent variables of column 1, 2, 5 and 7.¹⁶ We cannot reject that the coefficient on the ordinary (no raffle) treatment is jointly equal to zero across the four regressions (p-value 0.252). In contrast, we do reject that the coefficient on the ordinary (no raffle) treatment equals the coefficient on commitment (no raffle) treatment (p-value 0.061).

So far we have focused on the results for treatment groups without the raffle. As mentioned before, the pattern of coefficients for the differences of private or public raffle vs. no raffle treatments is largely inconsistent between ordinary and commitment treatments, and as such we find the results to be inconclusive. For two of the outcomes in the table, the effect of the ordinary (public raffle) treatment does seem to be more positive than the effect of the ordinary (no raffle) treatment. The p-values at the bottom of the table also indicate positive overall effects of the ordinary (public raffle) treatment compared to the control group. These differences do not appear to be driven by baseline imbalance, and may simply reflect sampling variation.

C. Other outcomes

Table 6 presents regression results on the impacts of the treatments on household size, transfers to and from the social network, and demand for fixed deposit accounts, measured at the endline survey.

Column 1 shows that the intervention had no effect on household size. This implies that the impacts presented in Table 5 are driven by changes in agricultural decisions and outcomes rather than changes in household composition.

We are particularly interested in transfers sent and received because one of the barriers to

¹⁶ We restrict attention to just the regressions for the four outcomes in columns 1, 2, 5, and 7 of Table 5 because the other outcomes in the table are simple linear combinations of the dependent variables in columns 1, 2, 5, and 7 and therefore are not separately determined. The dependent variable in column 5 (value of crop output, sold and not sold) is constructed as the sum of the dependent variables in columns 3 (proceeds from crop sales) and 4 (value of crop not sold), while the dependent variable in column 6 (farm profit) is constructed as the dependent variable in column 5 (value of crop output, sold and not sold) minus the dependent variable in column 2 (total value of inputs).

savings may be the inability to 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 their savings were inaccessible.

In columns 2, 3 and 4 of Table 6 we examine the sums of transfers made, transfers received and net transfers over the last twelve months. In order to explain the higher input use for commitment group farmers, additional availability of resources is most relevant during the pre-planting period. Thus, we present results in columns 5, 6 and 7 from regressions with dependent variables similar to those in columns 2 to 4 but with the sums of transfers restricted to categories in which the biggest gift was made before or during October 2009 (see Appendix B for further details of the variable definitions).

We find no evidence of reduced net transfers for the commitment (no raffle) treatment. If anything, there is a small positive, effect on net transfers made (column 4). Results are qualitatively similar for the set of restricted transfer variables (columns 5 to 7).¹⁷ It is important to note, however, that the transfer variables examined in Table 6 refer to *inter*-household transfers, and do not capture any changes in *intra*-household transfers. It remains possible that the commitment treatment effect operated at least in part by reducing transfers by study participants to spouses and other individuals within the same household.¹⁸

Though we do not find evidence that commitment savings accounts reduced transfers to other members of the social network, the accounts may have helped farmers increase their input use by dampening another possible result of social pressure to share. Individuals who know they will be subject to demands from others in their social network can prevent others from claiming their money by spending it preemptively. Rapidly consuming income makes it unavailable to others; it is consistent with signaling a high marginal utility of consumption in a model where income is taxed and redistributed from those with low marginal utility of consumption to high marginal utility of consumption. Goldberg (2010) found support for such a model in an experiment that demonstrated that Malawian cash crop farmers who received money in public settings spent significantly more of that money immediately than farmers who received money in private settings. In this project, we do not have the high-frequency consumption data necessary

¹⁷ This result is reminiscent of Chandrasekhar et al. (2011), who show in a lab-in-the-field experiment among Indian villagers that savings access does not crowd out transfers to others.

¹⁸ We cannot shed light on this, however, because our follow-up survey did not ask questions on transfer activity within the study participant's household. These would be important data to collect in future research.

to test whether farmers with commitment savings accounts were less likely to engage in hasty consumption than farmers without such accounts. However, a reduction in sub-optimally timed consumption is a channel through which offers of commitment accounts could have led to increased use of inputs and improvements in output, profits, and household expenditures.

Lastly, we study subsequent ownership of fixed deposit accounts (column 8) at the time of the endline survey. Fixed deposit accounts in Malawi typically have a duration of three or six months. The client makes an initial one-time deposit of pre-specified amounts, typically in multiples of MK10,000. During the three- or six-month duration the client cannot make a withdrawal from the fixed deposit account and also cannot increase the savings balance.

Interestingly, we find that ownership of fixed deposit accounts is six percentage points higher and significant at the 1% level in the commitment (no raffle) group, and three percentage points higher in the ordinary (no raffle) group (significant at the 5% level) compared to the control group (this difference in treatment effects across the ordinary and commitment treatments is not significantly different from zero at conventional levels). The results suggest that our treatments, particularly the commitment (no raffle) treatment, led farmers to value savings products with commitment features.

5. Heterogeneous effects

Commitment savings accounts may have caused higher deposits, greater availability of funds at planting time, and higher expenditures on agricultural inputs by helping farmers manage their own self-control problems, or by helping them manage demands from others in their social networks. Results presented so far – namely the fact that increases in input use resulting from the commitment (no raffle) treatment are several times larger than amounts deposited into commitment accounts – are much more consistent with the commitment account offer helping solve “other control” problems than self-control problems. In this section, we conduct additional analyses aimed at shedding further light on the relative importance of self-control vs. other-control problems in explaining the impacts of the commitment treatment.

Our approach in this section is to examine the extent to which treatment effects are heterogeneous vis-à-vis particular baseline variables. We estimate regression equations of the following form:

$$(3) Y_{ij} = \delta + \beta_1(\mathbf{Channel}_{ij} * \mathbf{Ordinary}_j) \\ + \beta_2(\mathbf{Channel}_{ij} * \mathbf{Ord_PrivRaf}_j) + \beta_3(\mathbf{Channel}_{ij} * \mathbf{Ord_PubRaf}_j)$$

$$\begin{aligned}
& + \beta_4(\mathbf{Channel}_{ij} * \mathbf{Commitment}_j) \\
& \quad + \beta_5(\mathbf{Channel}_{ij} * \mathbf{Com_PrivRaf}_j) + \beta_6(\mathbf{Channel}_{ij} * \mathbf{Com_PubRaf}_j) \\
& + \gamma' \mathbf{X}_{ij} + \varepsilon_{ij}
\end{aligned}$$

where $\mathbf{Channel}_{ij}$ is a vector of individual characteristics that proxy for self-control and other-control problems: an indicator for having a hyperbolic discount rate, a measure of net transfers to others in the year before the baseline survey, an indicator for the “patient now, impatient later” preference reversal, the study participant’s years of education, and an index for baseline level of assets. Other right-hand-side variables include, as before, the baseline controls and stratification cell fixed effects.

We present results from this exercise in two sets of regressions in Table 7. In each set of regressions we show effects on total deposits during the pre-planting season (columns 1 and 4), on total value of farm inputs (columns 2 and 5), and on output (columns 3 and 6). The main effects for the baseline variables that are interacted with the treatment indicators are all included in the set of baseline controls.

We focus our discussion on the coefficients on the ordinary (no raffle) and commitment (no raffle) treatments, since in Tables 4, 5 and 6 we found that the effects of the raffle treatments were inconclusive.

The first set of columns shows results from regressions with treatment indicators interacted with net transfers made to the social network over the last 12 months as of the date of the baseline interview and interactions with an indicator for whether the respondent is classified as exhibiting hyperbolic time preferences based on a series of hypothetical questions at baseline. The second set of columns has results from regressions that include additional interactions with an indicator for the “Patient now, impatient later” time preference reversal, an index for asset ownership and years of education.

