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# **CREATING INCENTIVES TO SAVE AMONG MICROFINANCE BORROWERS: A BEHAVIORAL EXPERIMENT FROM GUATEMALA**

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**August 2010**



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# CREATING INCENTIVES TO SAVE AMONG MICROFINANCE BORROWERS: A BEHAVIORAL EXPERIMENT FROM GUATEMALA

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## Abstract

Many people who wish to save fail to do so because they lack the necessary self-discipline. Instruments linked to monthly wage payments have been introduced in formal economies to help overcome such problems, but this has proved more challenging in informal economies characterized by self-employment and the use of cash. We analyze the savings response of microfinance borrowers from the largest public Bank in Guatemala who were given the opportunity to contribute to a savings account at the time they make their regular monthly loan payment. The Bank engaged in a promotional campaign to induce its microfinance clients to open a savings account. They were then randomly offered one of three options: a Basic Savings account with no commitment to save and serving as control, an open commitment savings account (Open Treatment) where they would commit to save each time they pay their loan an amount up to them to decide, and a default commitment savings account (Default Treatment) where a default level of saving was set at 10% of the loan payment. We find that the Open Treatment generates no increase in the rate of opening accounts relative to the Basic Savings (40%), but that it increases the likelihood that deposits are made (from 33% to 75%) and leads to an increase in overall savings balances (from \$14 to \$28). The Default Treatment leads to a near doubling of the rate of account opening (from 40% to 77%), but conditional on opening an account, it generates overall savings balances identical to the Open Treatment. In both treatments, the faster rate of savings accumulation corresponds to a faster rate of capital repayment on the loan and a weakly lower incidence of repayment problems, indicating that savings and loan repayment are complementary. A simple behavioral model motivates why offering such products to current borrowers can help individuals escape the debt financing of investments.

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## 1. Introduction

In recent decades there has been a proliferation of new behavioral explanations for why individuals may find it difficult to save. Self-control problems may arise as a result of hyperbolic discounting (Laibson, 1997), intra-household disagreement (Ashraf et al., 2010), temptation goods (Banerjee and Mullainathan, 2009), or procrastination (O'Donoghue and Rabin, 1999). In any of these environments, individuals who say today that they would be willing to save tomorrow may decide not to do so once tomorrow arrives, and hence fail to execute their own savings plans. While individuals in developed countries are beginning to have access to financial instruments informed by these behavioral insights and typically linked to wage payments, this is not the case in the developing world where income more frequently derives from self-employment. The evidence that exists from developing countries shows that commitment devices are likely to have strong impacts on behavior (Ashraf, Karlan, and Yin, 2006; Dupas and Robinson, 2009), but as of yet few commercial financial institutions in developing countries have piloted scalable products. This paper reports on an experiment intended to fill this gap.

In collaboration with *Credito Hipotecario Nacional* (CHN), Guatemala's largest public-sector bank, we worked to design new financial products based on insights from the behavioral literature, and to offer them to the entire microfinance portfolio of the bank. CHN offers microfinance loans with monthly repayments over terms of 12 to 36 months, and therefore provides a unique opportunity to contract with agents in a developing country over a relatively long time frame. This is important because the erratic, cash-based financial lives of the poor increase the need for liquid savings (Collins et al. 2009) while at the same depriving them of the predictable, regular interactions with financial institutions that would otherwise ease contributions to savings plans.<sup>1</sup> We designed our experiment to focus solely on the determinants of savings that are behavioral, rather than being driven by classical optimization.

In order to minimize effects arising from variation in understanding of the basic savings products and terms offered, we define as the control a group that receives a savings promotion (brochure plus verbal reinforcement), an explanation of contract terms, and is offered the chance to open a savings account at loan disbursement (Basic Savings). We then compare two treatment arms to this control. In the first of these, clients taking new loans are offered the opportunity to define a monthly savings deposit that they will then be prompted to make each time they make a loan payment. This open commitment treatment (Open Treatment) has no financial penalties for failing to make the stipulated deposit, and hence can be thought of as an experiment in framing and anchoring (see DellaVigna 2009 for a summary of these issues). The second treatment arm is offered this same option but told that the bank will set this amount to 10% of the loan payment unless clients decide to change it (Default Treatment). This arm is motivated by the 'status quo bias' (Samuelson & Zeckhauser, 1988) and decision deferment (Tversky & Shafir, 1992) found in many studies, under which agents are much more likely to accept the default option offered by the program than would be expected from simple optimization theory.

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<sup>1</sup> Such as the 'Save More Tomorrow' plan based on automated paycheck contributions to a 401(k) plan in the U.S. (see Thaler and Benartzi, 2004).

The bank had no intention and no legal means of enforcing any of these commitments. Hence these plans offer a kind of ‘commitment-lite’ intervention, allowing individuals a psychological means to commit themselves to a savings trajectory, although they faced no financial penalties for failing to keep to this plan. All three treatments offered the one time opportunity to open a savings account, with lower transactions costs. So we expect anyone who thinks that savings “may be a good idea” to take on this opportunity, regardless of whether s/he really will prove able to save or not. What the Open Treatment offers is an additional mechanism to commit, with reminder each time the client pays on her loan to effectively deposit in the savings account. But it provides no help in the difficult decision of how much to save. So to the extent that this decision engenders procrastination or delays, it may not elucidate the full demand for commitment savings. The Default Treatment offers the same commitment device, with in addition a default option on how much to commit to save. Based on theory and previous empirical evidence, this default option should raise the uptake of the product (Beshears et al., 2009; Benzarti and Thaler, 1995; Johnson and Goldstein, 2004). The lack of enforcement of commitments and the full flexibility to deposit or withdraw savings at any time make these products financially equivalent in the sense that any desired pattern of savings could be implemented with any of the three treatments with exactly the same financial outcome. Hence, they only differ by the behavioral incentives they provide.

These three financial products were randomized across the 20 microfinance branches of CHN, stratified on baseline number of clients. Over the course of two months of active lending, 1,375 individuals took new microfinance loans from CHN and were offered one of the three products. This relatively small experiment generates good baseline balance, and because impacts observed are so large, provides us with compelling evidence as to the efficacy of the treatments.

We find that savings behavior is strongly divergent across treatments even though they provide identical direct financial incentives, suggesting a pervasive role for behavioral issues in savings decisions among this sample of Guatemalan entrepreneurs. Evidence of the power of the framing effects begins with the commitment amounts chosen by borrowers: 47% of those under the Open Treatment chose amounts that equal a Guatemalan bill (10, 20, 50, or 100 Quetzales per month) whereas 100% of those in the Default Treatment committed to save exactly 10% of their deposit, which due to interest charges typically equaled a non-integer currency amount. Those offered the Open Treatment are no more likely to open a savings account than the control, but conditional on opening one are 41% more likely to make subsequent deposits and save \$14 more on average during the duration of the experiment. Overall average savings (intention-to-treat) are \$7 higher for the Open Treatment than the Basic Savings (equal to \$5.6), not quite significantly different.

The Default Treatment doubles the probability that an individual will open a savings account when taking a loan (77% versus 40% in control), and then even in this expanded group of savers it increases savings rates and final balances. The effect of the Default Treatment on final savings balances in the overall portfolio of borrowers (the product of the above two results) is highly significant, with balances \$17 in excess of the control. Compared to the Open Treatment, the Default Treatment leads to a

significantly higher account opening but, conditional on opening an account, produces the same financial savings balance. Most relevant for the lending industry, the Default Treatment appears to decrease the rate at which clients renew their loans. This has implications for lender profits, but is also consistent with the idea, motivated in our theoretical model, that this ‘savings from borrowers’ promotion allows a specific type of individuals to escape a debt-financed equilibrium.

Even before the recent financial crisis, a drumbeat was building inside the microfinance world criticizing the externally-financed business model of most micro-finance lenders. The argument was made that strictly for the health of the financial institution it is important to draw liquidity from local markets. Local savings mobilization decreases the currency risk of the institution and provides a hedge against the sometimes fickle foreign entities that provide lending capital to microfinance. This was the motivation of our research partner, CHN, to build new savings products for microfinance borrowers. Because of capital scarcity caused by the international financial crisis and high default rates in the existing microfinance portfolio, new microfinance lending was effectively ended in mid-September 2008, and so the cohort of new borrowers being brought into the program slowed to a trickle at this point. Hence, the foreseeability of the financial crisis was the genesis of CHN’s interest in the project, and the onset of the actual financial crisis in the microfinance portfolio effectively ended our ability to promote the product. The financial crisis is surely having strong effects on the desire of Guatemalan households to save and borrow, but the differences across our randomized treatment arms should still provide a correct measure of impacts in this environment.

Whether or not it makes sense to use ‘nudges’ to promote savings to a group of people currently repaying loans depends entirely on what the counterfactual to that savings is. If we cast the decision in the typical developed-country context this likely does not make sense; individuals are surrounded by other ways to commit and debt is typically issued on a declining-balance basis. In developing countries on the other hand, individuals may have had very few other options to exercise commitment. Hence, the counterfactual to repaying a loan and saving using a commitment device may be repaying a loan at the same pace and not saving. We confirm that the rate of debt repayment in our sample is not correlated with either the endogenous or the experimental variation in savings amounts. Particularly given the fact that the savings promotion was done as individuals were applying for their loan, we can cast this decision as one over whether to take a *future* loan or to begin saving *now* in order to reduce or avoid that future loan. We formalize this concept using a simple theoretical model, and show that the same individuals who are likely to find commitment useful are also likely to use debt. While such individuals will not choose commitment savings over current debt, they may choose it over future debt. Our results provide strong evidence that financial products informed by new results from the behavioral economics literature about the role of self-discipline can be effective at boosting savings among micro-entrepreneurs.

In Section 2, we provide a simple theoretical motivation for why offering commitment products to current borrowers can be an effective means of allowing individuals to escape debt-based financing over the long term. In Section 3 we describe the experimental design, give more details on each of the

treatments, and present tests of the balance of the experiment. Section 4 presents impacts on the opening of accounts, the accumulation of savings balances, and on loan repayment. Section 5 offers preliminary evidence on the impact of the treatments on taking a further loan beyond the experimental window, and Section 6 concludes.

