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

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Jesse Atkinson
Alain de Janvry†
Craig McIntosh‡
Elisabeth Sadoulet†

Abstract

We report on an experiment in which a new set of commercial savings products, informed by the behavioral finance literature, were offered to the microfinance borrowers of Guatemala's largest public-sector bank. We find that prompting savings at the time of loan repayment leads savings deposits to double relative to the control, and framing a contribution of 10% of the loan payment causes them to double again. Loan repayment and savings accumulation appear to be complementary. Mainstreaming the most successful product tested here would allow the bank to realize savings sufficient to leverage 50% of the short-term loan portfolio.

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1. Introduction

Even before the recent financial crisis a drumbeat was building inside the microfinance world criticizing the externally-financed business model of most lenders (CGAP, 2010). Institutions that do not build up a base of domestic savings are failing to serve as true financial intermediators, and are exposed to substantial currency risk due to mismatches between hard-currency creditors and locally denominated loans. With the onset of the global financial crisis this logic has become more pressing, making it imperative that financial institutions be able to identify specific products that will allow a lending-driven financial institution to build up a reservoir of domestic savings. Fortunately, recent advances in behavioral finance have shown that while many people have difficulty saving, they can be assisted to do so through relatively simple product innovation. This paper reports on the result of an experiment that implemented a new set of commercial products intended to to build savings among microfinance borrowers from Guatemala's largest public-sector bank.

Behavioral explanations for the difficulty of savings focus on the group of individuals who wish to save but prove unable to do so. Such 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, 2001). In any of these environments, individuals will say today that they would be willing to save tomorrow, but will decide not to do so once tomorrow arrives. They therefore fail to execute their own savings plans. While individuals in developed countries have access to many financial instruments that help them overcome these problems (direct deposit, CDs, retirement plans, life insurance, etc.) [1], the cash-based economic environment of micro-entrepreneurs in the developing world is typically devoid of such instruments (Collins et al., 2009). The evidence that exists from developing countries shows that substantial demand exists and that commitment devices are likely to have strong impacts on behavior (Ashraf, Karlan, and Yin, 2006; Dupas and Robinson, 2009). As yet, however, few commercial financial institutions in developing countries have piloted scalable financial savings products that exploit these insights.

In collaboration with *Credito Hypotecario Nacional* (CHN), we deployed new financial products informed by this behavioral literature and offered 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 ask agents to consider long prospective time horizons during which they would anyway be interacting regularly with a financial institution. In order to focus on the behavioral dimensions of savings product design, the treatments induce no direct financial incentives for clients at all and instead differ only in the manner and extent to which borrowers are 'nudged' to save. Since many commercial financial institutions may find binding their clients into true commitment products difficult or objectionable, our products are driven by asking clients to determine a savings trajectory that they wish to

[1] 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). More recent empirical work on behavioral issues in US pension plan contributions include Card & Ransom (forthcoming) and Choi, Laibson, and Madrian (forthcoming).

follow over the course of the loan and then prompting them to make these self-specified savings deposits at the time of each loan payment. The bank does not, however, penalize clients for failing to meet this trajectory, and deposits, once made, can be freely withdrawn at any time without charges. Our products therefore are based more on provoking mental accounting and reinforcing the salience of savings (Karlan et al., 2010) than on the use of true commitments such as the 'lock box' of the SEED accounts of Green Bank in the Philippines (Ashraf et al., 2006), the non-withdrawable deposits of the Grameen Pension Scheme (Collins et al., 2009), or the free deposits and costly withdrawals implemented by Dupas and Robinson (2009). Our results show that this light-handed, easily scaled approach is indeed very successful at increasing savings balances.

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 the time of 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 of defining a monthly savings deposit that they will then be prompted to make each time they make a loan payment. This (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 and Zeckhauser, 1988) and decision deferment (Tversky and 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.

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. Those who desire today to save tomorrow will likely take on the opportunity to opan an account, regardless of whether s/he really will prove able to save or not. What the Open Treatment offers is an additional mechanism to reinforce savings behaviors, but it provides no framing of the decision as to how much to save. To the extent that this having to make this decision engenders procrastination or delays, it may not elucidate the full demand for commitment savings. The Default Treatment offers the same commitment device, but in addition frames the savings amount at 10% of the loan payment, and clients are now required to 'opt out' if they wish to avoid the opening of the account and the savings prompts. 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 the 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 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 who elected to save in the Default Treatment committed to exactly 10% of their loan payment, 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 the 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.

New borrowers represent an attractive group to whom to promote savings products in the sense that they are considering the medium-term future and will be regularly interacting with the financial institution. A natural question, however, is whether it can make sense to use 'nudges' to promote savings to a group of people currently repaying loans (the interest on savings is 4%, while the interest paid on loans is 24%). We present arguments both theoretical and empirical to suggest that this can be a sensible approach. First, there are the well-established benefits of liquid savings in buffering against shocks, a use to which long-term loans cannot easily be put. We find treatments that generate large savings deposits also generating the most frequent withdrawals, consistent with the use of the accounts for buffering. Secondly, we present a theoretical model showing that the simultaneous provision of debt and commitment savings products can allow a greater fraction of the population to eventually escape a debt-financed equilibrium than if individuals are forced to choose between a loan and commitment savings. We show that the treatment that generates the highest savings also generates the lowest loan renewal rate, particularly on smaller, short-term loans. Finally, we present evidence that savings deposits and loan repayment are in fact

complementary; the savings treatments generate faster pay-down of debt and weakly better overall repayment performance than the control group. Hence it appears that the savings generated by our treatments come from a different source than loan repayments and that savings promotion improves the overall loan portfolio for the bank. Using the reserve ratio under Guatemalan banking law prior to the crisis, the savings that would be generated by extending the most successful treatment to all borrowers would permit a 50% expansion in the permissible lending portfolio. find that savings mobilization with default options can help the bank generate about half of the funds used in its short-term loans to microfinance clients.