In our baseline survey, we ask respondents to make hypothetical trade-offs between receiving some money sooner, or more money later. These questions are designed to be analogous to the questions capturing time-preference reversals used by Ashraf, Karlan, and Yin (2006). Survey respondents are asked whether they prefer MK100 now or MK110 one month from now. Respondents who prefer MK100 now are then asked to choose between MK100 now and MK130 one month from now. The questions continue, with the value of the hypothetical payment in one month increasing from MK130 to MK150, MK200, and MK250, thus soliciting bounds on the discount rate for which the respondent is willing to wait one month to receive money. Later in the survey, after completing unrelated modules, we ask the same questions over

a different time frame: 12 months from now compared to 13 months from now. Individuals who are more patient with regards to receiving money in the future for the 12 and 13 month trade-off than with regards to receiving money immediately or in one month are considered “hyperbolic discounters”, and account for 10% of respondents. We categorize respondents as “Patient now, impatient later” if the opposite reversal occurs (30% of respondents).

If commitment savings accounts increase savings and investments by helping hyperbolic discounters with their own self-control problems, then we would expect a larger effect of commitment accounts (a positive interaction term coefficient) among those respondents whose baseline survey responses indicate hyperbolic preferences. Alternatively, if farmers in the commitment treatment were able to shield resources from social pressures to share (alleviating an “other-control” problem) we would expect a larger effect for those with higher net transfers at baseline (a positive interaction term coefficient) as this variable may proxy intensity of pressures to share from the social network.

An important first observation is that the effect of the treatments on any of the dependent variables in the table does not vary systematically according to respondents’ hyperbolic time preferences at baseline. In none of the regressions of the first or the second set are the coefficients of the relevant interactions statistically significantly different from zero.

By contrast, there does appear to be heterogeneity in treatment effects vis-à-vis baseline net transfers. The coefficients on the net transfers interaction terms with the ordinary and commitment (no raffle) treatments are positive and statistically significantly different from zero in columns 1 through 3. MK100 higher baseline net transfers raises the commitment (no raffle) treatment effect on total value of inputs by MK168 and on value of crop output by MK888. The effects are of similar magnitude for the ordinary treatment.

In the second set of results of Table 7 (columns 4 to 6) we explore how the coefficients change when additional interactions are included. It seems that most of the heterogeneity generated by baseline net transfers in the previous columns is now absorbed by the other included interactions, in particular by the interactions with the baseline asset index. The net transfer interaction terms with the commitment (no raffle) treatment in the regressions for total deposits and total value of inputs are no longer statistically significant and are smaller in size, although in the crop output regression the coefficient maintains approximately the same magnitude and statistical significance level.

The coefficient on the asset index interaction term with the commitment (no raffle) treatment is positive and statistically significantly different from zero in each of columns 4

through 6, indicating that the positive impact of this treatment on deposits, inputs, and crop output is magnified for households that had higher assets at baseline. For farmers in households with a one-point higher baseline asset index (which has a standard deviation of 1.86), the commitment (no raffle) treatment effect is larger for total OIBM deposits by MK7,170, for total value of inputs by MK14,939, and value of crop output by MK20,986. This pattern of heterogeneity is less strong for the ordinary (no raffle) treatment: corresponding coefficients are statistically significant in regressions for total deposits and value of inputs, but not for the value of crop output regression.

These patterns are sensible if wealthier farmers are more likely to face higher pressures to share from their social network. The fact that commitment (no raffle) treatment effect is larger for farmers in higher-asset households may reflect the fact that the commitment treatment helped these farmers decline demands for sharing from their social network, perhaps because it made claims that their funds were inaccessible more credible.

6. Benefit-cost analysis

Even a deliberately conservative analysis, which we carry out in Table 8, reveals substantial net benefits to society from offering commitment savings accounts. We take into account the costs to OIBM for setting up and servicing these accounts, the fees and time costs that customers face in using the accounts, and the benefits farmers gain from increased farm profits in the subsequent season. In our attempt to be conservative in this analysis, we do not include any additional profits to the bank from holding additional deposits (that can be lent to other customers or otherwise invested for a profit), and we do not attempt to include the dynamic benefits that customers who have higher profits in one year might reap through larger investments and consequently larger profits in subsequent years. Our calculations are most likely to be relevant for cash-crop farmers who have access to a centralized marketing system for their products, and pertain to the simultaneous offer of commitment savings accounts and direct deposit of crop proceeds into those accounts.

The bank incurs costs related to creating and servicing commitment savings accounts. We separate these costs into one-time costs that include opening new accounts for each customer, and ongoing costs for each deposit or withdrawal a customer is likely to make in the course of one growing season. Our estimated time costs are based on our experience administering commitment savings accounts for this study, and take into account salaries for OIBM bank

employees and the number of transactions conducted by each farmer. We estimate that opening and maintaining a single commitment savings account with direct deposit for one growing season costs the bank MK3,384 (\$23.34), net of fees paid by the customers.

We also compute the costs incurred by customers, who attend training and incur time and transportation costs and transaction fees for visiting the bank to withdraw money. We assume a 10 percent probability of being required to pay an MK1,000 (\$6.90) penalty for early withdrawal from the commitment savings account. The total estimated cost to a customer for having a commitment savings account with direct deposit is MK1,639 (\$11.30).

Estimated benefits to customers are increased farm profits of MK19,413 (\$133.88) relative to not having any direct deposit into an individual savings account (This figure comes from Table 5, column 6.). As discussed previously, this figure is likely to understate the total benefits to farmers because there may be dynamic benefits through increased investment and therefore increased profit in subsequent years. We also omit any benefits to the bank from having higher and more stable deposits. The net benefit to society is MK14,390 (\$99.24). These figures imply that an intervention offering commitment accounts would have an attractive benefit to cost ratio of 3.86. To put this net benefit estimate in perspective, commitment account offers have net benefits after one year that are more than three times larger than the estimated annual benefit of a \$100 grant to male-operated small businesses in Sri Lanka and Ghana (de Mel, et al 2008, Fafchamps, et al 2011).

7. Conclusion

We find that offering commitment savings accounts to smallholder cash crop farmers in Malawi has substantial impacts on savings prior to the next planting season, agricultural inputs applied in the next planting season, access to funds during the next lean (pre-harvest) period, crop sales at the next harvest, and total expenditures after the next harvest. By contrast, the impact of offering “ordinary” accounts is not as large or statistically significant.

Given the large impacts of the commitment treatment, it is important to ask why the treatment appears to have had such substantial effects, while the ordinary treatment did not. There are two possibilities. First, the commitment account may have helped farmers solve their self-control problems, giving them the discipline to maintain their balances until the next planting season when they could be used for agricultural inputs. Alternatively, the commitment accounts may have helped farmers to refrain from sharing with others in their social network.

We provide suggestive evidence in support of the latter explanation, namely, that the commitment account helped shield funds from the social network. First of all, the actual amounts saved in the commitment accounts offered were very low (about an order of magnitude lower than the observed increase in inputs), with most savings actually occurring in ordinary accounts. This helps rule out that the impacts of the commitment treatment were due to literally “tying the hands” of treated farmers by mechanically preventing them from spending their profits earlier in the year. In addition, we find that the impact of commitment savings is higher for individuals who are wealthier at baseline, a sub-group of respondents that is likely to face higher pressure to share with others. The impact of the commitment treatment has no large or statistically significant relationship with hyperbolic preferences as expressed in the baseline survey. Thus, commitment savings accounts appear to be most useful to those who are likely to face “other control” problems, rather than those facing self-control problems.

Our results point to a potentially low-cost means for microfinance institutions to raise farm inputs and incomes for current loan customers. There are relatively straightforward opportunities to offer farmers innovative savings facilities in the context of the organized marketing process of many crops, in Malawi and elsewhere in sub-Saharan Africa. It is relatively common for lenders to have direct funds-transfer arrangements with cash crop buyers for loan recovery. When such arrangements exist already, current loan customers can simply be offered direct deposit of crop proceeds into commitment accounts.

Nonetheless, it is important to consider the external validity of these results, as they are likely to be most applicable to cash crop farmers where sale proceeds can be directly deposited into bank accounts. In the central Malawi region we study, however, tobacco farmers have similar poverty and income levels to those of non-tobacco-producing households.¹⁹ As with all empirical research, future studies should test whether these findings hold in other contexts, such as in other countries and with other types of farmers who have differing payment arrangements for their crops.