## 2. Commitment savings alongside credit

### 2.1. Savings and borrowing

In what follows we provide a theoretical motivation for the unusual feature of our experiment, namely the offering of a commitment savings product to people who are currently repaying a loan. The simple take on this problem would be to say that, given the gap between lending and borrower rates, it makes sense to pay down debt rather than to save. We motivate here the idea that offering a commitment savings product alongside loans can allow individuals who would otherwise borrow indefinitely to escape the debt-financed equilibrium via saving and repaying the loan simultaneously.

A rich literature exists detailing a variety of informal means to execute control over future selves, most particularly rotating savings and credit associations (ROSCAs) (Besley, Coate, and Loury, 1994; Anderson and Baland, 2002; Ambec and Treich, 2007). Intriguingly, the suggestion has recently emerged that microfinance borrowing itself can be used as a commitment device to accumulate a lump sum of cash (Bauer, Chytilová, and Morduch, 2009; Banerjee and Duflo, 2010). This works because it is much more difficult to fail to repay debt than it is to fail to save. Imagine an individual who wants to buy a new durable object, but who lacks self-control and also lacks access to a commitment savings mechanism. Such an individual will wish to save (naïve) or plan to save (sophisticated) but finds himself unable to do so, and therefore remains without the durable good. The introduction of credit allows the present self to turn the tables on future selves; many future selves that are unwilling to save will be willing to make loan payments, given the large penalties that are attached to failing to repay (default) versus failing to save (none).

The ‘beta-delta’ formulation for the hyperbolicity problem lets us consider time inconsistency in a simple environment. In the standard formulation, utility is given by  $U_t = E_t \left[ u(c_t) + \beta \sum_{k \geq 1} \delta^k u(c_{t+k}) \right]$ . The parameter  $\beta \leq 1$  gives the degree of time inconsistency, and  $\delta \leq 1$  is the discount factor. The standard case where only the discounting factor matters obtains when  $\beta$  is equal to one, and as it falls towards zero preferences become more time-inconsistent.<sup>2</sup> To focus on first-order effects, we linearize marginal utility  $u'(c_t) = c_t$  and ignore uncertainty.

Individuals receive an exogenous per-period income flow of  $y_t$ . We abstract away from the speed at which an individual chooses to save, and consider the question of the decision to save one unit of capital

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<sup>2</sup> To see the time inconsistency, note that the MRS between  $t+1$  and  $t+2$  evaluated at time  $t$  is  $u'(c_{t+1})/\delta u'(c_{t+2})$  but the MRS between the same two periods from the perspective of the decision maker at time  $t+1$  is  $u'(c_{t+1})/\beta \delta u'(c_{t+2})$ .

for one period, which can then be invested in a good that returns a profit  $\pi \geq 1$  in the following period. Consumption under savings is  $y_t - 1$  today and  $y_{t+1} + \pi$  in the next period. The individual will choose to save today if  $\beta\delta\pi > 1$ . This sets him up on a long-run higher consumption path  $c_t = y_t + \pi - 1$ , with savings-financed investment every year.

We model access to the credit market as the ability to borrow one unit of startup capital and to receive the benefits of investment immediately. Tomorrow's self will pay back that one unit of capital plus an interest rate  $r$ .<sup>3</sup> Consumption today is  $c_t = y_t + \pi$ , while consumption tomorrow is  $c_{t+1} = y_{t+1} - (1+r)$ .

An individual will find it beneficial to take a loan today if  $1+r < \frac{\pi}{\beta\delta}$ . Credit generates a benefit by allowing the individual to shift profit forward relative to the time at which the good is 'saved' for, but does so at the cost of the interest rate when the loan is eventually paid back. Applying the same logic year after year, the long run consumption path with borrowing each year is  $c_{t+\tau} = y_{t+\tau} - (1+r) + \pi$ .

The decision to save, therefore, is driven by  $\beta\delta\pi$ , while the decision to borrow is driven by  $\frac{\pi}{\beta\delta} - r$ . This says that short-sightedness discourages savings and encourages debt, and profit increases them both. To summarize, utility under the different choices are:

$$\text{Autarky:} \quad U_t^a = y_t + \beta\delta y_{t+1} + \sum_{\tau \geq 2} \beta\delta^\tau y_{t+\tau} \quad (1)$$

$$\text{Saving:} \quad U_t^s = y_t - 1 + \beta\delta(y_{t+1} + \pi - 1) + \sum_{\tau \geq 2} \beta\delta^\tau (y_{t+\tau} + \pi - 1) \quad (2)$$

$$\text{Borrowing:} \quad U_t^b = y_t + \pi + \beta\delta(y_{t+1} - (1+r) + \pi) + \sum_{\tau \geq 2} \beta\delta^\tau (y_{t+\tau} - (1+r) + \pi) \quad (3)$$

Which individual chooses which path depends on the discount factors that shape the perception of time,  $\beta\delta$  between now and tomorrow, and  $\delta$  between any two future years. Areas where savings and borrowing are superior to autarky are defined by values of  $\beta\delta$  relative to  $\frac{1}{\pi}$  and  $\frac{\pi}{1+r}$ . The solution is illustrated in Figure 1, panel a, for the case when profits are relatively low,  $\pi^2 \leq 1+r$ .<sup>4</sup> The optimal choice is defined by three horizontal bands, with borrowing for  $\beta\delta < \frac{\pi}{1+r}$ , savings for  $\beta\delta > \frac{1}{\pi}$ , and autarky between the two values.

<sup>3</sup> This formulation, in which the consumption increase from investment is realized now, permits both entrepreneurial and consumption-driven motivations in borrowing.

<sup>4</sup> When profits are high,  $\pi^2 \geq 1+r$ , both borrowing and saving become more attractive and there is no area of autarky. There is a large area in which both savings and borrowing are superior to autarky, when  $\frac{1}{\pi} \leq \beta\delta \leq \frac{\pi}{1+r}$ . Comparing both options shows that borrowing is preferred when  $\beta\delta \leq \frac{\pi+1}{r}(1-\delta)$ . In this text, we only develop the more likely case of  $\pi^2 \leq 1+r$ , although introduction of commitment savings done further gives similar results for the high profitability case

It is important to recall that these choices are critically determined by the weight of short-term considerations. In the long-term, the saving-investment path allows for sustainable higher consumption than the debt driven path by the amount of the interest rate (or more generally by the difference between the borrowing and the deposit interest rates). It would therefore always be preferred. As clearly shown by the comparison of expressions (2) and (3), this long-term benefit of savings is balanced by a large difference in the very first period only, whereby borrowers can start consuming at a high level while savers have to reduce their consumption. This large difference is most critical to the more impatient and those with hyperbolic discount rate. In this formalization, a time unit corresponds to the terms of the loan, which typically is 1 to 3 years in the context we are studying. For many microfinance loans, this time is often even shorter at 4-6 months.

## 2.2. Introducing commitment savings

With a commitment savings plan, a time inconsistent individual will consume in the first period but start saving in the second. Question is whether introduction of this plan could be used by some individuals to switch from a borrowing to a savings regime, and if so whether it would make sense to both save and borrow during this transition.

Commitment savings products can allow sophisticated, time-inconsistent individuals for whom  $\beta\delta < \frac{1}{\pi} < \delta$  to switch from the non-investment consumption path  $c_t = y_t$  to the investment path  $c_{t+\tau} = y_{t+\tau} + (\pi - 1)$ , after one period in which consumption is  $c_{t+1} = y_{t+1} - 1$ . Utility with commitment savings is:

$$\text{Commitment savings: } U_t^{cs} = y_t + \beta\delta(y_{t+1} - 1) + \sum_{\tau \geq 2} \beta\delta^\tau (y_{t+\tau} + \pi - 1) \quad (4)$$

In a situation where individuals could a priori choose between saving now, commit to save in the future, or invest as alternative strategies, commitment savings is preferred to autarky when  $\beta\delta < \frac{1}{\pi} < \delta$ ,

and preferred to borrowing when  $\left(\frac{1}{\beta\delta} + 1\right)(1 - \delta) < \frac{r}{\pi}$ . This is represented by the area above the curve AB

on Figure 1, panel b. This mapping in the parameter space completely defined the optimal choice in a situation where individuals have to choose either one of these financial instruments, but not two. One can read the optimal choice for a given time inconsistency  $\beta$  along the diagonal of slope  $\beta$ . Individuals with moderate time inconsistency (high value of  $\beta$ ) will choose to borrow if very impatient, stay in autarky if less impatient, take commitment savings if somewhat patient, and immediate savings if most patient. Individuals with stronger time inconsistency (low value of  $\beta$ ) may never choose autarky or immediate savings, and only move from borrowing to commitment savings.

Consider now the case of an individual who is on a borrowing path. As a saving commitment instrument is made available, he can contemplate switching to savings. This entails starting to save in

period  $t+1$ . Note that if borrowing was profitable to start with ( $\beta\delta < \frac{\pi}{1+r}$ ), the individual will prefer to borrow in year  $t$  and  $t+1$  even as he starts to save. The utility associated with this additional path that includes borrowing in period  $t$  and  $t+1$  while starting to save in period  $t+1$  is therefore:

*Commitment savings with borrowing*

$$U_i^{csb} = y_t + \pi + \beta\delta(y_{t+1} - (1+r) + \pi - 1) + \beta\delta^2(y_{t+2} - (1+r) + \pi - 1) + \sum_{\tau \geq 3} \beta\delta^\tau (y_{t+\tau} + \pi - 1) \quad (5)$$

Comparing  $U_i^{csb}$  with  $U_i^b$  shows that switching from a borrowing path to a saving path is optimal when  $\delta^2(1+r) > 1$ . This is represented in Figure 2, panel c, by the area ABEF.

In conclusion, commitment savings offer a powerful tool for individuals to transition from a debt financed investment path to a savings financed investment path if they are time inconsistent but willing to save in the future. Maintaining borrowing while transitioning to accumulating savings to invest is superior to having to endure a period without investment in the transition. It also increases the range of individual that would be willing to transition.

In the model, we assumed that one loan period's commitment savings allow the project to be fully financed in the next period. The linearization of marginal utility made it easier for an individual to decrease consumption a great deal today by repaying debt and saving at the same time. In reality, our results will show that the average balance achieved by commitment savers is only about 10% of the amount of the loan, and so the commitment question appears to call for less sacrifice but a longer period of accumulation than provided for in our model. While the linearization of utility makes this sacrifice easier, a concave utility function would mean that the willingness to sign on to commitment savings would be highest when one has the most money in one's pocket. Even in this case, then, it can make sense to market commitment savings at the time of disbursement of loans from a dynamic targeting perspective. This model thus makes a point new to the literature, which is that while commitment savings products allow a set of individuals to escape debt financing, the simultaneous provision of debt and commitment savings can be more effective yet. Those currently taking a loan are consequently a natural sample in which to test this hypothesis. This is what motivates the CHN experiment.

