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Prompting Microfinance Borrowers to Save: A Field Experiment from Guatemala

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I. Introduction

Saving is important for the poor in managing their liquidity (Collins et al. 2009). Yet, most people have difficulty meeting their savings objectives, particularly the poor as their income streams provide them with few abilities to commit to savings plans. Recent advances in behavioral finance have shown, however, that assistance to save can be provided through relatively simple product innovations. This article reports on the results of an experiment that introduced a new set of commercial products based on planning and reminders to help microfinance borrowers from Guatemala's largest public-sector bank build their savings. We justify promoting this apparently counterproductive behavior in which saving is at a lower interest rate than borrowing, with a model of borrowers who are time inconsistent but willing to save in the future: saving while borrowing helps them fulfill their goal of transiting from less debt-financed to more savings-financed investment.

Behavioral explanations for the difficulty of saving focus on the group of individuals who wish to save but prove unable to do so. Such self-control problems may arise for a variety of reasons, including hyperbolic discounting

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(Laibson 1997), intrahousehold disagreements (Ashraf et al. 2010), temptation goods (Banerjee and Mullainathan 2009), and procrastination (O'Donoghue and Rabin 2001).[1] In any of these environments, individuals 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 linked to income earnings that help them overcome these problems (regular direct deposits, retirement contributions, life insurance payments, etc.), the cash-based economic environment of microentrepreneurs in the developing world is typically devoid of such instruments (Collins et al. 2009).[2] Available evidence from developing countries shows that substantial demand for savings exists and that commitment devices are likely to have strong impacts on behavior (Ashraf, Karlan, and Yin 2006; Brune et al. 2011; Dupas and Robinson 2013). As of yet, however, few commercial financial institutions in developing countries have piloted scalable financial savings products that exploit these insights.

In collaboration with Crédito Hipotecario Nacional (CHN), we randomized the deployment of new behaviorally motivated financial products across the bank's entire microfinance clientele. CHN offers microfinance loans with monthly repayments over terms of 12–36 months and, therefore, provides a unique opportunity to use the discipline of regular loan repayments over a long period to offer borrowers different savings strategies. 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 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 "lockbox" of the

[1] This is not to deny other reasons why people do not save, in particular, when there is pressure from relatives and friends to share their savings (Baland, Guirkinger, and Mali 2011; Brune et al. 2011).

[2] The "Save More Tomorrow" financial instrument is based on automated paycheck contributions to a 401(k) plan in the United States (see Thaler and Benartzi 2004). More recent empirical works on behavioral issues in US pension plan contributions include Card and Ransom (2011) and Choi, Laibson, and Madrian (2011).

SEED (Save, Earn, Enjoy Deposits) accounts of the Green Bank in the Philippines (Ashraf et al. 2006), the nonwithdrawable deposits of the Grameen Pension Scheme (Collins et al. 2009), or the free deposits and costly withdrawals implemented by Dupas and Robinson (2013). Our results show that this light-handed, easily scaled approach can indeed be very successful at increasing savings balances.

In order to minimize effects arising from variation in understanding of the basic savings products and terms offered, or from the salience and promotion effect of the intervention, we define as the control a group that receives a savings promotion (brochure plus verbal reinforcement) and 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 to define 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 planning and reminders (Karlan et al. 2010). The second treatment arm is offered this same option but told that the bank will set this amount at 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 of behavior, under which agents are much more likely to accept the default option offered by the program than would be expected from simple optimization theory.

Those who desire today to save tomorrow will likely take on the opportunity to open an account, regardless of whether they really will prove able to save. Much of the procrastination that is common in deciding to undertake the first step of opening an account should be taken away by this opportunity (DellaVigna 2009). 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 having to make this decision engenders procrastination or delays, this treatment may not elucidate the full demand for savings. The Default Treatment offers the same planning-and-reminder device, but in addition it frames the savings amount at 10% of the loan payment, and clients are now required to "opt out" if they wish to change to any other value, including zero savings.[3] Based on theory and previous empirical evidence, this default option should raise the uptake of the product (Benzarti and Thaler

[3] The default commitment savings amount of 10% was chosen by the bank because it felt that it was unlikely that clients would adjust the commitment amount upward and, hence, wanted to stipulate an amount that reflected the upper end of the range that would realistically be chosen by clients.