In Section 2, we provide a simple theoretical motivation for the simultaneous provision of loans and commitment savings products. 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, loan repayment, and loan renewal, and Section 5 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.[2]

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).

[2] In order to make the unique point about the value of simultaneous provision of debt and commitment savings we model a true commitment product. For a theoretical model specifically focused on the question of how reminders to save drive behavior, see Karlan et al., 2010.

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 β is equal to one, and as it falls towards zero preferences become more time-inconsistent.[3] 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 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 r, the interest rate.[4] 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:

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

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

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

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[3] 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 $u'(c_{t+1})/\beta\delta u'(c_{t+2})$.

[4] This formulation, in which the consumption increase from investment is realized now, permits both entrepreneurial and consumption-driven motivations in borrowing.

Which individual chooses which path depends on the discount factors that shape the perception of time, $\beta\delta$ between now and tomorrow, and δ 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 $\pi^2 \leq 1+r$, or profits are relatively low.[5] 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.

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:

$$\textit{Commitment savings}: \qquad U_t^{cs} = y_t + \beta\delta\left(y_{t+1} - 1\right) + \sum_{\tau \geq 2} \beta\delta^{\tau}\left(y_{t+\tau} + \pi - 1\right) \tag{4}$$

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[5] 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

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 β along the diagonal of slope β. Individuals with moderate time inconsistency (high value of β) 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 β) 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

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

Comparing U_t^{csb} with U_t^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 δ and degree of time inconsistency β. 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 (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%[6]. 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.

[6] CHN charges a flat interest rate on the declining balance.

Having set out to build commitment-like savings products, a bank could promote them by trying to locate individuals wanting to save and then using a set of reminders and prompts to encourage them to stick to this chosen path. This relationship requires that the bank and its clients be able to communicate and transact small amounts regularly, making per-transaction costs a central concern. The lending practices of CHN provide an opportunity to forge this relationship, because the institution combines regular monthly repayment periodicity with unusually long-term individual loans. Thus marketing the product to current borrowers provides the transactional framework in which to offer a commercial savings product with two features: an initial option to self commit and subsequent 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.

In the initial research design, CHN branches were to be be randomly assigned one of the three products and then offer that product for approximately three months before switching to another product. This design would have created 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 15th 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).[7] 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 (Basic Savings, Open Treatment, and Default Treatment) 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.[8] The loan officers used a

[7] Lending standards were not changed during September, so clients are still comparable to August and July.
[8] Agencies generally disburse funds on one day, about every two weeks.

color brochure to explain the rules of the savings account: the savings would earn 4% interest[9], savings were not collateralized (could not be held or seized if the loan is in default[10]), 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.

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. 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 no 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

[9] Prior to the month this experiment began, savings accounts earned 1.5% interest.

[10] 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.

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 dummy for the Open Treatment branches, D_b a dummy for the Default Treatment branches, and ε_{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.[11] 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 95th 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 commitment amounts*

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

[11] We omit in this comparison three branches in which savings were previously compulsory.

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 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 ***Deposit 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[12]. 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 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

[12] Excluding the initial deposit at the opening of the savings account.

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.[13] 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

[13] 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.

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 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.

4.5. *Loan renewal and the use of balances when the loan cycle ends*

Twenty-six months after the beginning of the experiment, just over half of the loans are still outstanding, meaning that we can examine the probability of loan renewal for the 50% of clients whose loans have come to term as of late September 2010, our last date of observations. By that time, 768 loans had been paid off, of which 498 had passed maturity date and 280 were loans that both had passed maturity date and were paid off at the intended time. We can first partition these by loan duration; we have 131 completed 12-month loans, 81 18-month loans, 311 24-month loans, and then a group of 240 36-month loans that had been paid off, most of whose original maturities had not yet been reached. Particularly for those small 12-month loans all of whose maturity dates had already passed, the Default Treatment decreases the probability of renewal, which is what our theory model would lead us to predict (note that the 12-month loan is most typical of the products offered by microfinance institution).

We can push harder on this result in a number of ways. First, since the idea is that accumulated savings permit people to escape debt, we can instrument for savings balances with the treatments and see whether there appears to be a direct relationship between these. Then, since prepayment and loan renewal are related with each other in complex and endogenous ways, we can select the sample in two ways. In columns 5-7 we examine only the 280 loans that closed exactly at maturity, so as to abstract away from pre-payment. When we do this, we find that both the savings balances and the savings ratio (as a fraction of loan size) are significantly negative at the 10% level, indicating that higher savings balances decrease loan renewal probabilities. The point estimate remains stable although the result looses its statistical significance when we instrument for savings and control for loan size. Alternatively, in columns 8-10 we keep all 498 paid-off loans that had intended maturity before the end of our data window; point estimates are very similar to the previous analysis. To demonstrate the flip-side of this relationship, 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, and those that stopped

borrowing. While renewers typically leave most of the savings balances in the account, non-renewers withdraw most of their savings from their account.