### **2.3. The role of the default option in decision making**

The previous model shows that a person will choose to either never save, save now, or commit to save in the future, depending on her discount factor  $\delta$  and degree of time inconsistency  $\beta$ . This motivates our 'Open' commitment product where the borrower can choose how much to commit to save when making loan payments. In the Default commitment product, the only difference is that rather than having the savings option described with the amount left up to the borrower, an amount of 10% of the loan payment is offered as the default option. Hence an individual taking no action will save nothing in the Open Treatment, and will save 10% in the Default Treatment. Beginning with Samuelson and Zeckhauser's

(1988) concept of 'status quo bias', two strains of the behavioral literature motivate why variation in the default option provided to customers may have an influence on observed outcomes.

First, there is the procrastination effect according to which the cognitive burden of thinking through the alternative options causes agents to defer deciding if the cost of postponing the decision is low. Tversky and Shafir (1992) and Dhar and Nowlis (1999) find that this behavior becomes more common as the choice set expands, contrary to the principle of value maximization. Hence our Default Treatment, by providing a yes/no decision over both savings and the savings amount, may ease the decision to begin saving relative to the Open Treatment which requires both taking the decision to save and setting the savings amount. In a related argument, O'Donoghue and Rabin (1999, 2001) motivate status-quo behavior as being driven by the intersection of procrastination and incorrect expectations about future behavior. Because taking a decision involves some pain that can be deferred to tomorrow, hyperbolic individuals (particularly naïve ones) will put off deciding. By changing the action that will be taken if an agent procrastinates in deciding what to do, we can have powerful effects on observed outcomes. Madrian and Shea (2001) and Beshears et al. (2007) examine the effects of a switch to automatic enrolment in 401(k) plans for employees of large US firms and find that both enrolment and contribution amounts are strongly driven by the defaults provided by employers.

Second, there is the endorsement effect proposed by Madrian and Shea (2001) according to which the default option is interpreted by individuals as a form of advice coming from a knowledgeable party. In our case this explanation may be particularly pertinent; forced savings of 10% of the loan payment are not uncommon in microfinance, nor is the use of current savings balances to determine the size of future loans. Hence it is possible that the Default Treatment impacts decision making not because borrowers are on autopilot with respect to savings decisions, but because the creation of a reference point at 10% savings actually influences their sense of what is optimal. Under this explanation it is not the ease of deciding aspect of the default product that would drive behavior but the framing of the 'correct' amount at around 10%.

While we will not be able to disentangle these two mechanisms using the Default Treatment, our experiment reveals an unusually pure set of behavioral impacts. This is because, under the 10% default savings, there is in fact no automated transfer of money as would be the case for the 401(k) plans studied in the literature. Rather the borrower is prompted to make a voluntary deposit. Hence, even under the 'default', real action is still required for the agent to save, and thus any potential impacts are not arising from a pure auto-pilot phenomenon but rather from the '10% by default' treatment truly making agents more willing to make savings deposits. This is an important difference in helping achieve discipline in savings between the formal sector (where savings can be automatically deducted from wage payments) and the informal sector (where savings must be decidedly added to interest payments). What is common between the two is the strict periodicity of wage and loan payments that serve as a disciplinary deadline for the savings commitments made. Finding such deadlines is more difficult in the informal sector where self-employment prevails than in the formal sector where wage-employment is the norm.

### **3. The experiment and research design**

#### ***3.1. The Experiment***

We conducted our experiment with CHN, which currently offers a full range of financial products including mortgage credits, business loans, insurance, and microfinance lending. The microfinance department was opened in August 2006, and was growing quickly prior to the experiment initiation in July 2008. In the first half of 2008, CHN increased its microcredit client base by 67% to 9,000 and its microcredit portfolio by 74% to Q122 million (\$15.3 million). During those six months, CHN opened new branches and added microfinance services to existing branches. Still, microcredit represented only 14% of total lending.

Within CHN, microfinance is generally defined as an individual loan below \$3,125. Nearly all of CHN's microfinance loans are individual loans with constant monthly payments. Group loans, loans with uneven payments, or payments timed to the harvest season represent less than 10% of outstanding loans and were excluded from the experiment and analysis. Loan terms are exceptionally long relative to microcredit standards, with about 50% of them at 36 months, 30% at 24 months, and the rest at 12 and 18 months. Because the microfinance department was relatively new and repayment periods long, most clients were not returning clients. Interest rates varied from 20 to 35%, with most loans offered at 21% and 24%<sup>5</sup>. CHN's administrative records indicate that 85% of loans were made for small business use and about 10% for housing (repair, improvement, or financing), although this is not necessarily meaningful as money is fungible. At the beginning of the experiment, in July 2008, CHN was experiencing portfolio repayment challenges. Nearly 28% of capital was more than 30 days behind, up from 20% at the start of the year.

Logistically, a bank could provide a commercial commitment-like savings product by allowing its clients to pick a future savings trajectory, and then using a set of reminders and prompts to encourage them to stick to this chosen path. This would require that the bank be able to interact with individuals wanting to save small amounts regularly. But, for the bank, profits from such an intensive savings relationship with very small savings depositors are likely to be difficult to achieve.

CHN, however, has a unique opportunity to profit from such a scheme with its microfinance clients because it makes individual loans with relatively long terms and monthly repayments. This provides the institutional framework to offer a commercial savings product with two features: the option to self commit and monthly savings reminders to reinforce the savings decision. The CHN microfinance setup thus allows to link a commitment-type savings product with a long-term microfinance loan repaid monthly over 1 to 3 year periods. The possibility of adding a savings reminder at negligible additional cost to either the client or the bank engenders a sustainable savings relationship between borrowers and the bank. While CHN fits this situation, traditional microfinance institutions offering group lending with short loan terms may not. The experiment includes three different products that we describe in detail below. In the initial research design, CHN branches would be randomly assigned one of the three products and would offer that

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<sup>5</sup> CHN charges a flat interest rate on the declining balance.

product for approximately three months before switching to another product. This design would create multiple cohorts for comparison and allow a difference-in-difference analysis. The experiment started mid-July 2008, with expectation for the first product rotation mid-October 2008. From July 15<sup>th</sup> through the end of August, the portfolio continued to grow at the recent average pace of about 250-350 new loans every two weeks. In September however, the international financial crisis hit the banking sector in Guatemala. New loan activity declined 65% due to liquidity scarcity (and management concerns about the deteriorating microfinance portfolio performance).<sup>6</sup> The lending program was essentially closed in the first week of October when CHN only disbursed 75 loans. By March 2009, microcredit lending had not recovered at a sufficient rate to justify revitalizing the experimental design. Our experiment was therefore de-facto truncated. Yet, the initial randomization and two and a half months of active lending give us enough observations for a single difference estimation of the impact of these products. In this paper, we therefore analyze the product acceptance rates and savings behavior of this cohort of 1,375 borrowers taking loans between July 15, 2008 and March 2009, although mostly until the end of September 2008. We observe their credit and savings behavior until November 25, 2009.

### **3.2. *The savings products***

The three financial products that were offered are labeled Basic Savings, Open Treatment, and Default Treatment. They were randomized across the 20 microfinance branches of CHN, stratified on baseline number of clients. Starting on July 15, 2008, all microcredit clients applying for a new loan were offered the savings account assigned to their branch. The savings accounts were promoted by the loan officer during the loan application meeting, which generally occurred one to two weeks prior to loan disbursement.<sup>7</sup> The loan officers used a color brochure to explain the rules of the savings account: the savings would earn 4% interest<sup>8</sup>, savings were not collateralized (could not be held or seized if the loan is in default<sup>9</sup>), savings could be added to and withdrawn in part or in full at any time, and the loan approval was not contingent on acceptance of the savings product. Although there was no established minimum balance, clients must maintain a nominal balance of at least 1Q (12.5 UScts) to prevent account closure as part of Guatemala's anti-money laundering laws. In short, there are no restrictions on the account. Additionally, we developed a one-page signature form asking clients if they understood the savings product and if they agreed to accept the product. Due to banking laws, the savings account could not be opened automatically, but required the client to complete separate forms, deliver them to the cashier, and wait a short period for approval. Although most clients were new to CHN, some already had savings accounts and were allowed to use those accounts. The pre-existing accounts took on the rules of the project accounts.

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<sup>6</sup> Lending standards were not changed during September, so clients are still comparable to August and July.

<sup>7</sup> Agencies generally disburse funds on one day, about every two weeks.

<sup>8</sup> Prior to the month this experiment began, savings accounts earned 1.5% interest.

<sup>9</sup> The savings and credit operations have always been quite separate within CHN, not even sharing client identifications, which meant that CHN credibly never seized or even put pressure on clients' savings when loans were in difficulty.

The Basic Savings group was offered this savings product with no commitment option and no reminders.

In the Open Treatment group, the loan officer gave the borrower the opportunity to opt-in to the savings reminders, by choosing an amount they commit to save monthly. They could have chosen any absolute monetary amount including 0. To accept the product, borrowers signed a form that included both the amount of desired monthly savings and the number of months they will be reminded. When the borrowers made their monthly loan payment, the cashier asked them if they would like to save their committed amount.

In the Default Treatment group, borrowers were told that unless they chose otherwise (opt-out), a default savings level was set at 10% of their monthly loan payment. Clients could opt-out by choosing a lower savings level, including zero. The signature form clearly stated the proposed savings amount (e.g., 10% times Q290 loan payment = Q29 savings) and number of months. Like in the other options, savers had to open their savings account separately. Borrowers that had selected a non-zero level of savings were reminded to save each time they paid a loan installment. All other rules governing the account were identical to the Basic Savings product.

While the Open and Default Treatments offer the appearance of a commitment, CHN did not want to use any mechanism that would have forced the clients to abide by their commitment, rewarded them for abiding by the commitment or penalized them for failing to do so. In addition, the bank was not in any legal position to prevent borrowers from withdrawing savings at any points in time. Hence, no real or enforceable commitment was possible. The treatment, therefore, is just a framing exercise around a higher monthly payment than just loan repayment. This framing is reinforced by the bank's network of tellers, who view a prompt screen as they receive the loan payment that includes the payment amount and the commitment savings amount broken out separately.