We do not study the effect of either ordinary or commitment savings accounts in the absence of direct deposit. Direct deposits both reduce transaction costs and operate as a “channel factor” to increase savings. OIBM administrative data reveal that, aside from the direct deposits, other cash deposits into accounts were very low. It is by no means certain that simply setting up

¹⁹ Based on authors’ calculations from the 2004 Malawi Integrated Household Survey (IHS), individuals in tobacco farming rural households in central Malawi live on PPP\$1.48/day on average, while the average for central Malawian rural households overall is PPP\$1.51/day.

commitment accounts would have high impact without the direct deposit facility. Separating the impact of direct deposit from the impact of savings accounts is an important area for future research.

In addition, while the well-being of farmers offered commitment accounts may have improved, we do not shed light directly on impacts on others in the community. An initial worry was that the commitment accounts led farmers to make fewer transfers to others in the community in the context of informal insurance arrangements (for example, to help others cope with shocks). As it turns out, we do not find any negative impacts of the commitment treatment on net transfers to other households. That said, reduced “anticipatory consumption” in the months immediately after the intervention may have had negative impacts via reduced demand for goods and services produced by others in the community.

Another important question is whether the impacts we find would be sustainable over time. In the longer term, if commitment savings facilities lead to higher average incomes, this may allow less reliance on informal insurance and thus less sharing. More formally, a new low-sharing norm introduced by the commitment accounts can be intertemporally sustainable under a variety of conditions. For example, one could argue that in the context of a model of costly state falsification (Lacker and Weinberg, 1989), the commitment account provided a means to hide savings more effectively, resulting in a new equilibrium with lower sharing. Alternatively, if one imagines that individuals are part of a risk-sharing network playing an infinitely repeated coordination game, the introduction of commitment accounts allowed players to use “cheap talk” and coordinate from a high-sharing equilibrium to a sustainable low-sharing equilibrium.

These points about broader impacts and longer-term sustainability of the changes we observed are, of course, speculative at this point. We view investigation of longer-term impacts on beneficiaries and on others in the community as an important avenue for future research.

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Figure 1: Project timing

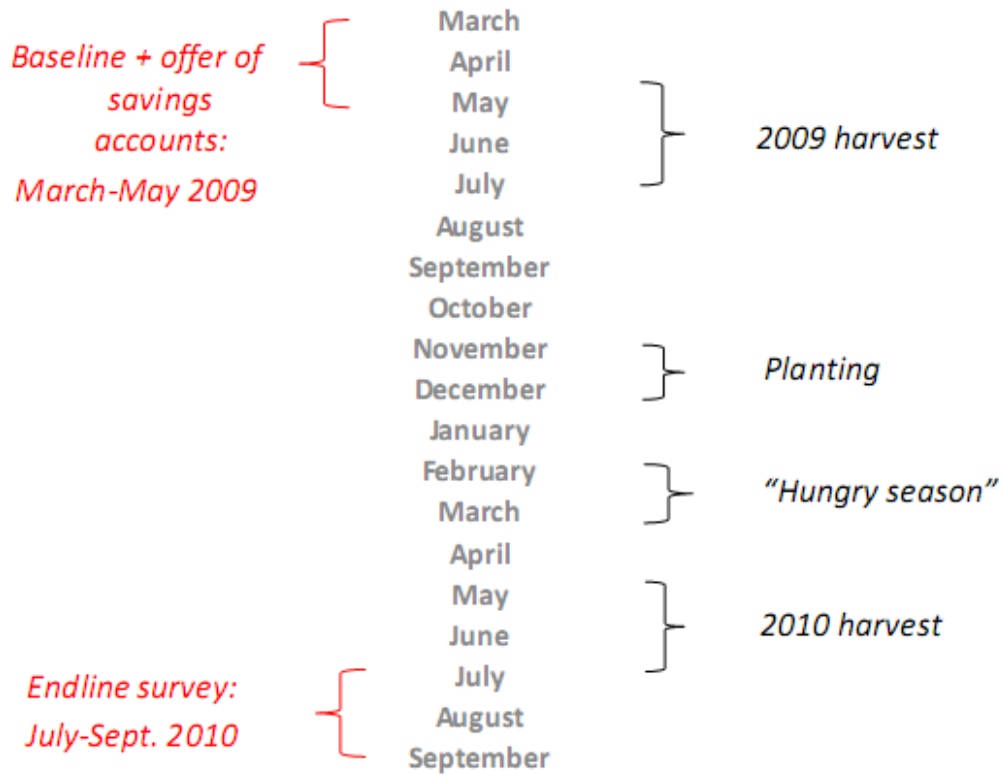


Figure 2: Tobacco Sales and Bank Transactions

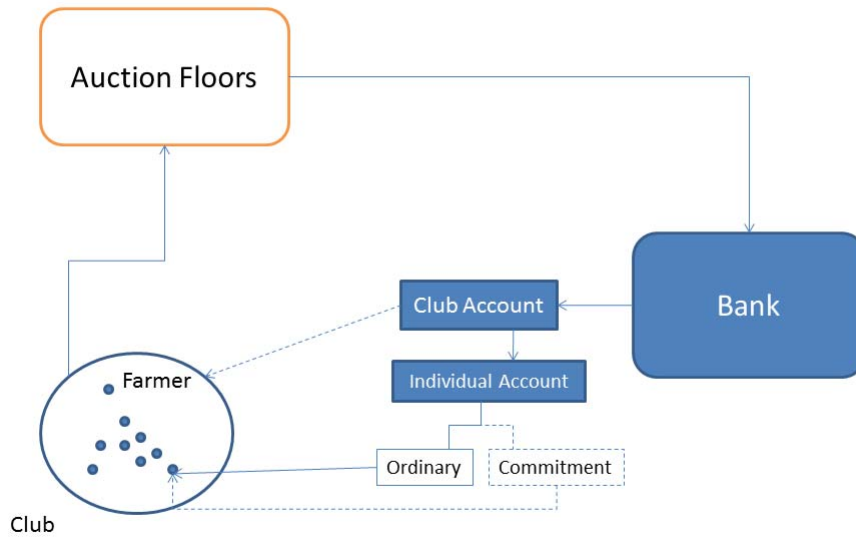
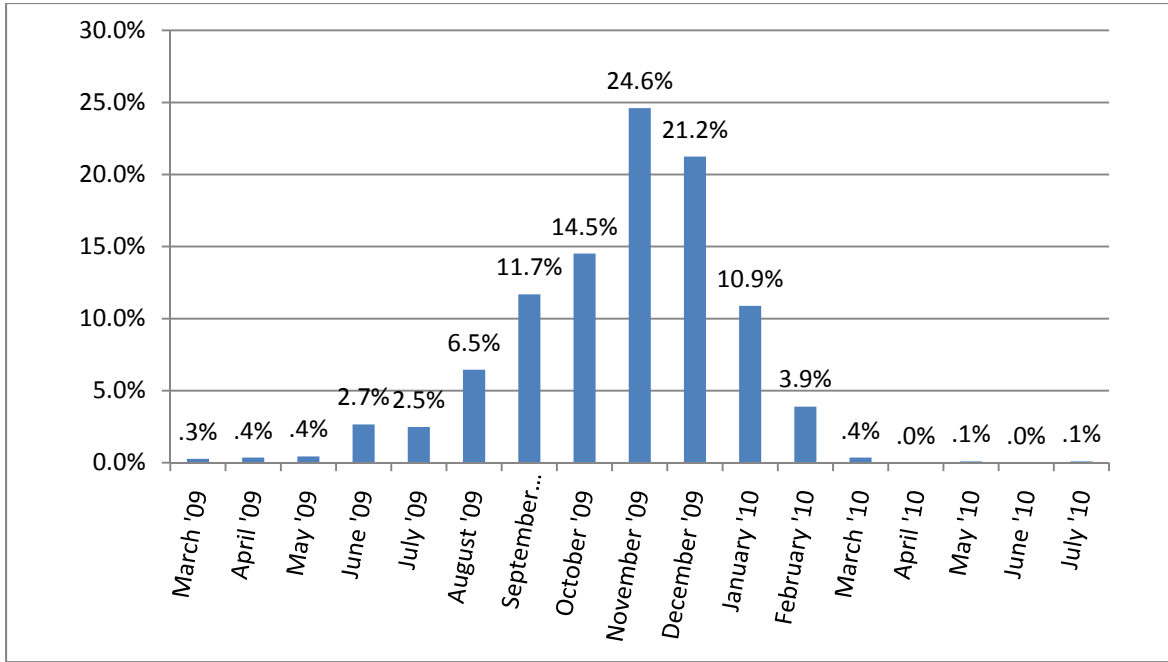


Figure 3: Distribution of commitment savings release dates grouped by month



Appendix A: Account details and full text of training script

Savings account details

In this experiment we offered farmers training and account opening assistance for two types of accounts depending on the 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 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 MK1,000 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 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.