1995; Johnson and Goldstein 2004; Beshears et al. 2008). Because both treatments cause tellers to prompt clients to save each time they make a loan deposit, they introduce a "direct appeal" dimension, one that has been found to drive behavior in fields as disparate as charitable giving (Andreoni, Rao, and Trachtman 2011; DellaVigna, List, and Malmendier 2012) and voter turnout (Green and Gerber 2008). Most important, however, the lack of enforcement of commitments and the full flexibility to deposit or withdraw savings at any time make these products completely equivalent in a financial sense. Hence, they differ only in the behavioral nudges that they provide.

The bank had no intention and no legal means of enforcing any of these self-commitments. Hence, these savings plans offer individuals a psychological means of committing themselves to a savings trajectory with no financial penalties for failing to implement it. Despite a wealth of recent empirical work demonstrating the efficacy of hard commitment, there are at least two reasons why self-commitment may provide a more attractive alternative in practice. First, hard commitment is likely to be more effective at creating savings but also hampers one of the core reasons to building savings balances, namely, to buffer against shocks. Self-commitment, if effective at promoting savings, retains broad latitude for households to use savings to protect themselves from shocks even during the asset-accumulation phase. Second, commercial firms are likely to find it difficult to impose hard commitment on clients in competitive marketplaces, and in this sense self-commitment may prove a more feasible means of taking the results of this new behavioral research to scale via the commercial banking network.

These three financial products were randomized across the 20 microfinance branches of CHN, stratified on the baseline number of clients. Over the course of 2 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. Those offered the Open Treatment are no more likely to open a savings account than the control, but they are 20% more likely to make at least one deposit and, conditional on opening an account, have net accumulated savings that are 3.5 times the control value of $10. Overall average savings (intention to treat) are $11.50 higher for the Open Treatment than the Basic Savings (equal to $4), although not quite significantly different. The Default Treatment doubles the probability that an individual will open a savings account when taking a loan (77% vs. 40% in the control), and then even in this expanded group of savers it increases savings rates and final balances by an amount similar to the Open Treatment. These extensive and intensive margins combine to produce (intention-to-treat) default final savings balances that are more than six times those in the control ($25 vs. $4). Loan repayment is, if anything, better in the treatment arms than the control, and 69% of clients in the default arm who took a subsequent loan elected to retain the savings reminders in the new loan cycle. These results indicate that commercial microfinance lenders can use soft commitment savings products in a manner that is both effective and popular with clients.

New borrowers represent an attractive group to which 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 makes sense to use "nudges" to promote savings at a 4% interest rate to a group of people currently repaying loans at a 26% interest rate. 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 that treatments that generate large savings deposits also generate the most frequent withdrawals, consistent with the use of the accounts for buffering. Second, we present a theoretical model showing that the simultaneous provision of debt and commitment savings products can allow a larger fraction of the population to eventually escape a debt-financed equilibrium than if individuals are forced to choose between a loan and commitment savings. 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. 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. This is interesting to microfinance institutions that have been pressed to reduce external financial dependency in the context of currency risks and international interest rates volatility and to build a greater reservoir of domestic savings (CGAP 2011).

The article proceeds as follows. In Section II, we provide a simple theoretical motivation for the simultaneous provision of loans and commitment savings products. In Section III, we describe the experimental design, give more details on each of the treatments, and present tests of the balance of the experiment. Section IV presents impacts on the opening of accounts, the accumulation of savings balances, loan repayment, and loan renewal. Section V provides some estimates of the share of liquidity needed for the lending operations of the bank that could be raised through this savings program, and Section VI concludes.