What the Default Treatment carries in addition to the Open Treatment is a focal point for the savings decision. There is not as such a difference in "effort", "time", or "cost" in committing savings under the Default and Open Treatments. Procrastination theory however applies to the extent that it saves on the need to figure out how much to save, and hence makes it an easier decision. The "endorsement effect" theory suggests that clients assume that this is a sort of advice from an institution that has higher understanding or knowledge of what the optimal rate of savings should be.

Because the offering of commitment savings products necessarily includes the promotion of savings, the Basic Savings treatment was designed to capture the savings promotion effect, and allows us to isolate the commitment with reminders effect by using it as a control group.

### **3.3. Data**

CHN provided administrative data on its lending activities in the form of bimonthly portfolio reports. These data inform the original terms of the loan, the issuing officer and branch, the number and amount of missed payments, the amount of interest and capital arrears, and remaining outstanding capital.

By identifying when the loan dropped out of the report, we identify when the loan was closed within a 2-weeks window. Separate information on renegotiated loans, starting in December 2008, distinguishes them from loans closed after being fully repaid.

Branches provided additional information on the exact loan payment amount including insurance services, the loan's intended use, the day on which the monthly payment is due, and the client's gender.

On the savings side, we have information on all movements for the period April 2008 to November 25, 2009, as well as balance of the accounts as of November 25, 2009. CHN produced a special report linking the savings account numbers to the their owner's loan number. We netted out the within day transactions, and thus reconstructed the exact day-to-day running balance on each account. While there is nothing in these movements identifying which ones correspond to "committed deposits" as opposed to any other use of the savings account, we will attempt at analyzing the effect of commitment on deposit behavior by not counting the very small deposits that correspond to interest payments. However, comparison of the aggregate net balances includes all deposits and withdrawals.

There was no specific microfinance savings product prior to introduction of this experiment, and even though some savings account certainly were owned by microcredit clients, there is no possibility to distinguish them in the CHN information system. This is because the credit and savings data systems were maintained separately, with no numerical customer ID link until August 2008 when CHN implemented a new information system. We therefore cannot easily trace the effect of the savings promotion on the time series evolution of savings activities, nor can we compare deposits and withdrawal behaviors under these new products with the behavior of clients that used savings accounts even when they were not promoted.

### **3.4 Randomization tests**

We verify the quality of the randomization in Table 1. These tests of equality of means are done in a regression framework, allowing for clustering standard errors are the branch level:

$$x_{ib} = \beta_0 + \beta_1 O_b + \beta_2 D_b + \varepsilon_{ib}$$

where  $x_{ib}$  is a characteristic of account  $i$  in branch  $b$ ,  $O_b$  a treatment dummy for the Open Savings branches,  $D_b$  a dummy for the Default Treatment branches, and  $\varepsilon_{ib}$  an idiosyncratic element clustered at the branch level.

We looked at microfinance loans extended before and after the experiment was put into place, since the treatments are expected to have no effects on loan taking. In the pre-experiment period, we observed 2,237 microfinance loans taken over the period March to mid July 2008. In the post-experiment period, July 15 to end of September, we observed 1,259 new microfinance loans. We observe no statistical differences across the treatment arms on loan size, terms, purpose, or delinquency level.

Ideally we would like to compare savings behavior among microfinance borrowers prior to the experiment. However, as mentioned above, there is no way to identify savings accounts that correspond to microfinance borrowers in the pre-experiment period. When the experiment took place, however, about

10% of the clients already had a savings account with CHN.<sup>10</sup> For these clients, taking up the savings offer consisted in linking their existing account to their new loan. We observe the savings account balance at the time of their new loan. For the purpose of this randomization test, we select the savings accounts more likely to be similar to microfinance savings on the basis of their average balance. Specifically, we restrict the sample of pre-treatment CHN savings accounts to the 2,420 accounts with average balance over the pre-experiment period below the 95<sup>th</sup> percentile of the distribution of balances of identified microfinance savings. By construction, the average balances of this selection of accounts are bound to be similar across treatment groups. What we compare, however, is the activity recorded in these accounts over the pre-experiment period in terms of number and average size of deposits and withdrawals. Table 1 shows no significant differences in the level of activities of these savings accounts across treatment arms.

Hence, despite a small number of randomization units, microfinance borrowers are comparable across treatment arms in their credit and pre-treatment saving behavior. This validates the use of simple differences to measure the impact of the treatments.

#### **4. Comparison of savings behavior across treatments**

##### **4.1. Uptake and commitments**

We define uptake as opening of a new savings account or linking a pre-existing account to a new loan. Table 2 reports the average uptake across treatment groups. In the Basic Savings branches, 40.4% of the clients chose to open a savings account. Uptake is substantially higher by an additional 36.8% in the Default Treatment branches, but not so in the Open Treatment branches. This result is robust to considering the period of intense lending activity until October 2008 (col. 2) or to adding controls for the loan characteristics (col. 3). Restricting to clients that did not have any existing savings account, uptake is lower in Basic Savings branches, and impact even higher (although not significantly so) with the Default Treatment (col. 4).

So why is it that the Open Treatment did not induce some potential “sophisticated” individuals to take the opportunity of realizing the savings that they could not do otherwise, as expected from the theory? This is likely because the promotion to open a savings account was quite powerful. By offering to open a savings account with no fees and no obligation, a high interest rate on deposits, and de facto very little transaction costs since the client was already doing business at the bank, time-inconsistent clients may have opened an account whether they would in fact eventually make a deposit into it or not. Hence it is in the use of the account that we expect to see the commitment effect. This promotion effect can be seen in Figure 2, which reports the evolution over time in the daily number of new savings accounts. A large discontinuity is observed on July 15 when the experiment started. This is for all savings accounts, not just the microfinance accounts. But there is no reason for any discontinuity in the other types of savings account on that particular date. As can be seen in Figure 3, uptake also increased over time, possibly as a

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<sup>10</sup> We omit in this comparison three branches in which savings were at time compulsory.

result of learning by loan officers and branch staffs. An important observation here is that the difference between treatments is stable over time.

Why is uptake higher with the Default Treatment if everyone who ever intended or not to save could be induced to open a savings account by the promotion package? We interpret this as an endorsement effect for the 10% savings level rather than the effect of reducing procrastination, which should have been curtailed by the one-time opportunity offered to open a savings account.

The Open Treatment was framed in monetary amounts, and hence very naturally clients chose commitment amounts in multiples of Guatemalan bills (10, 20, 50, and 100 Quetzales). The Default Treatment, by contrast, was framed in terms of percentage, and all clients that opened an account chose to commit to the suggested 10%. In a sense, as commitments were not to be enforced, there was not too much cost in accepting the Default option. But as we will see in the next section, this commitment—however little ownership it entails—did influence deposit behavior. The distribution of commitment amounts in monetary value thus reflects this framing (Figure 4). On average, commitment amounts were \$4.79 in the Open Treatment and substantially higher at \$7.91 in the Default Treatment (Table 2, col. 5)

#### **4.2 Deposits behavior**

The main expected effect of a commitment treatment is to induce regular saving deposit behavior in the amount one has committed. In that respect, both Open and Default Treatments contain the same commitment incentive. And indeed, conditional on uptake and committed amount, we observe very similar behavior. These results are reported in Table 3. A first deposit of some non-zero amount is compulsory at the time of opening the savings account. So the first act in using the account is really the second deposit. Table 3 shows that both treatments raise the percentage of savers that use their account by more than 40 percentage points over the base value of 33.3 in the no-commitment Basic Savings control group (col. 1). While the percentage of savers that make at least 4 deposits falls to 12.7% in the control group, the difference of 30 percentage points of the commitment treatments remains substantial (col. 3). Over the whole period of observations, the control group averaged 1.7 deposits per opened savings account, while the treated groups averaged more than 4 deposits per account (col. 4). These results are robust to adding controls (col. 2), and the point estimates for the two treatments are very close to each others.

A second striking element of this commitment effect is the size of the deposits made relative to the committed amounts (Figure 5). There are definitely some deposits that do not correspond to any pre-committed savings amount, but simply reflect the normal activity of a savings account, where in particular very large amount are deposited and withdrawn at any point in time. Yet 69% of the deposits in the Open Treatment and 82% of those in the Default Treatment are within 25% of the committed amount<sup>11</sup>. It is interesting to observe that an externally suggested amount (the 10% default option) has a stronger suggestive power than the self-chosen amount. Could it be that having decided oneself on an amount, one is more aware

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<sup>11</sup> Excluding the initial deposit at the opening of the savings account.

of the arbitrariness of the committed amount and more prone to succumb to the self-control problem? This would be particularly the case if the 10% default acts as an endorsement effect.

Combining frequency and amount of deposits, how well do savers reach their overall own saving objective? We measure this progress to goal at 10 months into their loan by their cumulative deposits in excess of the amounts they committed to deposit. To minimize the effect of the few outliers that made some very high deposits, of orders of magnitude significantly above the committed monthly amount, we estimate a median regression. Results reported in Table 3, columns 5 and 6, show that savers under the Open Treatment almost met their objective, depositing a non-significant 2.5% less (or US\$0.60) than they had committed. Savers under the Default Treatment deposited a bit less than what they committed, 18.5% or US\$11.7. But one should remember that their commitment was substantially higher than in the Open Treatment, with a mean value of \$79 compared to \$31 for ten months. In absolute terms, savers deposited \$12.50 in the Basic Savings, \$25.63 in the Open Treatment, and \$49.25 in the Default Treatment over the first 10 months of their loans (col. 7)

In conclusion, the CHN microfinance borrowers did respond to the offer of a commitment savings product by depositing more frequently and in amounts usually close to what they had committed.

#### ***4.3 Final balance and savings accumulation***

While savers largely meet their commitments with regular deposits, whether CHN clients are actually able to accumulate savings depends as well on their patterns of withdrawals. We now look at the pattern of accumulation of savings and how it was affected by the treatments. Using the information on all transactions, we construct the day-by-day balance on all savings accounts, starting from the day they received their loan. Averages by treatment are represented in Figure 6. Because the treatments were linked to a loan, we separate the 12-months loans that came to maturity during the period of observations from the longer term loans.