Sum of deposits into accounts, pre-planting is the sum of (positive) transactions into the respondent's OIBM accounts (sum across all accounts) during the period of March to October 2009.

Sum of withdrawals from accounts, pre-planting is the sum of (negative) transactions out of the respondent's OIBM accounts (sum across all accounts) during the period of March to October 2009.

Net of all transactions, pre-planting is the difference between the sum of all deposits and withdrawals in the respondent's OIBM accounts during the period of March to October 2009.

Net of all transactions, planting is the difference between the sum of all deposits and withdrawals in the respondent's OIBM accounts during the period of November 2009 to April 2010.

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.

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 revenue from crop sales across all crops sold.

Value of crop not sold is kilograms of crops not sold multiplied by the price/kilogram, summed across all 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.

Value of crop output (sold & not sold) is the sum of "Proceeds from crop sales" and "Value of crop not sold" defined above.

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.

Transfers made, biggest gift bf. Oct09 is the same variable as “Transfers made” above with the sum of transfers restricted to categories in which the biggest gift was made before or in October 2009.

Transfers received, biggest gift bf. Oct09 is the same variable as “Transfers received” above with the sum of transfers restricted to categories in which the biggest gift was made before or in October 2009.

Total net transfers made, biggest gift bf. Oct09 (MK) is the difference between “Transfers made, biggest gift bf. Oct09” and “Transfers received, biggest gift bf. Oct09” as defined above.

Has fixed deposit account is 1 if the respondent has a fixed deposit account with any bank, and 0 if not.

Not interviewed in endline is 1 if the respondent was not interviewed and is 0 if the respondent was interviewed during the endline survey of July to September 2010.

Table 1: Summary Statistics

	<u>Mean</u>	<u>Standard Deviation</u>	<u>10th Percentile</u>	<u>Median</u>	<u>90th Percentile</u>	<u>Observations</u>
Treatment conditions						
Control group	0.135	0.341	0	0	1	3150
Ordinary Account	0.448	0.497	0	0	1	3150
Ordinary x Private Raffle	0.149	0.356	0	0	1	3150
Ordinary x Public Raffle	0.153	0.360	0	0	1	3150
Commitment Account	0.417	0.493	0	0	1	3150
Commitment x Private Raffle	0.142	0.349	0	0	1	3150
Commitment x Public Raffle	0.139	0.346	0	0	1	3150
Baseline Characteristics						
Number of members per club	13.88	6.44	9.00	11.00	23.00	299
Female	0.063	0.243	0.000	0.000	0.000	3150
Married	0.955	0.208	1.000	1.000	1.000	3150
Age [years]	45.02	13.61	28.00	44.00	64.00	3150
Years of education	5.45	3.53	0.00	6.00	10.00	3150
Household Size	5.79	1.99	3.00	6.00	9.00	3150
Asset index	-0.02	1.86	-1.59	-0.67	2.46	3150
Livestock index	-0.03	1.15	-1.00	-0.36	1.37	3150
Land under cultivation [acres]	4.67	2.14	2.50	4.03	7.50	3150
Proceeds from crop sales [MK]	126000	175000	7000	67000	300000	3150
Cash spent on inputs [MK]	25118	41148	0	10000	64500	3150
Has bank account	0.63	0.48	0.00	1.00	1.00	3150
Savings in cash at home [MK]	1243.79	3895.00	0.00	0.00	3000.00	3150
Savings in bank accounts [MK]	2083.16	8264.71	0.00	0.00	3000.00	2949
Hyperbolic	0.10	0.30	0.00	0.00	1.00	3117
Patient now, impatient later	0.30	0.46	0.00	0.00	1.00	3117
Net transfers made in past 12m [MK]	1753.46	7645.07	-2990.00	500.00	8100.00	3150
Missing value for formal savings and cash	0.064	0.244	0.000	0.000	0.000	3150
Missing value for time preferences	0.010	0.102	0.000	0.000	0.000	3150
Transactions with Partner Institution						
Any Transfer via Direct Deposit	0.154	0.361	0	0	1	3150
Deposits into ordinary accounts, pre-planting [MK]	18472	82396	0	0	38907	3150
Deposits into commitment accounts, pre-planting [MK]	615	5367	0	0	0	3150
Deposits into other accounts, pre-planting [MK]	296	3804	0	0	0	3150
Sum of deposits into accounts, pre-planting [MK]	19383	84483	0	0	40694	3150
Sum of withdrawals from accounts, pre-planting [MK]	-18600	82744	-38600	0	0	3150
Net of all transactions, pre-planting [MK]	762	13857	0	0	649	3150
Net of all transactions, planting [MK]	-1117	8472	0	0	6	3150
Endline Survey Outcomes						
Land under cultivation (acres)	4.52	2.66	2.00	4.00	8.00	2835
Total value of inputs [MK]	66910	82196	2200	43500	153000	2835
Proceeds from crop sales [MK]	113000	163000	0	59500	278000	2835
Value of crop not sold [MK]	58664	61733	11732	40974	120000	2835
Value of crop output (sold & not sold) [MK]	174000	200000	25492	112000	383000	2835
Farm profit (output-intput) [MK]	108000	155000	0	68486	261000	2835
Total expenditure in last 30 days [MK]	11905	13219	2250	7500	26000	2835
Household size	5.80	2.15	3.00	6.00	9.00	2835
Total transfers made [MK]	3152.42	5098.93	0.00	1300.00	8000.00	2835
Total transfers received [MK]	2203.99	4377.29	0.00	500.00	6050.00	2835
Total net transfers made [MK]	938.72	5896.38	-3000.00	350.00	5750.00	2835
Transf. made, biggest gift bf. Oct09 [MK]	428.75	1402.69	0.00	0.00	1000.00	2835
Transf. received, biggest gift bf. Oct09 [MK]	482.44	1617.00	0.00	0.00	1150.00	2835
Net transf. made, biggest gift bf. Oct09 [MK]	-58.76	1943.54	-600.00	0.00	600.00	2835
Has fixed deposit account	0.07	0.25	0.00	0.00	0.00	2835
Not interviewed in follow-up	0.10	0.30	0.00	0.00	0.50	3150