II. Commitment Savings Alongside Credit

A. Savings and Borrowing

In what follows, we provide a theoretical motivation for two unusual features of our experiment, namely, the offering of a savings product to people who are currently repaying a loan and the use of "self-commitment." The simple take on this problem would be to say that, given the gap between lending and borrowing rates, it makes sense to pay down debt rather than to save. We motivate here the idea that offering a savings product alongside loans can make sense. One simple reason why this could make sense is the buffer provided by savings; costly default under unexpected shocks could be prevented with a cushion of savings. The model presented here takes a different tack, showing that simultaneous commitment savings and borrowing can allow individuals who would otherwise borrow indefinitely to escape the debt-financed equilibrium via saving and repaying the loan simultaneously. In order to make the unique point about the value of simultaneous provision of debt and savings, we first model a true commitment product and then extend the model to consider the case of voluntary self-commitment to save.[4]

A rich literature exists detailing a variety of informal means to execute control over future selves, most particularly with 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 (naive) 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).

[4] 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 in which only the discounting factor matters obtains when β is equal to 1, and as it falls toward 0 preferences become more time inconsistent.[5] 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 the following period in a good that returns a profit $\pi \geq 1$. 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 start-up capital and to receive the benefits of investment immediately (this is in contrast with the 1-year delay necessary for savings to generate enough resources for a productive investment). In this formalization, a time unit corresponds to the terms of the loan, which typically is 1–3 years in the context we are studying. For many microfinance loans, this time is often even shorter, at 4–6 months. Tomorrow's self will pay back that one unit of capital plus r, the interest rate.[6] 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 $1 + r < \pi/\beta\delta$. Credit generates a benefit by allowing the individual to shift profit forward relative to the time at which the good is "saved" for, but it 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 $(\pi/\beta\delta) - r$. This says that shortsightedness discourages savings and encourages debt, and profit increases them both. To summarize, utility under the different choices is as follows:

[5] To see the time inconsistency, note that the marginal rate of substitution between $t + 1$ and $t + 2$ evaluated at time t is $u'(c_{t+1})/\delta u'(c_{t+2})$, but the marginal rate of substitution between the same two periods from the perspective of the decision maker at time $t + 1$ is $u'(c_{t+1})/\beta\delta u'(c_{t+2})$.

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

autarky

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

saving

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

and borrowing

$$U_t^b = y_t + \pi + \beta\delta[y_{t+1} - (1 + r) + \pi] + \sum_{\tau\geq 2} \beta\delta^\tau [y_{t+\tau} - (1 + r) + \pi]. \tag{3}$$

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 2 future years. Areas where savings and borrowing are superior to autarky are defined by values of $\beta\delta$ relative to $1/\pi$ and $\pi/(1 + r)$. The solution is illustrated in figure 1*a*, for the case when $\pi^2 \leq 1 + r$, or profits are relatively low.[7] The optimal choice is defined by three horizontal bands, with borrowing for $\beta\delta < \pi/(1 + r)$, savings for $\beta\delta > 1/\pi$, 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). Savings-driven investment would therefore always be preferred over the long run. 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 initial difference is a critical driver of the behavior of the impatient and the hyperbolic.

B. *Introducing Commitment Savings*

A commitment savings plan can permit a time-inconsistent individual to consume in the first period but start saving in the second. We now examine whether

[7] 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 $1/\pi < \beta\delta < (\pi/1 + r)$. Comparing both options shows that borrowing is preferred when $\beta\delta \leq (\pi + 1/r)(1 - \delta)$. In this text, we only develop the more likely case of $\pi^2 \leq 1 + r$. Introduction of commitment savings gives similar results for the high-profitability case.