The pattern of savings accumulation of the long-term borrowers on the right panel shows a striking difference between the two treatment groups and the control group. Over 16 months of observations, savers from the treatment groups accumulated \$30-35, progressing at a steady pace, while the Basic savers saved about \$15 in the first month after opening their account and then never more. But the other striking feature of these patterns is the little difference across the two treatments. Despite Default Treatment savers making much higher deposits, their net accumulation is not different from that of the Open Treatment savers. This is confirmed in the regression analysis reported in Table 5, for savers with long term loans in column (4), but also for savers with any loan-term in column (1). The result is also robust to adding controls (col. 2) or to restricting the sample to loans taken prior to October 11, 2008 (col. 3). The figure suggests that there may be a steeper accumulation in the Default Treatment, but neither the difference in slope nor the cumulated \$5 difference at 16 months are significantly different from 0. It would take a longer observation period to see whether this difference is real.

This similarity of conditional accumulated savings between the two treatments despite very different deposit behaviors implies a higher number, and to a lesser extent higher level, of withdrawals, as confirmed by Table 4.

The results for the unconditional average savings accumulation across all borrowers, however, is quite different across treatments (Table 5, col. 5). This is because the uptake of savings accounts in the Default Treatment is much larger than in the other two groups. The Open Treatment leads to large (but still statistically insignificant) increase in average savings over the control group; \$12.6 compared to \$5.6. The Default Treatment leads to an average \$22.6 accumulated savings, or more than quadruple the savings in the control group.

It is important to notice that savings accumulation is not the only benefit of having a savings account. It could well be that being able to withdraw small amounts when needed can bring substantial welfare if it avoids using a moneylender, forgoing the opportunity of a purchase, or being penalized for not making a monthly payment in due time. We unfortunately do not observe this broader set of behaviors and hence cannot document any such benefits.<sup>12</sup> What we observe is that Default Treatment savers have made many more transactions on their accounts than the Open Treatment or the Basic savers.

#### ***4.4 Capital repayment and default***

One obvious concern with this savings product is that, by making additional demands on the liquidity of borrowers, it somehow damages their ability to repay loans. To make the same point from the perspective of the client, the product asks them to save at 4% interest when they are paying 24% interest on the loan. Is the use of this savings product slowing down the rate at which their loans are repaid? If so, this can create a heavy interest cost on the client. If, on the other hand, savings amounts come from a different source within the household than loan repayment amounts, the fact that the loan interest rate exceeds the savings rate is irrelevant.

To address this question, we examine loan repayment rates across the treatment arms, as well as whether repayment correlates with the savings amounts. In looking at these results we emphasize that only the comparison across treatment arms is randomized, and therefore variables like having opened a savings account or savings rates are endogenous. If clients have extra money, they may choose to save more, repay their loan faster, or both. The regression results in Table 6 show that clients do both. The capital repayment rate is measured by the ratio of excess repayment of the principal as of July 2009. Problems encountered by the Microfinance Branch of CHN are illustrated by this result. In the control group, borrowers are on average behind their principal payment by 29% (col. 1). Note however that both treatment groups and in particular the Open Treatment savers are lagging much less in their repayments. Column 2 shows that the

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<sup>12</sup> There is no pattern in the withdrawals of the Default Treatment savers that would suggest that they withdraw money from their accounts to meet their savings commitments or to pay their monthly dues, nor that they withdraw their commitment deposits after having put them in.

difference observed in the Open Treatment group comes from clients that have opened a savings account and column 3 that clients with a higher savings rate also repay their loans faster.

Columns 4 to 6 show no increase in delinquency (defined as being at least 30 days behind payments at 6 months into their loan) or in the number of missed payments induced by the savings treatments, and even a (not quite significant) decline among Open Treatment savers.

The conjecture that inducing microfinance borrowers to save may delay their loan repayments or jeopardize their abilities to make their monthly payments is not borne by the observations. Using the regularity of microfinance loan repayments as an opportunity to build the self-discipline to save in the informal sector thus appears to be a win-win strategy.

## **5. Epilogue: Loan renewal and the use of balances when the loan cycle ends**

Sixteen months after the beginning of the experiment most loans are still outstanding, and borrowers seem to be accumulating. We use the limited sample available to us at present to estimate what borrowers will do when their loan comes to term (this analysis will be updated in late 2010). We can get a preview from the subset of loans that were paid off by November 2009, our last date of observations. By that time, 171 loans had been fully paid off, 87 of them were 12-months loans whose term had expired, and 84 were longer terms loans that were cancelled after full payment.<sup>13</sup> Of these clients, 108 had a savings account. Only 34 of these clients took another loan from CHN by November 2009. As for the uptake of savings account, all of the clients in the Default Treatment branches accepted the default savings account (including those that had not taken it the first time), as did 12 of the 21 clients in the Open Treatment branches.

Figure 7 shows the pattern of accumulation of savings around the time the borrowers closed their loans. A sharp contrast emerges between those that took another loan subsequent to this closing loan (only 20 accounts), and those that stopped borrowing (88 accounts). The latter also withdrew most of their savings from their account. It would be consistent with the theory that accumulated savings have allowed some borrowers to withdraw from borrowing. Working against this interpretation is the fact that the savings balances appear to be too small to fully substitute for credit. Their average is \$40, while loan amounts average \$2,000.

In the regression analysis reported in Table 7, we find that loan renewal is indeed less likely for those in the high-saving Default Treatment. Hence not only are clients in this treatment disproportionately likely to withdraw their savings at the end of the term, but they are less likely to take new loans. In column 2 of Table 7, however, we control for the ‘mechanisms’ that would be expected to link this treatment to the decrease in loan renewal, such as opening an account, savings balances, and paying off the loan early. If anything, the ‘net’ treatment effect left in the treatment dummy becomes stronger (see Flores & Flores-Lagunes (2009) for a discussion of Mechanism and Net Average Treatment Effects). This would be consistent with a dislike of the Default policy driving dropout, but in any event the treatment does not

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<sup>13</sup> We do not include the loans that were closed in default and renegotiated.

appear to drive dropout through savings accumulation. Therefore while our results are consistent with a theoretical model predicting that effective commitment devices offered jointly with borrowing can increase the likelihood of exiting from debt financing, additional data will help to clarify this picture.

## **6. Conclusions**

We collaborated with the largest public bank in Guatemala to randomly offer its microfinance clients the opportunity of opening a savings account (Basic Savings) and of selecting two new types of commitment savings instruments (Open and Default Treatments). With the latter, clients could “commit” to regularly deposit a chosen amount in a savings account when paying the monthly due on their loan. They would be reminded of their commitment when they made their loan payments, but they had no obligation and would not be penalized if they failed to deposit. In that sense, the commitment was no more than a psychological means to commit, a framing exercise. In the Open Treatment, clients had to choose the amount they wanted to deposit each month; in the Default Treatment, the offer came with a default option of 10% of the monthly loan payment, but clients could change it to any amount they wanted, including 0. In both treatments and the control Basic Savings, a promotion was offered to open a savings account with no fees and a higher interest rate than the standard savings account, but no other conditions or restrictions were imposed.

The results are striking. While the savings promotion was powerful in inducing clients to open a savings account, 40% of them did so in the Basic Savings and Open Treatment, the Default Treatment raised that number to almost 80%. Conditional on having opened an account, the commitment with reminders induced 75% of the clients to actually use at least once their account, compared to only 33% in the control group. Combining these results show that 13.5% of the microfinance clients had an active savings account in the Basic Savings promotion group, 33.5% in the Open Treatment, and 58.5% in the Default Treatment. Deposits were most often within a small range of the committed amounts, and median savings reached the goals savers had set for themselves in the Open Treatment, while missing by less than 20% of their larger goal in the Default Treatment.

Activities on the savings accounts also show numerous withdrawals, particularly in the Default Treatment. After 16 months of observation, net accumulated savings for those who had opened an account is \$14 in the Basic Savings group, and about \$29 in the two Open and Default Treatments. Including the non-savers, the Open Treatment raised the average savings from \$5.6 to \$12.6, and the Default Treatment to \$22.6. On balance, then, these results suggest that a widespread implementation of the 10% by Default Savings product is likely to lead to large increases in savings balances in the organization. We uncover no evidence that these larger savings balances in any way damage loan repayment; if anything the reverse.

These treatments represent scalable commitment savings products, incorporating insights from behavioral economics and a growing number of experiments with commitment devices. Under our introductory model, sophisticated microfinance borrowers, who recognize that they lack the self-discipline to save and are willing to bind themselves, would experience welfare benefits from these products. The

combination of both a commitment device and a default option, represented by the Default Treatment product, has potential to overcome decision making limitations among sophisticated individuals in the informal sector, possibly moving them from a debt-driven to a savings-driven investment trajectory.

**Table 1. Randomization tests**

	Basic Savings	Open Treatment	Test of equality with Basic Savings	Default Treatment	Test of equality with Basic Savings
	Mean	Mean	t-stat	Mean	t-stat
<b>Pre-experiment loans</b>					
Loan size (US\$)	2,020	1,957	-0.21	1,667	-1.53
Interest rate	0.24	0.24	0.56	0.24	0.24
Loan term (months)	31.1	28.5	-0.71	27.7	-1.01
Monthly payment (US\$)	85.4	88.0	0.40	79.0	-1.13
Loan purpose is housing	0.10	0.06	-0.54	0.08	-0.29
Female borrower	0.66	0.60	-1.47	0.65	-0.27
Delinquency (number of missed payments)	5.43	4.80	-0.45	4.59	-0.60
Number of observations	682	613		942	
<b>Post-experiment loans</b>					
Loan size (US\$)	1,699	1,676	-0.11	1,465	-1.56
Interest rate	0.25	0.26	1.25	0.25	-0.19
Loan term (months)	30.2	27.9	-0.78	25.8	-1.42
Monthly payment (US\$)	76.9	79.6	0.40	74.8	-0.31
Loan purpose is housing	0.07	0.06	-0.17	0.11	0.60
Female borrower	0.73	0.68	-0.72	0.73	-0.04
Number of observations	480	355		424	
<b>Pre-experiment savings account activities</b>					
Number of deposits	1.32	1.60	0.87	1.67	0.76
Number of withdrawals	1.78	2.01	0.46	2.33	1.36
Average deposit amount (US\$)	87	80	-0.50	77	-1.43
Average withdrawal amount (US\$)	84	83	0.12	92	-0.71
Number of observations	746	869		805	

t-stat based on robust standard errors clustered at the branch level.