Data based on two surveys conducted in February to April 2009 (baseline) and July to August 2010 (endline), and on administrative records of our partner institution. See Appendix B for details of the 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)
<u>Dependent variable:</u>	Female	Married	Age [years]	Years of education	Household Size	Asset index	Livestock index	Land under cultivation [acres]	Proceeds from crop sales [MK]	Cash spent on inputs [MK]	Has bank account	Savings in accounts and cash [MK]	Hyperbolic	Patient now, impatient later	Net transfers made in past 12m [MK]	Missing value for formal savings and cash	Missing value for time preferences
Ordinary Account	0.05*** (0.02)	-0.03** (0.01)	-0.93 (1.25)	0.03 (0.28)	-0.11 (0.16)	0.24 (0.16)	-0.04 (0.10)	0.11 (0.20)	7,990.09 (12,746.24)	2,416.66 (2,628.59)	0.01 (0.04)	200.15 (730.59)	0.00 (0.02)	-0.08* (0.05)	81.78 (547.16)	-0.01 (0.02)	0.00 (0.01)
Ordinary x Private Raffle	-0.00 (0.02)	0.03** (0.01)	-0.57 (1.22)	0.14 (0.28)	0.18 (0.16)	-0.08 (0.17)	-0.01 (0.09)	-0.14 (0.18)	3,647.16 (12,805.07)	6,396.18* (3,579.03)	-0.02 (0.05)	-1.61 (737.33)	0.00 (0.02)	0.07 (0.05)	185.57 (535.56)	0.01 (0.02)	0.00 (0.01)
Ordinary x Public Raffle	-0.02 (0.02)	0.01 (0.01)	-0.97 (1.10)	0.34 (0.27)	0.09 (0.15)	-0.35** (0.16)	-0.06 (0.08)	-0.15 (0.19)	-2,175.54 (13,692.49)	5.18 (2,919.49)	-0.04 (0.05)	513.75 (729.41)	-0.01 (0.02)	0.08 (0.05)	521.88 (477.44)	0.02 (0.02)	-0.00 (0.01)
Commitment Account	0.03* (0.02)	-0.02 (0.01)	-1.17 (1.09)	0.38 (0.24)	-0.08 (0.16)	0.13 (0.15)	-0.02 (0.12)	-0.01 (0.18)	11,874.76 (13,172.83)	2,428.01 (3,407.12)	-0.04 (0.04)	769.73 (885.36)	0.03 (0.03)	-0.06 (0.05)	-313.63 (541.27)	-0.01 (0.02)	0.01 (0.01)
Commitment x Private Raffle	0.00 (0.02)	0.01 (0.02)	0.11 (0.95)	-0.39 (0.26)	0.28* (0.15)	0.04 (0.18)	-0.03 (0.12)	0.25 (0.19)	-2,078.18 (13,687.38)	3,023.89 (3,906.29)	0.05 (0.05)	-309.33 (1,009.58)	0.01 (0.03)	-0.04 (0.04)	151.71 (496.27)	0.02 (0.02)	-0.01 (0.01)
Commitment x Public Raffle	0.03 (0.02)	-0.01 (0.02)	-0.77 (1.12)	-0.46* (0.25)	-0.17 (0.15)	-0.22 (0.15)	-0.11 (0.11)	-0.35** (0.18)	-16,144.40 (14,593.46)	49.10 (3,992.86)	-0.04 (0.05)	-844.44 (888.06)	-0.02 (0.03)	-0.02 (0.05)	200.28 (536.89)	-0.01 (0.02)	-0.02 (0.01)
<u>Mean Dep Var in Control</u>	0.02	0.97	46.23	5.31	5.81	-0.11	0.03	4.67	117,364.71	21,629.03	0.66	3,235.37	0.10	0.35	1,655.33	0.07	0.01
<u>Number of observations</u>	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
<u>P-values of F-tests for regressions in columns 1 - 17:</u>																	
Ordinary, No Raffle = Commitment, No Raffle	0.519	0.360	0.832	0.169	0.824	0.532	0.826	0.530	0.790	0.997	0.265	0.531	0.293	0.592	0.409	0.947	0.302
Ordinary, Private Raffle = 0	0.007	0.856	0.214	0.517	0.690	0.311	0.592	0.896	0.303	0.010	0.895	0.782	0.881	0.777	0.652	0.981	0.625
Ordinary, Public Raffle = 0	0.060	0.158	0.076	0.157	0.883	0.399	0.285	0.821	0.641	0.376	0.587	0.324	0.820	0.897	0.265	0.688	0.601
Commit., Private Raffle = 0	0.032	0.488	0.341	0.986	0.190	0.284	0.714	0.198	0.402	0.080	0.801	0.579	0.174	0.014	0.772	0.417	0.899
Commit., Public Raffle = 0	0.000	0.030	0.121	0.762	0.121	0.507	0.238	0.039	0.740	0.445	0.048	0.916	0.680	0.093	0.850	0.233	0.571
<u>P-values of F-tests for joint significance of baseline variables:</u>																	
Ordinary Account			0.898														
Ordinary x Private Raffle			0.474														
Ordinary x Public Raffle			0.122														
Commitment Account			0.633														
Commitment x Private Raffle			0.408														
Commitment x Public Raffle			0.140														

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-tests for column regressions: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments. 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)
Dependent variable:	Any Transfer via Direct Deposit	Sum of deposits into accounts, pre-planting [MK]	Sum of withdrawals from accounts, pre-planting [MK]	Deposits into ordinary accounts, pre-planting [MK]	Deposits into commitment accounts, pre-planting [MK]	Deposits into other accounts, pre-planting [MK]	Net of all transactions, pre-planting [MK]	Net of all transactions, pre-planting [MK]
Ordinary Account	0.16*** (0.05)	21,574.40*** (7,071.27)	-20,946.16*** (6,748.68)	21,345.45*** (6,960.03)	-100.19 (235.00)	329.14 (278.41)	628.24 (1,027.27)	-883.37 (638.35)
Ordinary x Private Raffle	0.01 (0.05)	-14,590.93** (7,365.91)	14,941.27** (7,032.66)	-14,107.76* (7,274.96)	2.69 (253.25)	-485.86* (271.13)	350.34 (1,114.66)	80.33 (740.02)
Ordinary x Public Raffle	0.04 (0.06)	-699.36 (9,259.74)	-188.13 (9,065.18)	-221.39 (9,199.30)	47.21 (229.47)	-525.19** (256.78)	-887.49 (1,423.90)	333.66 (719.51)
Commitment Account	0.21*** (0.05)	21,829.20*** (6,884.03)	-20,707.85*** (6,828.63)	19,431.76*** (6,281.25)	1,994.26** (788.77)	403.18 (348.01)	1,121.35* (670.15)	-1,317.50*** (483.77)
Commitment x Private Raffle	0.03 (0.06)	-5,323.61 (7,847.63)	5,377.32 (7,546.66)	-4,445.14 (7,191.84)	-698.03 (910.53)	-180.44 (366.94)	53.70 (972.69)	-51.38 (686.09)
Commitment x Public Raffle	-0.05 (0.05)	-3,596.97 (8,092.59)	4,051.28 (7,891.34)	-2,652.51 (7,568.31)	-792.87 (849.92)	-151.58 (355.81)	454.31 (932.74)	-267.63 (598.30)
<u>Mean Dep Var in Control</u>	0.00	3,281.13	-3,256.44	3,107.05	0.00	174.09	24.69	-157.77
<u>Number of observations</u>	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
<u>P-values of F-tests:</u>								
Ordinary, No Raffle =								
Commitment, No Raffle	0.333	0.978	0.978	0.825	0.009	0.847	0.678	0.557
Ordinary, Private Raffle = 0	0.001	0.151	0.209	0.126	0.674	0.335	0.036	0.059
Ordinary, Public Raffle = 0	0.000	0.009	0.008	0.008	0.803	0.223	0.802	0.203
Commit., Private Raffle = 0	0.000	0.004	0.005	0.007	0.008	0.381	0.115	0.013
Commit., Public Raffle = 0	0.001	0.002	0.003	0.004	0.003	0.247	0.037	0.002

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments.

Table 5: Impact of Treatments on Agricultural Outcomes and Household Expenditure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable:	Land under cultivation [acres]	Total value of inputs [MK]	Proceeds from crop sales [MK]	Value of crop not sold [MK]	Value of crop output (sold & not sold) [MK]	Farm profit (output-input) [MK]	Total expenditure in last 30 days [MK]
Ordinary Account	0.05 (0.19)	8,472.34 (6,077.12)	9,341.96 (11,764.74)	-1,670.06 (4,551.72)	7,166.73 (14,534.33)	1,071.47 (11,042.07)	411.36 (876.30)
Ordinary x Private Raffle	0.25 (0.21)	-7,212.02 (6,355.19)	979.29 (12,102.78)	7,055.67 (4,533.55)	9,553.75 (14,812.85)	15,489.94 (11,450.81)	275.93 (979.08)
Ordinary x Public Raffle	0.41** (0.19)	-325.31 (6,553.14)	11,760.29 (12,560.25)	7,844.49* (4,612.98)	20,979.92 (14,961.77)	20,170.59* (11,652.61)	1,154.05 (931.85)
Commitment Account	0.42** (0.20)	15,507.62** (6,175.25)	22,089.14* (11,481.58)	9,497.67* (5,316.14)	33,418.12** (14,898.83)	19,412.53 (12,199.64)	1,858.19** (856.56)
Commitment x Private Raffle	-0.13 (0.19)	-7,287.75 (7,000.23)	11,708.24 (13,656.58)	-9,754.99** (4,849.81)	-1,048.79 (15,823.44)	1,868.14 (13,224.24)	-532.73 (888.32)
Commitment x Public Raffle	-0.14 (0.20)	-8,926.36 (6,328.36)	-1,946.82 (11,856.82)	-3,538.19 (4,939.13)	-7,472.14 (14,581.30)	2,096.20 (11,990.53)	-710.46 (979.41)
<u>Mean Dep Var in Control</u>	4.28	59,251.65	94,863.64	55,071.20	152,067.41	92,579.31	10,678.42
<u>Number of observations</u>	2,835	2,835	2,835	2,835	2,835	2,835	2,835
<u>P-values of F-tests:</u>							
Ordinary, No Raffle =							
Commitment, No Raffle	0.057	0.323	0.287	0.027	0.074	0.111	0.141
Ordinary, Private Raffle = 0	0.146	0.811	0.376	0.249	0.260	0.163	0.419
Ordinary, Public Raffle = 0	0.017	0.143	0.083	0.195	0.063	0.082	0.050
Commit., Private Raffle = 0	0.122	0.164	0.013	0.952	0.041	0.101	0.098
Commit., Public Raffle = 0	0.164	0.206	0.096	0.184	0.080	0.073	0.207
<u>P-value of F-test of Ordinary= 0 across regressions of columns 1, 2, 5, 7:</u>			0.252				
<u>P-value of F-test of Ordinary=Commitment across regressions of columns 1, 2, 5, 7:</u>			0.061				