This evidence appears to be consistent with the idea that accumulated savings are permitting individuals to escape debt financing, but several caveats must be added to this interpretation. First, across the whole sample of closed loans these savings balances appear to be too small to substitute for credit; the average savings balance is $34 while the average loan is $1,500. Secondly, the result holds only for small, short-term loans. Of course, putting these two objections together may imply that it is only when loan balances are sufficiently small that savings over the course of a single loan cycle can substitute for credit. Within the 12-month group of non-renewers the average loan size is $824 and the average saving balance $42. While the draw-down of savings among non-renewers seen in Table 7 is consistent with our story, it can also be explained by the simpler fact that when people are ending their credit relationship with the bank they also choose to end their savings relationship, even if the use to which those savings are put does not substitute for credit.

5. Savings mobilization

What is the potential value of these treatments in terms of savings mobilization for the institution? Consider the savings balance of an account over the period of the loan. We compute the equivalent constant savings balance $\bar{b}$ over the loan term as solution of:

$$B = \bar{b}\,\frac{1-\delta^{T+1}}{1-\delta} = \sum_{t=0}^{T} b_t \delta^t$$

where b_t is the savings balance on day t, B is the present value of the flow of balances b_t, δ the daily discount factor, and T the loan term. The daily discount factor $\delta = .96^{1/365}$ is derived from the cost of these funds, i.e., an annual deposit rate of 4%. These average savings balances are reported in percentage of the total loan amount, by loan category in Table 8. Loans of typically $1,000 thus generate an equivalent savings balance of $17-18 in the Basic Savings, $16-35 in the Open Treatment, and $37-46 in the Default Treatment among savers (columns 2-4). Reported to the overall population of loan takers, the average balances are $7 in the Basic Savings, $7-16 in the Open Treatment, and $29-36 in the Default Treatment. With the reserve ratio of 15% that applies to commercial banks in Guatemala, this provides the institution with funds for lending that can reach 19-23.8% of the loan amount under the Default Treatment (columns 5-7).[14]

These balances should however be compared not to the loan amount but to the average outstanding debt over the course of the loan, which is substantially lower than the loan amount. With constant monthly payments and an interest rate of 24% over a declining capital balance, the average

[14] Reserve ratio in 2005. Source: Competition Policies in Emerging Economies: Lessons and Challenges from Central America and Mexico. *Edited by Claudia Schatan and Eugenio Rivera*. Springer/IDRC 2008

outstanding debt is only 56.1% of the loan amount if the loan term is 12 months, and 80.7% if the loan term is 24 months (col. 1). Hence on a 12-month loan of $1,000, the bank's capital outlay is on average $561 while the generated savings allow additional lending of $238 with the Default Treatment, half of the outstanding loan.

6. Conclusions

We collaborated with the largest public bank in Guatemala to offer its microfinance clients the opportunity of opening a savings account (Basic Savings) and of selecting two new types of 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 product is 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, 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 Treatments) 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 their account at least once, compared to only 33% in the control group. Combining these results, 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.

Activity in these 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.

Overall, then, our results indicate that the use of these savings products has produced a 'win-win': borrowers use the prompting and framing to get closer to their desired savings trajectories, banks build local liquidity out of which they can lend more safely than from capital acquired on the international market, and the presence of these saving products speeds up loan repayment while slightly decreasing default. The frequent

withdrawals made from high-balance accounts suggest that the lack of true commitment is permitting clients to use them to buffer against small shocks, which presumably improves welfare even relative to a true commitment savings product. For all these reasons the product appears to be benefiting both borrowers and the bank. We also show that savings mobilization was not negligible. With the most powerful treatment in which a default option is suggested and for short 12-months loans, savings accumulation generates almost 8.2% of the loan average outstanding capital. With the 15% reserve ratio that prevails in Guatemala for commercial bank lending, the Default savings scheme can allow lenders to generate funds to cover about half of their short run loans to microfinance clients.

At a time when many credit-only microfinance lenders are undergoing the regulatory transformation to be able to capture savings, there is a great deal of interest in how consumer-friendly, effective savings products can be developed. While coercive savings practices such as the forced collateralization of savings have justifiably come under criticism, a burgeoning empirical literature makes it clear that individuals are often disappointed with their own ability to save. The products investigated in this paper suggest a way to resolve this conundrum; generating substantial savings balances by revealing the clients who in fact desire to save without penalizing those who do not. Because they were offered to individuals already interacting with the bank, the products were very inexpensive to administer, requiring only one additional piece of paperwork at the time of loan signing and the creation of a module in the bank's computer system that indicates to tellers the savings deposit they should prompt clients to make at the time of loan payment. We show that this combination of credit and savings can make sense from a theoretical point of view, and demonstrate empirically that savings are being generated in a way that is directly complementary with both the speed and quality of loan repayment. Our research therefore provides a practical, cost-effective set of products that financial institutions can use to build local deposits while at the same time fortifying the quality of their loan portfolio.