Period of observations: Pre-experiment is March 1-July 14, 2008; post-experiment is July 15-September 30, 2008.

Loans are microfinance loans. Savings accounts are accounts with mean balance over the period below the 95th percentile of the pre-existing savings account balances of borrowers in the experiment. Branches in which savings were at times compulsory not included in savings account activities.

**Table 2. Uptake: Creation of a linked savings account and commitment**

	Opens or links a savings account			Opens a savings account	Commitment, conditional on uptake (US\$)
	(1)	(2)	(3)	(4)	(5)
Open Treatment	0.044 (0.122)	0.017 (0.115)	0.079 (0.114)	0.167 (0.113)	
Default Treatment	0.368*** (0.119)	0.371*** (0.125)	0.386*** (0.107)	0.508*** (0.118)	3.12** (1.19)
Controls					
Interest rate			-1.821** (0.836)		
Loan term (months)			0.0033 (0.004)		
Monthly payment (US\$)			2.78E-06 (4.24E-06)		
Female borrower			0.101** (0.042)		
Intercept	0.404*** (0.073)	0.408*** (0.073)	0.660** (0.282)	0.258*** (0.065)	4.79*** (0.97)
Observations	1375	1317	1375	1242	532
R-squared	0.11	0.12	0.13	0.19	0.07

Robust standard errors in parentheses, clustered at the branch level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Uptake equal to 1 if client opened or linked a savings account at time of new loan.

Col. 2 restricted to period July 15 to October 11, 2008. Col. 4 restricted to clients without pre-existing accounts.

Col. 5 restricted to the treatment branches. The intercept represent the average commitment in Open Treatment branches.

**Table 3. Deposit behavior, conditional on uptake**

	Makes a second deposit		Makes a fourth deposit	Number of Deposits	Cumulated deposit in excess of commitment, at 10 months		Cumulated deposit at 10 months
	(1)	(2)	(3)	(4)	Median regressions (%)	Median regressions (US\$)	Median regression (US\$)
Open Treatment	0.414*** (0.10)	0.377*** (0.09)	0.426*** (0.11)	4.005*** (1.00)	-2.5 (6.9)	-0.6 (2.8)	13.13*** (4.84)
Default Treatment	0.426*** (0.15)	0.344*** (0.11)	0.428*** (0.14)	4.424*** (1.42)	-18.5*** (5.9)	-11.7*** (2.9)	36.75*** (6.97)
Controls							
Interest rate		0.051 (0.77)					
Loan term (months)		-0.0144*** (0.004)					
Monthly payment		3.60E-05 (4.34E-05)					
Female borrower		0.0104 (0.037)					
Intercept	0.333*** (0.07)	0.738*** (0.23)	0.127*** (0.02)	1.695*** (0.29)			12.50*** (4.50)
Observations	745	745	745	745	532	532	745
R-squared	0.157	0.221	0.152	0.168			
Test Open=Default: p-value	0.93	0.79	0.99	0.81	0.09	0.02	0.00

Robust standard errors in parentheses, clustered at the branch level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Bootstrapped standard errors with 100 repetitions for the median regressions.

**Table 4. Withdrawal behavior, conditional on uptake (US\$)**

	Number of withdrawals		Mean withdrawal	
	(1)	(2)	(3)	(4)
Open Treatment	-0.25 (0.26)	-0.23 (0.34)	16.02 (11.81)	13.63 (13.66)
Default Treatment	0.35 (0.24)	0.464* (0.24)	25.6 (15.63)	29.98* (15.41)
Controls				
Interest rate		3.2 (4.65)		236.0 (207.70)
Loan term (months)		0.0240* (0.01)		1.3 (0.99)
Monthly payment		0.00594** (0.00)		0.388* (0.20)
Female borrower		0.4 (0.26)		0.5 (9.13)
Intercept	1.258*** (0.17)	-1.1 (1.45)	27.37*** (2.19)	-100.5 (88.32)
Observations	745	745	745	745
R-squared	0.007	0.02	0.01	0.04
Test Open = Default: p-value	0.037	0.029	0.63	0.45

Robust standard errors in parentheses, clustered at the branch level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5. Net accumulated savings by November 11, 2009 (US\$)**

	Borrowers with linked savings account				All borrowers
	(1)	(2)	(3)	(4)	(5)
Open Treatment	14.30** (5.8)	11.07** (4.1)	15.24* (7.4)	14.87** (6.1)	7.0 (4.8)
Default Treatment	15.51** (6.2)	14.36* (7.2)	13.26** (5.2)	20.3 (11.9)	17.04** (6.4)
Controls					
Interest rate		79.2 (50.0)			
Loan term (months)		0.18 (0.28)			
Monthly payment		0.131*** (0.03)			
Female borrower		-17.10* (9.0)			
Intercept	13.78*** (1.7)	-7.057 (16.9)	13.78*** (1.7)	13.98*** (1.6)	5.570*** (1.4)
Observations	745	745	707	639	1375
R-squared	0.031	0.11	0.03	0.046	0.055
Test Open=Default: p-value	0.883	0.694	0.823	0.688	0.212

Robust standard errors in parentheses, clustered at the branch level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1  
Col. 3 restricted to loans taken between July 15 and October 11, 2008; col. 4 to loans with term longer than 12 months.

**Table 6. Capital repayment rate and loan delinquency**

	Capital repayment rate			Delinquent		Missed payments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Open Treatment	0.209** (0.09)	0.0938 (0.10)	0.196** (0.09)	-0.13 (0.12)	-0.03 (0.15)	-0.12 (0.08)	-0.04 (0.09)
Default Treatment	0.163 (0.10)	0.173 (0.10)	0.134 (0.10)	-0.14 (0.12)	-0.16 (0.15)	-0.13 (0.09)	-0.14 (0.09)
Savings / owed capital			1.204*** (0.29)				
Created a linked savings account		-0.076 (0.10)			0.024 (0.15)		0.015 (0.09)
* Open Treatment		0.264** (0.11)			-0.230 (0.15)		-0.181* (0.10)
* Default Treatment		0.023 (0.12)			0.018 (0.16)		-0.001 (0.11)
Intercept	-0.290*** (0.07)	-0.259** (0.09)	-0.302*** (0.07)	0.366*** (0.10)	0.357** (0.15)	0.517*** (0.06)	0.511*** (0.09)
Observations	1,375	1,375	1,375	1,375	1,375	1,373	1,373
R-squared	0.03	0.04	0.04	0.02	0.04	0.03	0.05

Robust standard errors in parentheses, clustered at the branch level; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Capital repayment rate is the ratio of excess repayment over the loan size on July 31, 2009. Delinquency is being at least 30 days behind capital repayment at 6 months. Missed payments is the fraction of bimestrial balance that shows at least one missed payment.

Savings is the ratio of savings to owed principal in November 2009.

**Table 7. Renewal of loan after closure (12 months loans only)**

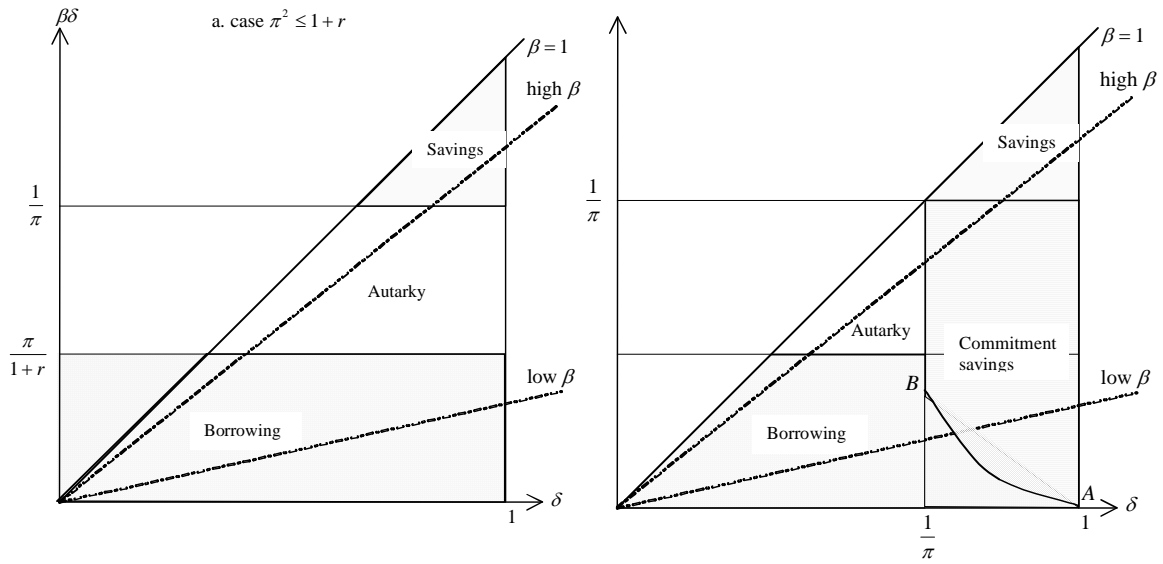
	Take a new loan after closure	
	(1)	(2)
Open Treatment	0.114 (0.287)	0.056 (0.265)
Default Treatment	-0.237* (0.117)	-0.266** (0.118)
Loan paid off before term		0.453** (0.192)
Opened a linked savings account		(0.072) (0.130)
Savings balance before closure (\$)		0.00106* (0.001)
Intercept	0.286** (0.117)	0.316** (0.118)
Observations	90	90
R-squared	0.16	0.22
Test Open=Default: p-value	0.211	0.228

Standard errors in parentheses, clustered at the branch level;

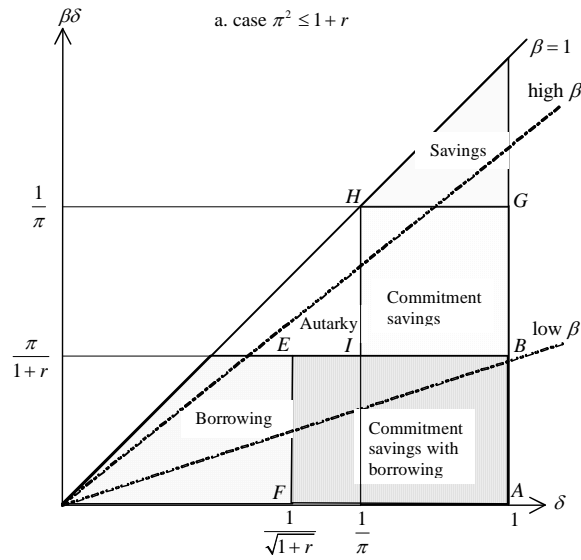
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**a. Savings or Borrowing**