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments. F-tests of "Ordinary=0" and "Ordinary=Commitment" are based on Seemingly Unrelated Regressions (SUR) estimation and test if the coefficient on Ordinary is jointly significantly different from zero and if the coefficient on Ordinary equals the coefficient on Commitment across regressions with independent variables from column 1, 2, 5 and 7.

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

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Household size	Total transfers made [MK]	Total transfers received [MK]	Total net transfers made [MK]	Transf. made, biggest gift bf. Oct09 [MK]	Transf. received, biggest gift bf. Oct09 [MK]	Net transf. made, biggest gift bf. Oct09 [MK]	Has fixed deposit account
Ordinary Account	0.05 (0.11)	489.07 (351.95)	-205.98 (322.24)	640.41 (436.29)	23.65 (88.18)	-73.97 (124.25)	114.09 (139.93)	0.03** (0.02)
Ordinary x Private Raffle	0.13 (0.11)	-556.78* (333.92)	-45.58 (310.05)	-445.06 (442.32)	61.94 (86.25)	-54.88 (126.50)	133.00 (120.59)	-0.03** (0.02)
Ordinary x Public Raffle	0.16 (0.11)	-511.68 (372.17)	-201.28 (297.76)	-297.40 (401.70)	123.71 (99.23)	-97.25 (113.73)	205.43* (120.24)	-0.01 (0.02)
Commitment Account	0.06 (0.11)	275.41 (330.32)	-490.66* (290.30)	722.19* (405.26)	79.47 (83.72)	-272.32*** (104.66)	358.65*** (128.14)	0.06*** (0.02)
Commitment x Private Raffle	0.13 (0.12)	96.98 (380.60)	5.61 (251.89)	121.39 (403.43)	14.46 (94.88)	54.34 (97.73)	-48.80 (120.26)	-0.02 (0.03)
Commitment x Public Raffle	0.08 (0.11)	-21.58 (336.37)	517.79** (257.24)	-593.28 (399.37)	44.13 (101.46)	83.10 (100.81)	-35.76 (144.22)	-0.01 (0.03)
<u>Mean Dep Var in Control</u>	5.72	2,871.70	2,492.13	417.89	358.53	641.98	-297.32	0.04
<u>Number of observations</u>	2,835	2,835	2,835	2,835	2,835	2,835	2,835	2,835
P-values of F-tests:								
Ordinary, No Raffle =								
Commitment, No Raffle	0.952	0.553	0.299	0.846	0.525	0.064	0.050	0.250
Ordinary, Private Raffle = 0	0.115	0.819	0.424	0.644	0.291	0.297	0.045	0.972
Ordinary, Public Raffle = 0	0.051	0.948	0.185	0.374	0.123	0.127	0.009	0.276
Commit., Private Raffle = 0	0.114	0.325	0.105	0.053	0.312	0.064	0.022	0.018
Commit., Public Raffle = 0	0.231	0.444	0.928	0.753	0.219	0.115	0.038	0.011

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle". "Commitment, Private Raffle": "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle

Table 7: Interactions of Treatments with Baseline Variables

	(1)	(2)	(3)	(4)	(5)	(6)
<u>Dependent variable:</u>	Sum of deposits into accounts, pre-planting [MK]	Total value of inputs [MK]	Value of crop output (sold & not sold) [MK]	Sum of deposits into accounts, pre-planting [MK]	Total value of inputs [MK]	Value of crop output (sold & not sold) [MK]
Ordinary X Net Transfer [MK100]	416.93** (176.855)	202.43** (96.128)	695.63** (303.062)	326.53* (171.641)	114.63 (85.152)	524.98* (289.554)
Ordinary x Priv Raffle	-395.55**	-30.69	-287.80	-345.76**	-24.18	-276.34
X Net Transfer [MK100]	(174.407)	(118.439)	(313.303)	(169.365)	(100.632)	(284.710)
Ordinary x Pub Raffle	-341.44*	-22.28	-295.70	-294.79*	-7.27	-273.81
X Net Transfer [MK100]	(181.564)	(118.932)	(328.152)	(177.700)	(99.910)	(305.346)
Commitment X Net Transfer [MK100]	167.93** (81.538)	184.33** (76.922)	888.20*** (243.610)	119.34 (75.164)	89.87 (68.579)	720.20*** (210.732)
Commitment x Priv Raffle	-111.69	-117.67	-716.76***	-94.67	-50.08	-566.80***
X Net Transfer [MK100]	(84.173)	(78.832)	(232.765)	(81.504)	(69.690)	(189.065)
Commitment x Pub Raffle	180.62	75.90	-240.60	154.16	115.28	-203.00
X Net Transfer [MK100]	(210.001)	(146.433)	(358.533)	(157.098)	(125.621)	(278.607)
Ordinary X Hyperbolic	122.85 (16,132.572)	-5,936.38 (15,146.595)	-21,073.86 (35,806.994)	5,220.97 (13,891.886)	-3,309.66 (14,816.764)	-9,031.46 (34,260.903)
Ordinary x Priv Raffle	-7,035.92	-3,631.53	34,830.00	-14,857.53	-22,444.66	-7,287.97
X Hyperbolic	(14,670.451)	(16,676.679)	(45,252.168)	(12,932.439)	(15,101.615)	(37,808.889)
Ordinary x Pub Raffle	25,780.07	-8,617.46	10,968.04	25,285.62	-13,111.31	12,799.54
X Hyperbolic	(33,555.082)	(15,274.921)	(35,832.348)	(33,923.938)	(15,699.083)	(36,505.410)
Commitment X Hyperbolic	837.29 (15,380.153)	-13,638.04 (14,801.850)	-757.45 (39,612.455)	-873.47 (15,400.039)	-8,604.19 (14,452.032)	14,622.33 (38,371.726)
Commitment x Priv Raffle	13,630.33	13,214.98	34,940.40	15,824.53	6,510.79	22,925.77
X Hyperbolic	(18,069.426)	(14,257.993)	(42,129.775)	(17,427.893)	(14,447.993)	(38,626.257)
Commitment x Pub Raffle	-22,966.49	-16,570.10	-62,839.37*	-23,437.43	-21,077.81	-66,287.75*
X Hyperbolic	(16,749.106)	(13,960.819)	(37,193.996)	(16,860.192)	(13,464.299)	(36,322.741)
Ordinary				9,877.14	2,644.11	18,508.19
X Patient Now, Impatient Later				(10,942.682)	(10,175.196)	(22,161.539)
Ordinary x Priv Raffle				-10,965.34	-16,793.90	-24,887.36
X Patient Now, Impatient Later				(10,997.945)	(10,508.457)	(23,147.604)
Ordinary x Pub Raffle				1,040.99	-4,068.24	23,757.27
X Patient Now, Impatient Later				(12,678.930)	(10,585.181)	(23,051.212)
Commitment				211.66	9,742.40	25,658.20
X Patient Now, Impatient Later				(11,342.556)	(10,959.463)	(23,557.326)
Commitment x Priv Raffle				2,981.76	-10,111.56	-3,318.92
X Patient Now, Impatient Later				(12,336.392)	(11,617.182)	(27,306.302)
Commitment x Pub Raffle				-12,989.73	-9,233.78	-4,359.77
X Patient Now, Impatient Later				(14,262.175)	(13,058.409)	(31,649.280)
Ordinary X Asset Index				14,328.44*	9,604.80***	8,982.90
Ordinary x Priv Raffle				(7,359.891)	(2,996.460)	(8,042.009)
X Asset Index				-6,989.60	1,871.10	7,917.33
Ordinary x Pub Raffle				(7,449.397)	(3,592.380)	(10,578.169)
X Asset Index				-7,385.70	-994.09	5,873.07
Commitment X Asset Index				(7,843.693)	(3,494.974)	(10,610.178)
Commitment x Priv Raffle				7,170.34**	14,939.15***	20,985.90**
X Asset Index				(3,009.447)	(3,626.612)	(9,330.184)
Commitment x Pub Raffle				809.04	-6,488.17	-6,529.04
X Asset Index				(5,155.906)	(4,202.167)	(10,184.758)
Commitment x Pub Raffle				5,398.17	-10,187.93*	-16,648.36
X Asset Index				(8,817.109)	(5,527.874)	(12,117.508)
Ordinary X Years of Education				497.15 (734.848)	1,954.62 (1,387.837)	7,292.53* (3,707.156)
Ordinary x Priv Raffle				-666.37	-1,252.98	-5,631.54*
X Years of Education				(919.000)	(1,311.893)	(3,122.573)
Ordinary x Pub Raffle				1,097.53	859.29	-1,030.96
X Years of Education				(947.308)	(1,477.696)	(2,908.790)
Commitment X Years of Education				2,053.07 (1,310.090)	2,256.28 (1,619.124)	6,448.90 (4,189.145)
Commitment x Priv Raffle				-1,079.88	962.26	1,616.98
X Years of Education				(1,389.436)	(1,567.893)	(3,839.859)
Commitment x Pub Raffle				-1,859.03	-1,487.36	-1,087.84
X Years of Education				(1,835.938)	(1,590.322)	(3,808.639)
<u>Number of observations</u>	3,150	2,835	2,835	3,150	2,835	2,835
<u>P-values of F-tests:</u>						
All Interactinos = 0	0.015	0.032	0.005	0.053	0.000	0.036