Table 1. Randomization tests

	Basic Savings	Open Treatment		Default Treatment	
	Mean	Mean	Test of equality with Basic Savings t-stat	Mean	Test of equality with Basic Savings t-stat
Pre-experiment loans					
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	
Post-experiment loans					
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	
Pre-experiment savings account activities					
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$)
	(1)	(2)	(3)	(4)	(5)
Open Treatment	0.044	0.017	0.079	0.167	
	(0.122)	(0.115)	(0.114)	(0.113)	
Default Treatment	0.368***	0.371***	0.386***	0.508***	3.12**
	(0.119)	(0.125)	(0.107)	(0.118)	(1.19)
Controls					
Interest rate			-1.821**		
			(0.836)		
Loan term (months)			0.0033		
			(0.004)		
Monthly payment (US$)			2.78E-06		
			(4.24E-06)		
Female borrower			0.101**		
			(0.042)		
Intercept	0.404***	0.408***	0.660**	0.258***	4.79***
	(0.073)	(0.073)	(0.282)	(0.065)	(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 Median regressions		Cumulated deposit at 10 months Median regression	Unconditional cumulated Mean
	(1)	(2)	(3)	(4)	(%) (5)	(US$) (6)	(US$) (7)	(US$) (8)
Open Treatment	0.414***	0.377***	0.426***	4.005***	-2.5	-0.6	13.13***	28.6
	(0.10)	(0.09)	(0.11)	(1.00)	(6.9)	(2.8)	(4.84)	(43.59)
Default Treatment	0.426***	0.344***	0.428***	4.424***	-18.5***	-11.7***	36.75***	186.7*
	(0.15)	(0.11)	(0.14)	(1.42)	(5.9)	(2.9)	(6.97)	(92.75)
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***	0.738***	0.127***	1.695***			12.50***	51.83***
	(0.07)	(0.23)	(0.02)	(0.29)			(4.50)	(9.77)
Observations	745	745	745	745	532	532	745	1375
R-squared	0.157	0.221	0.152	0.168				0.014
Test Open=Default: p-value	0.93	0.79	0.99	0.81	0.09	0.02	0.00	0.14

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	-0.23	16.02	13.63
	(0.26)	(0.34)	(11.81)	(13.66)
Default Treatment	0.35	0.464*	25.6	29.98*
	(0.24)	(0.24)	(15.63)	(15.41)
Controls				
Interest rate		3.2		236.0
		(4.65)		(207.70)
Loan term (months)		0.0240*		1.3
		(0.01)		(0.99)
Monthly payment		0.00594**		0.388*
		(0.00)		(0.20)
Female borrower		0.4		0.5
		(0.26)		(9.13)
Intercept	1.258***	-1.1	27.37***	-100.5
	(0.17)	(1.45)	(2.19)	(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 (US$)

	Borrowers with linked savings account				All borrowers
	(1)	(2)	(3)	(4)	(5)
Open Treatment	14.30**	11.07**	15.24*	14.87**	7.0
	(5.8)	(4.1)	(7.4)	(6.1)	(4.8)
Default Treatment	15.51**	14.36*	13.26**	20.3	17.04**
	(6.2)	(7.2)	(5.2)	(11.9)	(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***	-7.057	13.78***	13.98***	5.570***
	(1.7)	(16.9)	(1.7)	(1.6)	(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.
Accumulated savings as of November 11, 2009.

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**	0.0938	0.196**	-0.13	-0.03	-0.12	-0.04
	(0.09)	(0.10)	(0.09)	(0.12)	(0.15)	(0.08)	(0.09)
Default Treatment	0.163	0.173	0.134	-0.14	-0.16	-0.13	-0.14
	(0.10)	(0.10)	(0.10)	(0.12)	(0.15)	(0.09)	(0.09)
Savings / owed capital			1.204***				
			(0.29)				
Created a linked savings account		-0.076			0.024		0.015
		(0.10)			(0.15)		(0.09)
* Open Treatment		0.264**			-0.230		-0.181*
		(0.11)			(0.15)		(0.10)
* Default Treatment		0.023			0.018		-0.001
		(0.12)			(0.16)		(0.11)
Intercept	-0.290***	-0.259**	-0.302***	0.366***	0.357**	0.517***	0.511***
	(0.07)	(0.09)	(0.07)	(0.10)	(0.15)	(0.06)	(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 month term	18 month term	24 month term	36 month term	Loans that closed at maturity			Loan with maturity before 29-Sep-10		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Open Treatment	-0.098	-0.031	0.059	0.139						
	(0.24)	(0.09)	(0.10)	(0.12)						
Default Treatment	-0.333***	-0.073	0.055	0.185***						
	(0.08)	(0.13)	(0.10)	(0.04)						
Savings balance					-0.00383*			-0.00333*		
					(1.70)			(1.82)		
Savings balance /						-2.945*	-2.54		-2.469	-2.571
loan amount						(1.74)	(1.48)		(1.21)	(1.28)
Loan amount (in 1000$)					0.0989*		0.0648	0.115***		0.0728**
					(1.67)		(1.29)	(2.95)		(2.16)
Constant	0.467***	0.240**	0.270***	0.111***						
	(0.07)	(0.08)	(0.08)	(0.03)						
Loan-term fixed effect					Y	Y	Y	Y	Y	Y
Time trend					Y	Y	Y	Y	Y	Y
Observations	131	86	311	240	280	280	280	498	498	498
Mean value of renewal	0.206	0.209	0.309	0.196	0.150	0.150	0.150	0.261	0.261	0.261