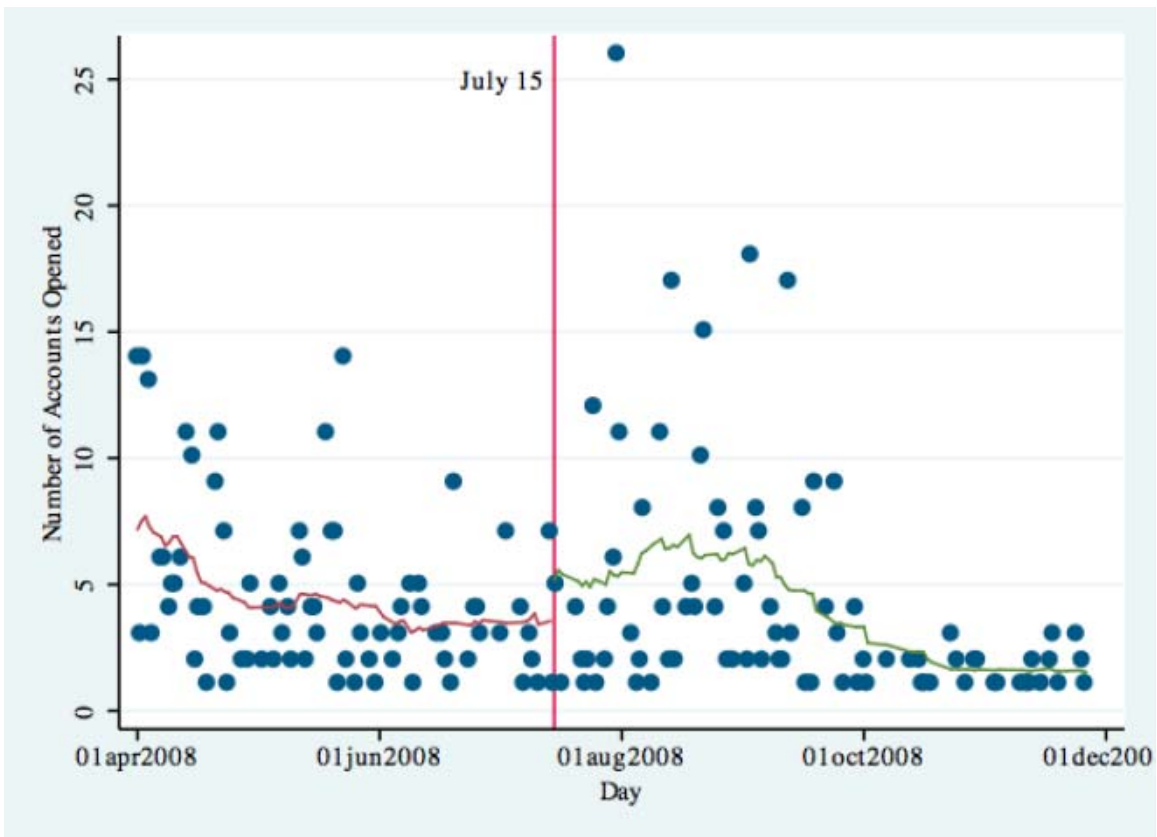
**b. Savings now, Commitment savings, or Borrowing**



**c. Commitment Savings with Borrowings**



**Figure 1. Optimal path with availability of savings and borrowing instruments**



**Figure 2. Savings accounts opened in Basic Savings treatment branches**

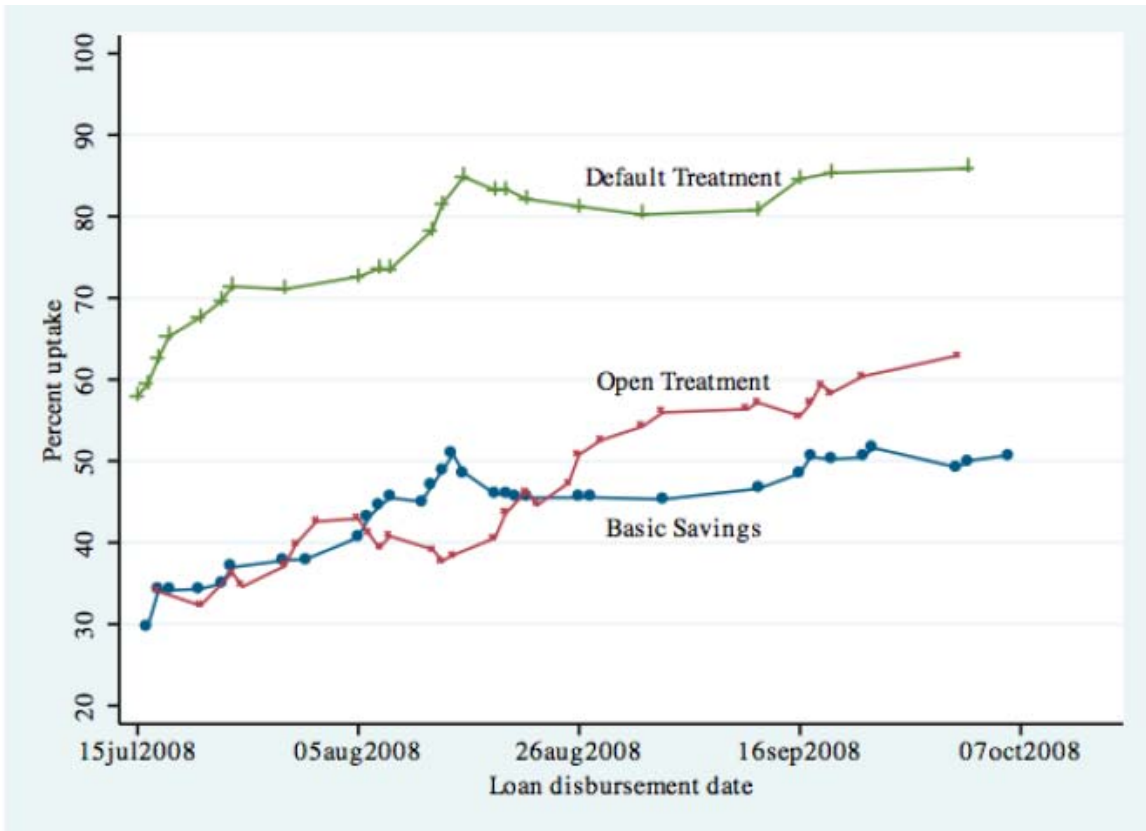
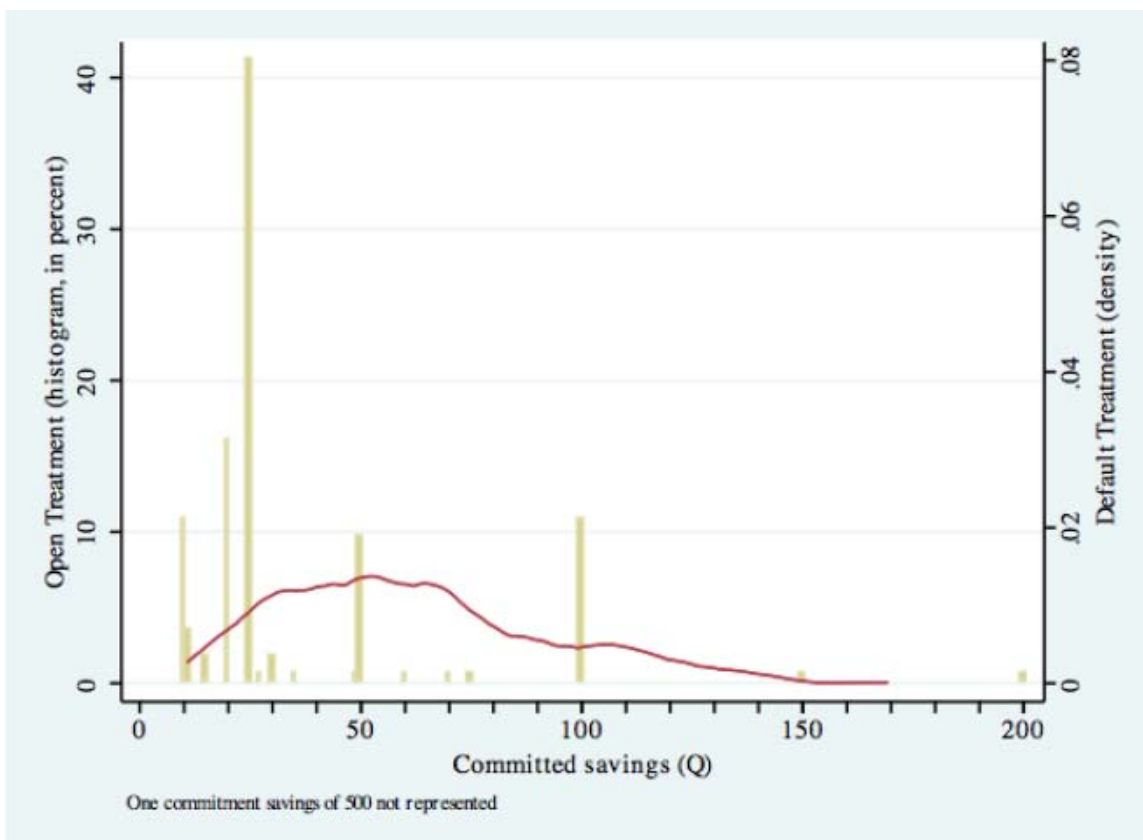