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors (in parentheses) are clustered at the club level. All regressions include stratification cell fixed effects, the full set of treatment indicators, and main effects of interaction variables, as well as a dummy for missing values in the time preference variables and interactions of treatment indicators with the same dummy.

Table 8. Benefit-cost analysis

	Malawi kwacha	US Dollars (\$1 = MK 145)
<u>Costs</u>		
OIBM		
<i>One time per customer costs</i>		
a) Account opening	1056.25	7.28
b) Staff time for training of farmer groups	287.50	1.98
c) Transportation to farmer groups (vehicle)	328.77	2.27
d) Transportation to farmer groups (fuel)	543.75	3.75
e) Management cost (risk assessment, reporting, audit)	333.33	2.30
<i>Transaction costs</i>		
f) Withdrawal costs	-103.13	-0.71
g) Deposit costs	937.50	6.47
Customers		
<i>One time costs</i>		
h) Time and transportation cost of training	333.00	2.30
i) Account opening	7.33	0.05
<i>Transaction costs</i>		
j) Withdrawal costs	150.00	1.03
k) Time and transport cost of going to the bank	1048.50	7.23
<i>Other</i>		
l) Early withdrawal	100.00	0.69
<u>Benefits</u>		
Customers		
m) Increased farm profits	19412.53	133.88
n) Net benefits to OIBM $-[a+b+c+d+e+f+g]$	-3383.98	-23.34
o) Net benefits to Customers $[m-(h+i+j+k+l)]$	17773.70	122.58
p) Net benefits to society $[n+o]$	14389.72	99.24
q) Benefit-to-cost ratio $[m/(a+b+c+d+e+f+g+h+i+j+k+l)]$	3.86	3.86
Assumptions		
Exchange rate	145 MK/US\$1	
OIBM staff salary	MK 75,000/month	
Time for opening an account	20 minutes	
Cost of OIBM smart card (to OIBM)	MK 900	
Time for conducting a group training	1.5 hours	
Group size	20 members	
OIBM transportation time to training	2.5 hours	
OIBM cost of transportation (vehicle)	MK 12 million, depreciated over 5 years	
OIBM cost of transportation (fuel)	300 KM round trip, 8 KM/liter, MK 290/liter	
Time for withdrawal	2 minutes	
Number of withdrawals/season	3	
OIBM processing time for deposit	30 minutes	
Number of deposits (tobacco sales)/season	4	
OIBM management cost	MK 500,000/season	
Cost of OIBM smart card (to customer)	MK 1200	
Customer transportation cost to bank	MK 300	
Customer waiting time at bank	15 minutes	
Customer opportunity cost of time	MK 110/day (5 hours)	
Probability of early withdrawal	10%	

Appendix Table 1: Attrition from Baseline to Endline Survey

<u>Dependent variable:</u>	(A)	(B)
	<i><u>Including Baseline Controls</u></i>	<i><u>No Baseline controls</u></i>
	Not interviewed during endline survey	Not interviewed during endline survey
Ordinary Account	-0.00 (0.03)	0.00 (0.03)
Ordinary x Private Raffle	-0.03 (0.02)	-0.04 (0.02)
Ordinary x Public Raffle	0.01 (0.03)	0.01 (0.03)
Commitment Account	0.00 (0.02)	0.01 (0.03)
Commitment x Private Raffle	-0.01 (0.02)	-0.02 (0.02)
Commitment x Public Raffle	-0.01 (0.02)	-0.00 (0.02)
<u>Mean Dep Var in Control</u>	0.10	0.10
<u>Number of observations</u>	3,150	3,150
<u>P-values of F-tests:</u>		
Ordinary, No Raffle =		
Commitment, No Raffle	0.802	0.790
Ordinary, Private Raffle = 0	0.085	0.096
Ordinary, Public Raffle = 0	0.680	0.519
Commit., Private Raffle = 0	0.764	0.711
Commit., Public Raffle = 0	0.775	0.883

Notes: Stars indicate significance at 10% (*), 5% (**), and 1% (***) levels. Standard errors are clustered at the club level. Regressions include stratification cell fixed effects.

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)
Dependent variable:	Any Transfer via Direct Deposit	Deposits into ordinary accounts, pre-planting [MK]	Deposits into commitment accounts, pre-planting [MK]	Deposits into other accounts, pre-planting [MK]	Sum of deposits into accounts, pre-planting [MK]	Sum of withdrawals from accounts, pre-planting [MK]	Net of all transactions, pre-planting [MK]	Net of all transactions, planting [MK]
Ordinary Account	0.17*** (0.05)	22,927.66*** (7,744.01)	-77.07 (229.74)	329.61 (263.08)	23,180.20*** (7,845.12)	-22,507.50*** (7,525.24)	672.70 (1,033.92)	-915.71 (654.82)
Ordinary x Private Raffle	0.00 (0.05)	-13,265.82* (7,956.91)	-26.93 (248.51)	-502.45** (249.12)	-13,795.20* (8,051.13)	14,103.27* (7,732.94)	308.07 (1,099.16)	-49.17 (723.69)
Ordinary x Public Raffle	0.04 (0.06)	-553.43 (10,138.38)	51.71 (231.44)	-528.79** (243.48)	-1,030.51 (10,207.28)	53.44 (10,079.24)	-977.07 (1,445.83)	320.19 (731.34)
Commitment Account	0.22*** (0.05)	21,061.32*** (6,544.53)	1,981.98** (792.99)	411.24 (351.68)	23,454.54*** (7,191.44)	-22,350.21*** (7,097.81)	1,104.33 (674.72)	-1,366.52*** (507.63)
Commitment x Private Raffle	0.03 (0.06)	-3,317.70 (7,265.29)	-660.97 (907.34)	-139.70 (384.74)	-4,118.37 (7,950.51)	4,295.93 (7,664.60)	177.56 (966.01)	-152.98 (686.33)
Commitment x Public Raffle	-0.06 (0.05)	-5,582.05 (7,960.91)	-829.90 (856.78)	-222.91 (365.10)	-6,634.86 (8,498.98)	7,052.44 (8,282.86)	417.58 (941.84)	-120.62 (608.45)
<u>Mean Dep Var in Control</u>	0.00	3,107.05	0.00	174.09	3,281.13	-3,256.44	24.69	-157.77
<u>Number of observations</u>	3,150	3,150	3,150	3,150	3,150	3,150	3,150	3,150
P-values of F-tests:								
Ordinary, No Raffle =								
Commitment, No Raffle	0.361	0.844	0.010	0.829	0.978	0.987	0.721	0.564
Ordinary, Private Raffle = 0	0.001	0.033	0.637	0.272	0.044	0.067	0.024	0.018
Ordinary, Public Raffle = 0	0.000	0.006	0.902	0.221	0.007	0.007	0.778	0.170
Commit., Private Raffle = 0	0.000	0.001	0.006	0.322	0.001	0.001	0.092	0.005
Commit., Public Raffle = 0	0.002	0.013	0.003	0.384	0.008	0.012	0.043	0.002

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments; "Private Raffle = 0, Ordinary or Commitment (jointly)" tests whether the coefficient on the interaction of "Ordinary" and "Commitment" with "Private Raffle" are jointly different from zero; "Public Raffle = 0, Ordinary or Commitment (jointly)" performs the same test but for the public raffle treatment condition.