Absolute value of robust z-statistics in parentheses

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

Savings balance and its ratio to loan amount are intrumented with the treatment dummy

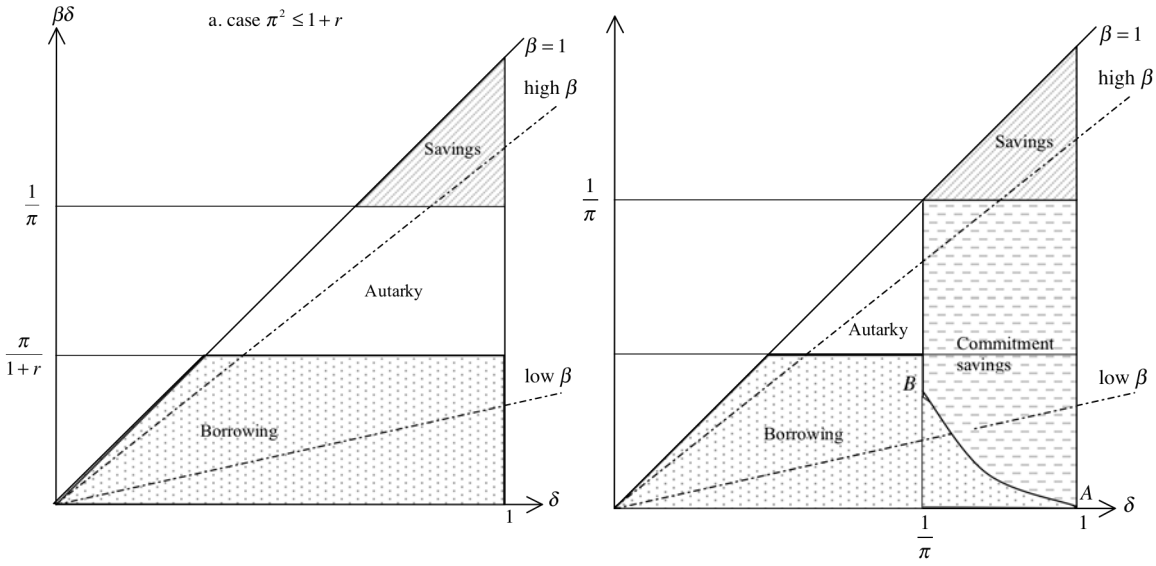
Mean value of saving balance is $19.6 ($20.3) and mean value of saving ratio is 0.025 (0.021) for the sample of laons used in columns 5-7 (8-10)

Table 8. Estimated available liquidity from savings mobilization

Loan term	Average amount of outstanding loan (percent of loan amount) (1)	Average savings balance in percentage of loan amount (savers only)			Potential lending from savings balance (percent of loan amount)		
		Basic (2)	Open (3)	Default (4)	Basic (5)	Open (6)	Default (7)
12 months	56.1	1.8	3.5	4.6	4.8	10.4	23.8
24 months	80.7	1.7	1.6	3.6	4.6	4.8	18.4

Estimated liquidity available for lending = average balance * rate of savings account opening (40.4% in Basic Treatment, 44.8% in Open Treatment, and 77.2% in Default Treatment) / reserve requirement ratio of 0.15.