Figure 3. Uptake of linked savings account, by treatment status



**Figure 4. Committed savings, by treatment status**

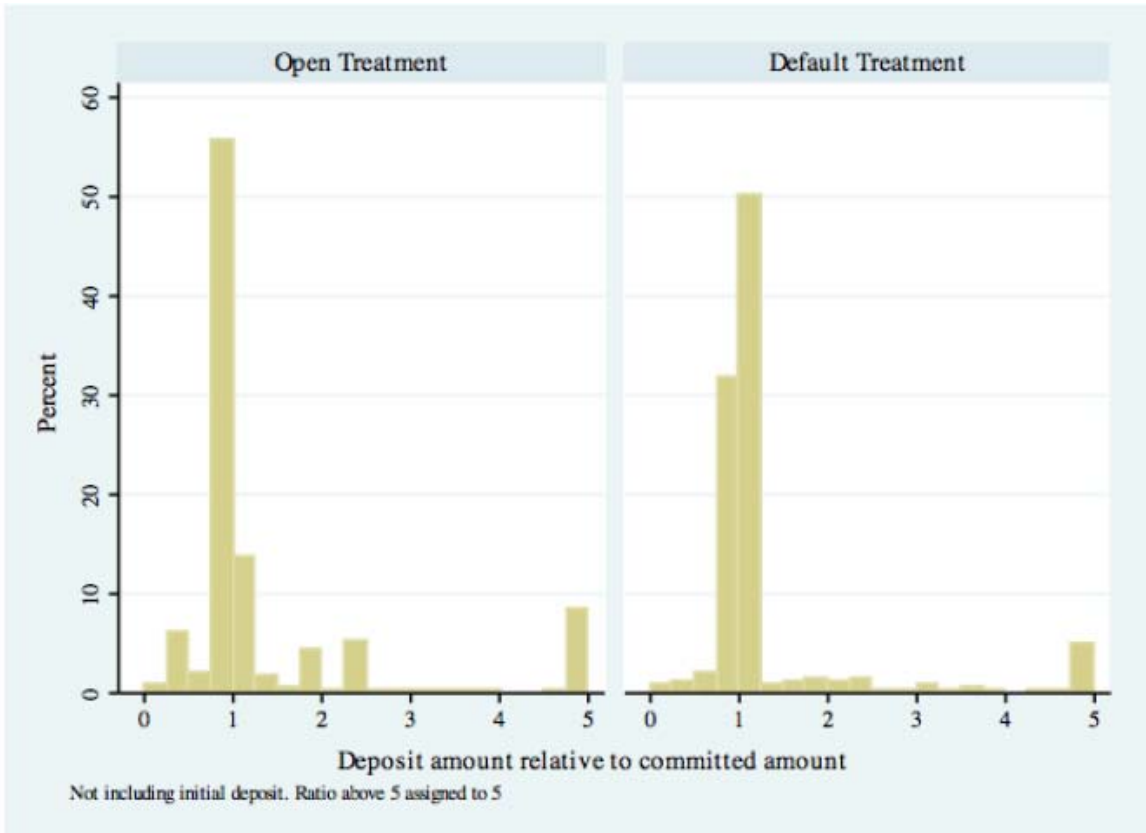
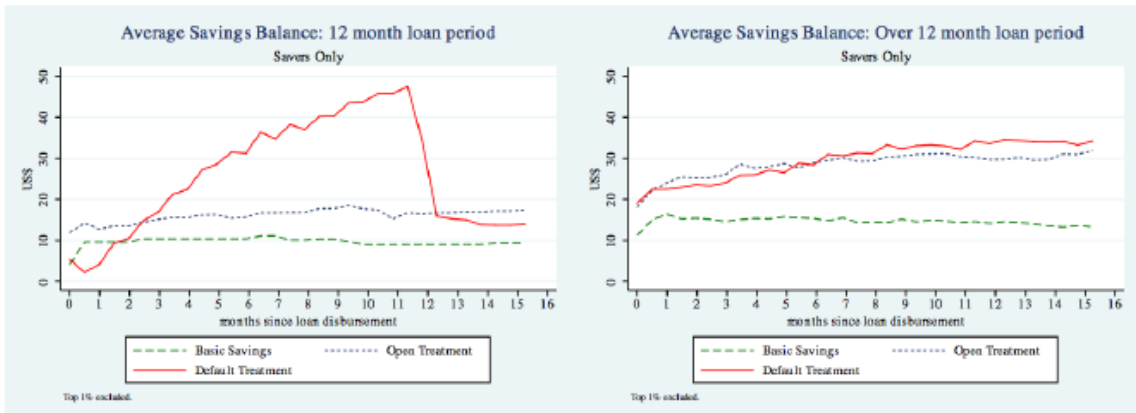
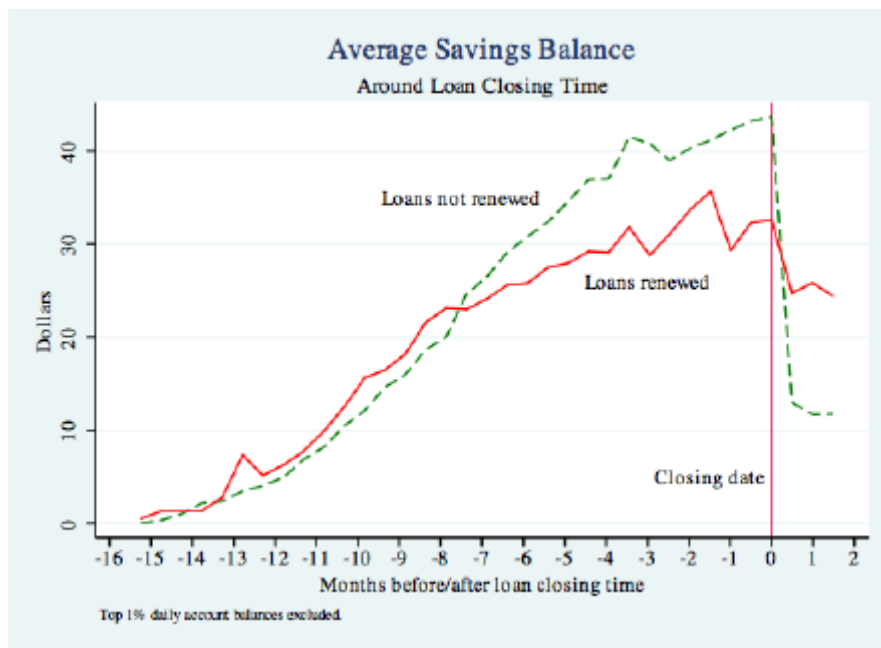


Figure 5. Deposit amount relative to committed amount, by treatment status



**Figure 6. Running savings balance by treatment status**



**Figure 7. Running savings balance upon loan closure**

## BIBLIOGRAPHY

- Ambec, Stefan, and Nicolas Treich. 2007. "Roscas as financial agreements to cope with self-control problems." *Journal of Development Economics*, 82(1): 120-137.
- Anderson, Siwan, and Jean-Marie Baland. 2002. "The Economics of Roscas and Intrahousehold Resource Allocation" *Quarterly Journal of Economics*, 117(3): 963-995.
- Ashraf, Nava, Diego Aycinena, Claudia Martinez, and Dean Yang. 2010. "Remittances and the Problem of Self Control: A Field Experiment Among Migrants from El Salvador." Working Paper, Economics Department, University of Michigan.
- Ashraf, Nava, Dean Karlan, and Wesley Yin. 2006. "Tying Odysseus to the Mast: Evidence from a Commitment Savings Product in the Philippines." *Quarterly Journal of Economics*, 121(2): 635-672.
- Banerjee, Abhijit, and Esther Duflo. 2010. "Giving Credit Where it is Due." Mimeo, Economics Department, MIT.
- Banerjee, Abhijit, and Sendhil Mullainathan. 2009. "The Shape of temptation: Implications for the Economic Lives of the Poor." Mimeo, Economics Department, MIT.
- Bauer, Michal, Julie Chytilová, and Jonathan Morduch. 2009. "Behavioral Foundations of Microcredit: Experimental and Survey Evidence." Mimeo, Economics Department, New York University.
- Benzarti, Shlomo, and Richard Thaler. 1995. "Myopic Loss Aversion and the Equity Premium Puzzle." *The Quarterly Journal of Economics*, 110(1):73-92.
- Beshears, John, James Choi, David Laibson, and Brigitte Madrian. 2009. "The Importance of Default Options for Retirement Saving Outcomes: Evidence from the United States." In: Jeffrey Brown, Jeffrey Liebman, David Wise, eds, *Social Security Policy in a Changing Environment*. The University of Chicago Press.
- Besley, Timothy, Stephen Coate, and Glenn Loury. 1994. "Rotating Savings and Credit Associations, Credit Markets and Efficiency." *Review of Economic Studies*, 61(4): 701-19.
- Carroll, Gabriel, James Choi, David Laibson, Brigitte Madrian, Andrew Metrick. 2009. "Optimal Defaults and Active Decisions." *Quarterly Journal of Economics*, 124(4): 1639-1674.
- DellaVigna, Stefano. 2009. "Psychology and Economics: Evidence from the Field" *Journal of Economic Literature*, 47(2): 315-37
- Dhar, Ravi, and Stephen Nowlis. 1999. "The Effect of Time Pressure on Consumer Choice Deferral." *Journal of Consumer Research*, 25(4): 369-384.
- Dupas, Pascaline, and Jonathan Robinson. 2009. "Savings Constraints and Microenterprise Development: Evidence from a Field Experiment in Kenya." NBER Working Paper No. 14693.
- Flores, C., and A. Flores-Lagunes. 2009. "Identification and Estimation of Causal Mechanisms and Net Effects of a Treatment under Unconfoundedness." *IZA Working Paper No. 4237*.
- Johnson, Eric, and Daniel Goldstein. 2004. "Defaults and Donation Decisions." *Transplantation* 78(12): 1713-1716.
- Laibson, David. 1997. "Golden Eggs and Hyperbolic Discounting." *Quarterly Journal of Economics*, 112(2): 443-477.
- Madrian, Brigitte, and Dennis Shea. 2001. "The Power of Suggestion: Inertia in 401(k) Participation and Savings Behavior." *Quarterly Journal of Economics*, 116(4): 1149-1525.
- O'Donoghue, Ted, and Matthew Rabin. 2001. "Choice and Procrastination." *Quarterly Journal of Economics*, 116(1): 121-60.

Samuelson, William, and Richard Zeckhauser. 1988. "Status Quo Bias in Decision Making." *Journal of Risk and Uncertainty*, 1(1): 7-59.

Tversky, Amos, and Eldar Shafir. 1992. "Choice Under Conflict: The Dynamics of Deferred Decision." *Psychological Science* 3: 358.