Appendix Table 3: Impact of Treatments on Agricultural Outcomes and Household Expenditure
Regressions with stratification cell fixed effects but without additional baseline controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Dependent variable:</u>	Land under cultivation [acres]	Total value of inputs [MK]	Proceeds from crop sales [MK]	Value of crop not sold [MK]	Value of crop output (sold & not sold) [MK]	Farm profit (output-input) [MK]	Total expenditure in last 30 days [MK]
Ordinary Account	0.11 (0.22)	10,923.27 (6,841.25)	14,546.26 (12,851.36)	26.20 (4,619.93)	14,630.56 (15,526.30)	6,399.13 (11,488.35)	831.83 (955.61)
Ordinary x Private Raffle	0.25 (0.24)	-5,296.73 (7,416.33)	3,216.05 (14,481.03)	6,607.88 (4,673.40)	11,626.56 (17,574.57)	15,588.30 (12,957.71)	398.97 (1,042.70)
Ordinary x Public Raffle	0.34 (0.23)	-855.44 (7,381.63)	10,587.35 (14,243.22)	6,014.47 (4,700.58)	17,847.02 (16,895.99)	17,329.24 (12,679.95)	923.14 (958.83)
Commitment Account	0.46** (0.23)	17,595.65** (7,346.81)	28,180.58** (13,609.43)	10,471.65* (5,821.05)	40,820.63** (17,755.82)	24,811.10* (13,541.50)	2,260.29** (1,006.45)
Commitment x Private Raffle	-0.07 (0.23)	-6,298.31 (8,448.52)	11,064.95 (16,499.58)	-9,422.64* (5,529.95)	-1,185.32 (19,759.02)	1,051.76 (14,964.58)	-378.69 (1,038.19)
Commitment x Public Raffle	-0.36 (0.23)	-12,792.81 (7,905.90)	-11,960.37 (15,763.19)	-7,810.87 (5,697.88)	-21,899.88 (19,883.42)	-8,464.72 (15,111.57)	-1,400.86 (1,145.79)
<u>Mean Dep Var in Control</u>	4.28	59,251.65	94,863.64	55,071.20	152,067.41	92,579.31	10,678.42
<u>Number of observations</u>	2,835	2,835	2,835	2,835	2,835	2,835	2,835
<u>P-values of F-tests:</u>							
Ordinary, No Raffle =							
Commitment, No Raffle	0.145	0.444	0.374	0.063	0.171	0.182	0.210
Ordinary, Private Raffle = 0	0.123	0.328	0.163	0.164	0.101	0.081	0.172
Ordinary, Public Raffle = 0	0.038	0.085	0.045	0.208	0.035	0.054	0.031
Commit., Private Raffle = 0	0.075	0.075	0.007	0.814	0.017	0.051	0.030
Commit., Public Raffle = 0	0.629	0.408	0.236	0.570	0.259	0.221	0.396
<u>P-value of F-test of Ordinary= 0 across regressions of columns 1, 2, 5, 7:</u>			0.106				
<u>P-value of F-test of Ordinary=Commitment across regressions of columns 1, 2, 5, 7:</u>			0.204				

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments; "Private Raffle = 0, Ordinary or Commitment (jointly)" tests whether the coefficient on the interaction of "Ordinary" and "Commitment" with "Private Raffle" are jointly different from zero; "Public Raffle = 0, Ordinary or Commitment (jointly)" performs the same test but for the public raffle treatment condition. F-tests of "Ordinary=0" and "Ordinary=Commitment" are based on Seemingly Unrelated Regressions (SUR) estimation and test if the coefficient on Ordinary is jointly significantly different from zero and if the coefficient on Ordinary equals the coefficient on Commitment across regressions with independent variables from column 1, 2, 5 and 7.

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)	(7)	(8)
<u>Dependent variable:</u>	Household size	Total transfers made [MK]	Total transfers received [MK]	Total net transfers made [MK]	Transf. made, biggest gift bf. Oct09 [MK]	Transf. received, biggest gift bf. Oct09 [MK]	Net transf. made, biggest gift bf. Oct09 [MK]	Has fixed deposit account
Ordinary Account	-0.04 (0.19)	650.96* (344.48)	-193.97 (320.99)	778.80* (418.47)	17.33 (86.74)	-80.05 (123.41)	113.07 (137.51)	0.03** (0.02)
Ordinary x Private Raffle	0.23 (0.19)	-460.58 (334.95)	-33.77 (320.88)	-370.38 (438.87)	70.19 (86.58)	-49.91 (127.77)	135.62 (121.81)	-0.04** (0.02)
Ordinary x Public Raffle	0.24 (0.18)	-544.64 (371.55)	-210.67 (297.05)	-323.01 (402.58)	123.12 (97.86)	-98.51 (115.89)	206.69* (119.35)	-0.02 (0.02)
Commitment Account	-0.01 (0.16)	470.16 (335.84)	-459.24 (283.53)	875.05** (419.60)	71.05 (80.33)	-270.77*** (104.13)	347.49*** (128.29)	0.06** (0.02)
Commitment x Private Raffle	0.34** (0.17)	120.40 (416.42)	-5.04 (241.61)	156.38 (459.38)	40.74 (96.18)	54.79 (99.24)	-24.20 (125.87)	-0.02 (0.03)
Commitment x Public Raffle	-0.10 (0.16)	-250.47 (378.40)	424.84 (258.92)	-733.23 (454.57)	27.47 (102.47)	76.44 (101.38)	-44.14 (148.70)	-0.01 (0.03)
<u>Mean Dep Var in Control</u>	5.72	2871.70	2492.13	417.89	358.53	641.98	-297.32	0.04
<u>Number of observations</u>	2,835	2,835	2,835	2,835	2,835	2,835	2,835	2,835
<u>P-values of F-tests:</u>								
Ordinary, No Raffle =								
Commitment, No Raffle	0.849	0.631	0.340	0.830	0.539	0.083	0.068	0.292
Ordinary, Private Raffle = 0	0.300	0.505	0.478	0.319	0.265	0.292	0.042	0.950
Ordinary, Public Raffle = 0	0.278	0.743	0.177	0.215	0.130	0.105	0.008	0.246
Commit., Private Raffle = 0	0.077	0.132	0.106	0.019	0.242	0.061	0.017	0.018
Commit., Public Raffle = 0	0.539	0.534	0.909	0.739	0.328	0.096	0.051	0.015

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-tests: "Ordinary, No Raffle = Commitment, No Raffle" tests the equality of means in ordinary and commitment treatment groups each without additional raffle treatments; "Ordinary, Private Raffle = 0" tests if the sum of the coefficient on "Ordinary" and the coefficient on "Ordinary x Private Raffle" is different from zero; "Ordinary, Public Raffle", "Commitment, Private Raffle"; "Commitment, Public Raffle" tests the same sums of the different combinations of savings and raffle treatments; "Private Raffle = 0, Ordinary or Commitment (jointly)" tests whether the coefficient on the interaction of "Ordinary" and "Commitment" with "Private Raffle" are jointly different from zero; "Public Raffle = 0, Ordinary or Commitment (jointly)" performs the same test but for the public raffle treatment condition.