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



c. Commitment Savings with Borrowings

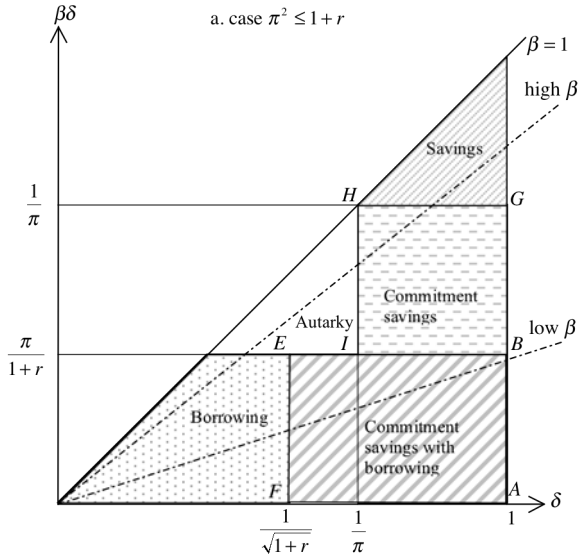


Figure 1. Optimal path with availability of savings and borrowing instruments

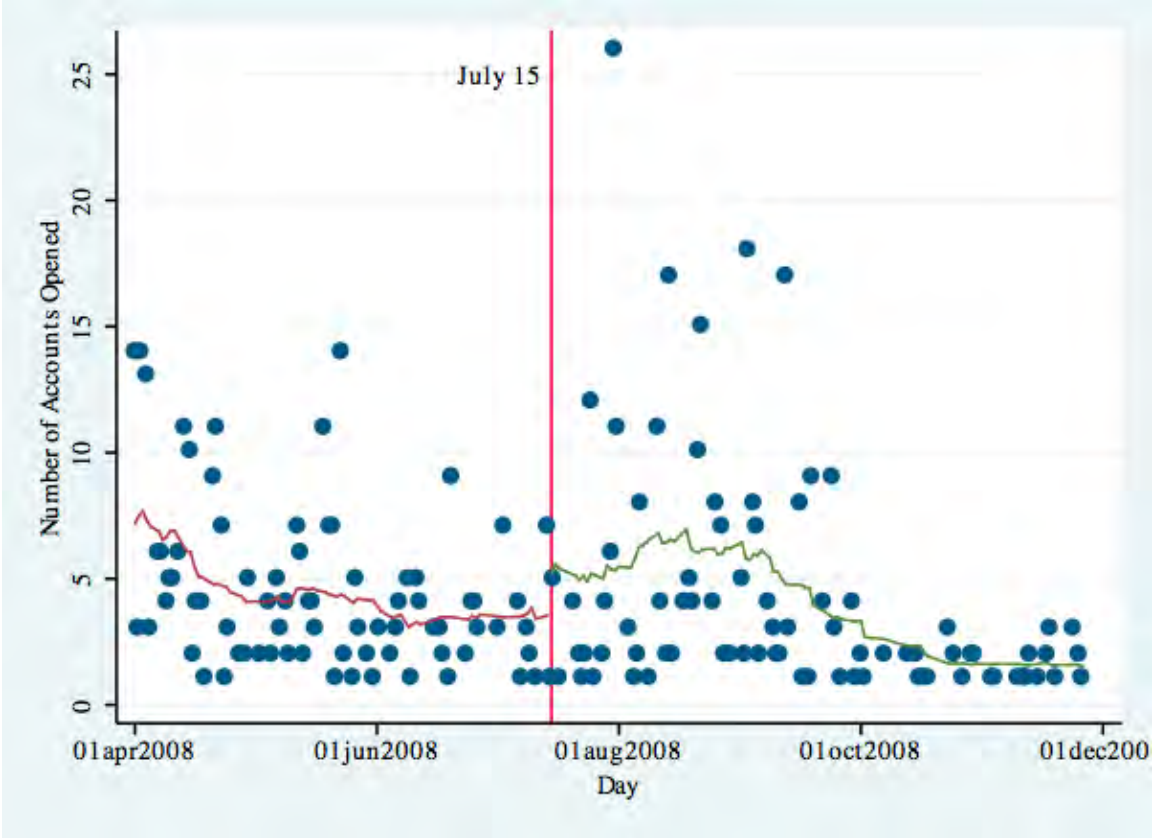


Figure 2. Savings accounts opened in Basic Savings treatment branches

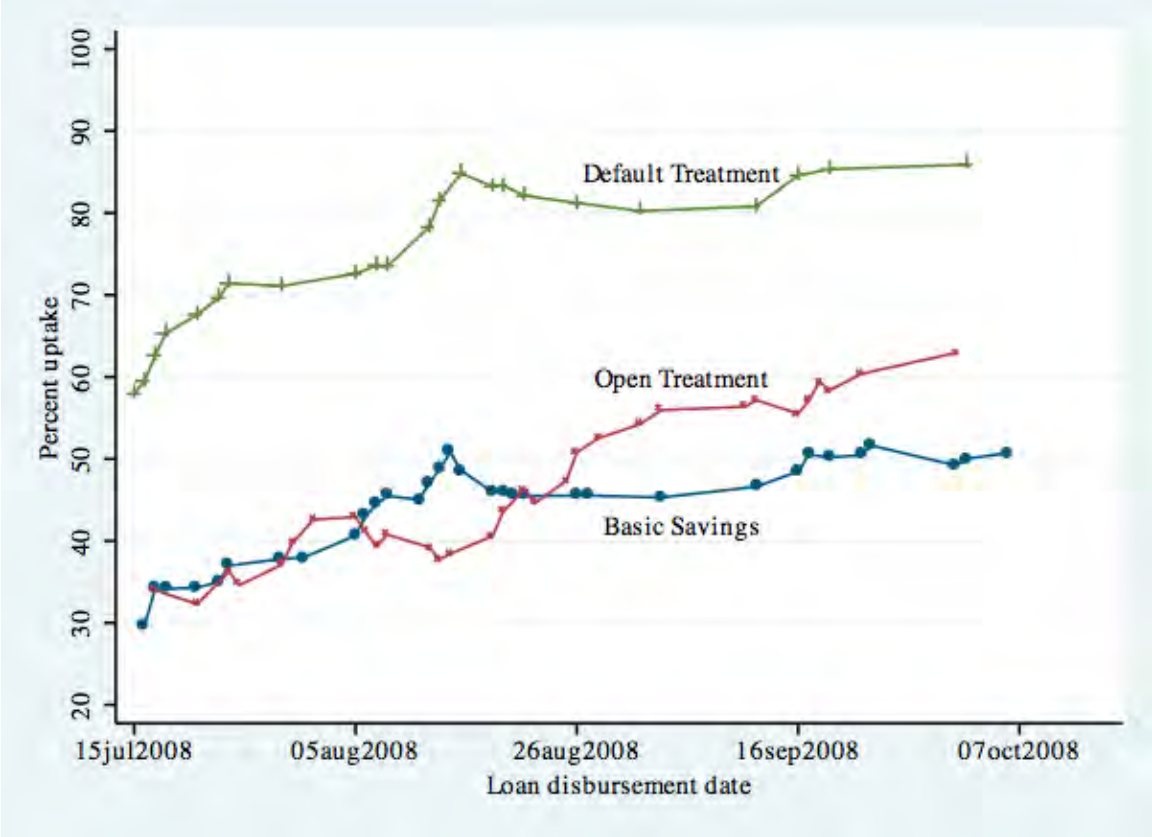


Figure 3. Uptake of linked savings account, by treatment status

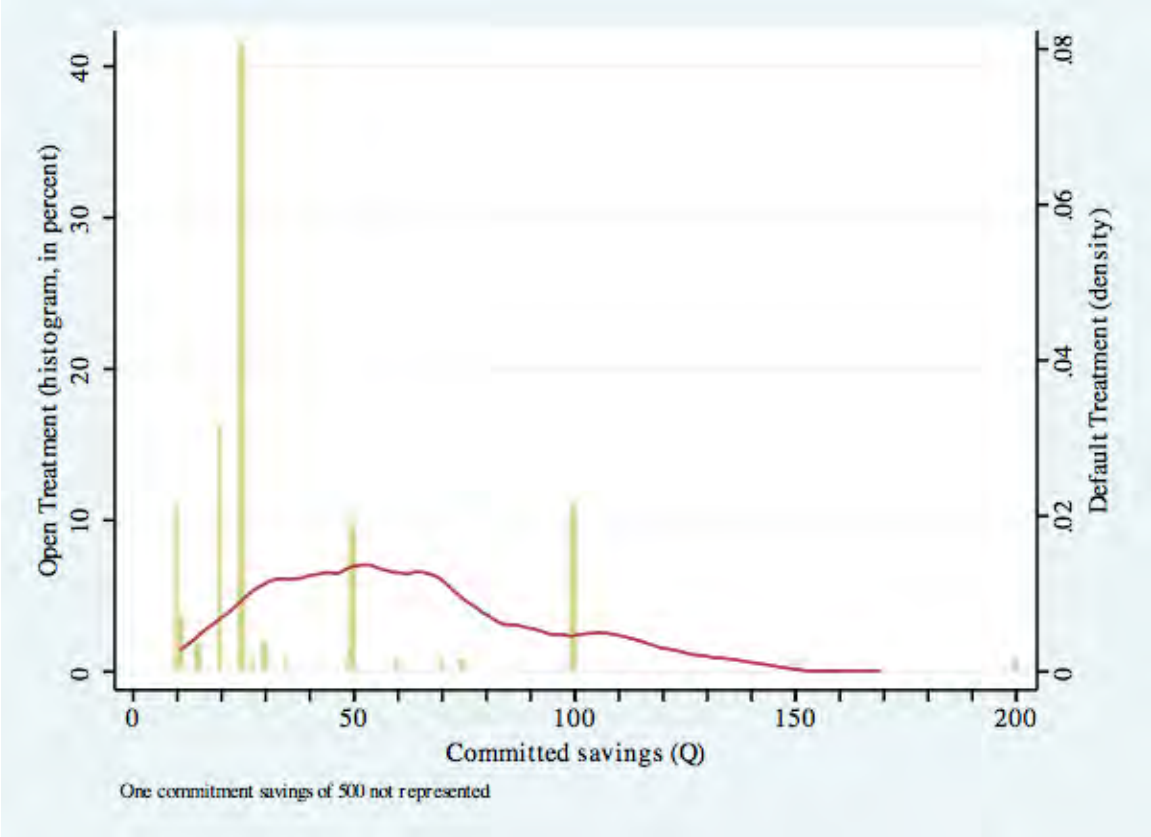


Figure 4. Committed savings, by treatment status

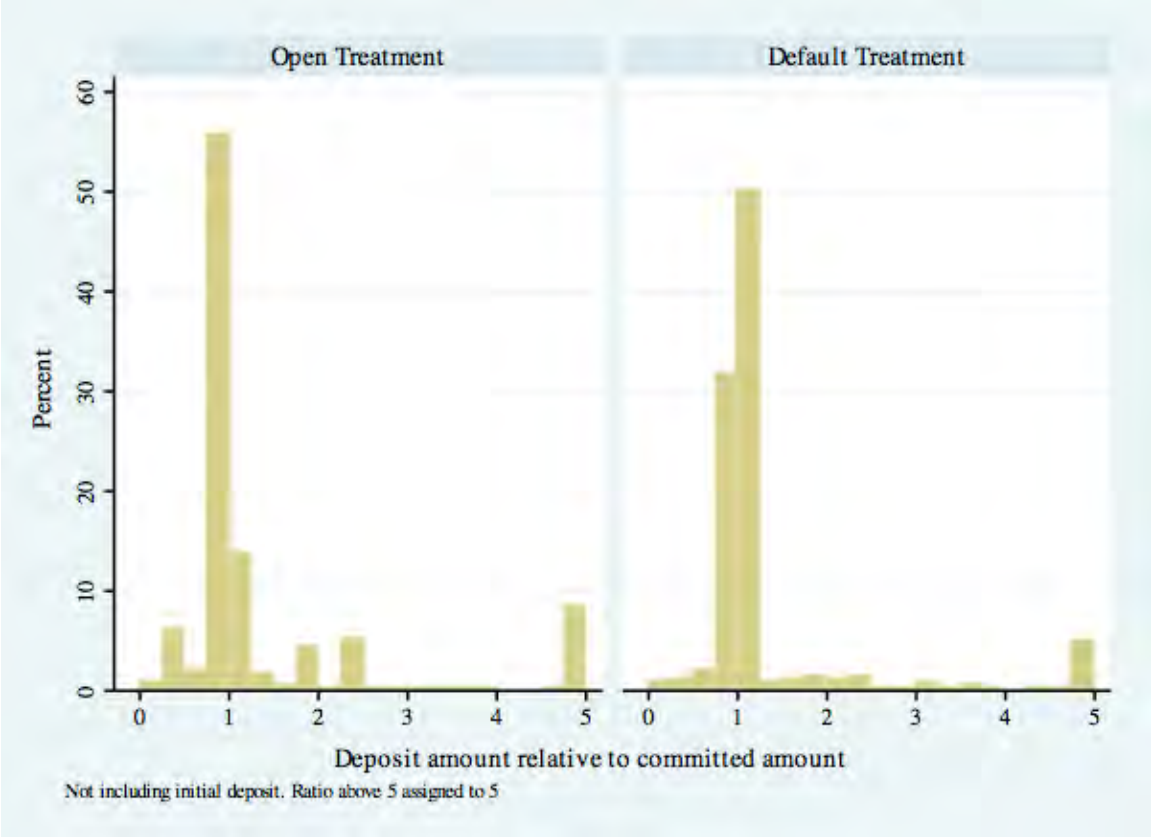


Figure 5. Deposit amount relative to committed amount, by treatment status

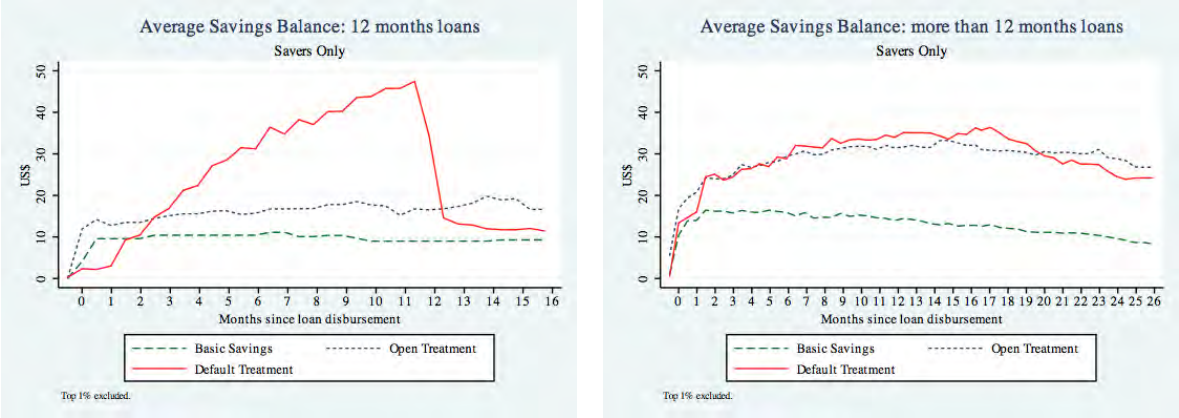


Figure 6. Running savings balance by treatment status

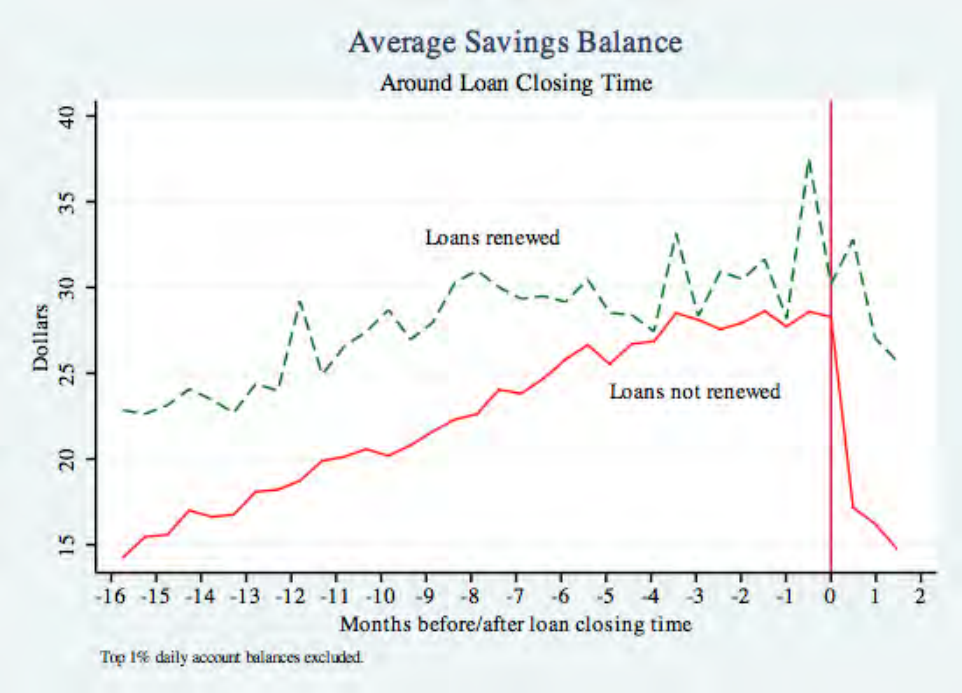


Figure 7. Running savings balance upon loan closure

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