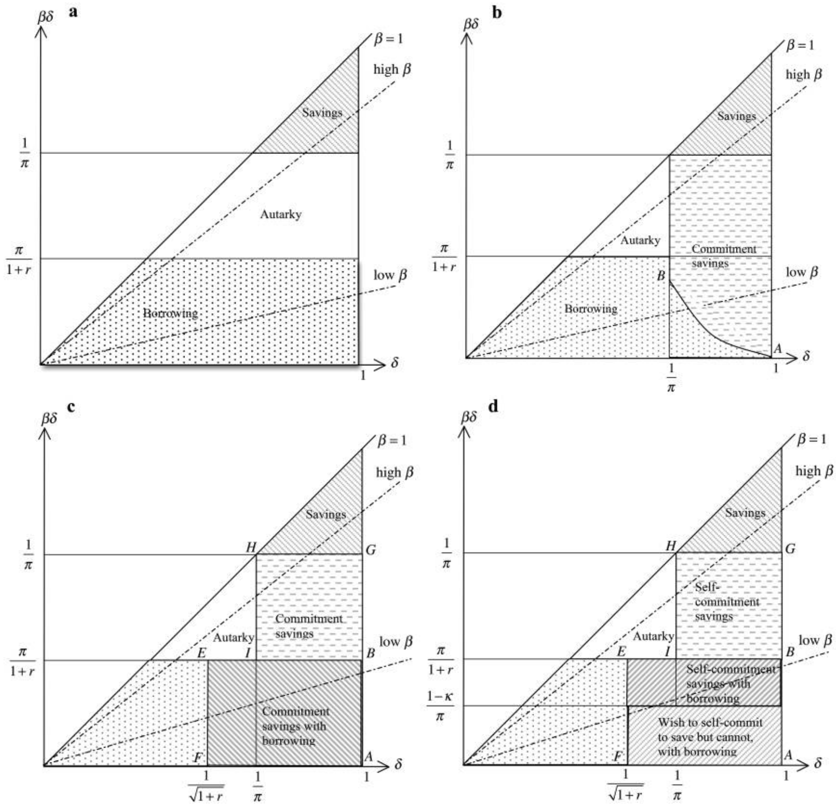

Figure 1. Optimal path with availability of savings and borrowing instruments: *a*, savings or borrowing; *b*, commitment savings or borrowing; *c*, commitment savings and borrowing; *d*, self-commitment and borrowing.

introduction of commitment could be used by some individuals to switch from a borrowing to a saving regimen and, if so, whether it would make sense to save and borrow simultaneously during this transition.

Commitment savings products can allow sophisticated, time-inconsistent individuals for whom $\beta\delta < 1/\pi < \delta$ to switch from the noninvestment 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

$$U_t^{cs} = y_t + \beta\delta(y_{t+1} - 1) + \sum_{\tau \geq 2} \beta\delta^\tau (y_{t+\tau} + \pi - 1). \tag{4}$$

In a situation in which individuals could a priori choose among saving now, commit to save in the future, or invest as alternative strategies, commitment savings is preferred to autarky when $\beta\delta < 1/\pi < \delta$ and preferred to borrowing when $[(1/\beta\delta) + 1](1 - \delta) < r/\pi$. This is represented by the area above the curve AB on figure 1*b*. This mapping in the parameter space completely defined the optimal choice in a situation in which 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 take 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 savings 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 ($\beta\delta < \pi/(1 + r)$), 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:

$$U_t^{\mathrm{csb}} = y_t + \pi + \beta\delta[y_{t+1} - (1 + r) + \pi - 1] + \beta\delta^2[y_{t+2} - (1 + r) + \pi - 1] + \sum_{\tau\geq 3} \beta\delta^{\tau}(y_{t+\tau} + \pi - 1). \qquad (5)$$

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 1*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 individuals who 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 savers is only about 2%–

5% 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 with which to test this hypothesis. This is what motivates the CHN experiment.

C. Role of Self-Commitment

We now consider explicitly the fact that while borrowers have committed to save a given amount, there is in fact no penalty for them failing to do so. This type of self-commitment has been explored in the literature on goal setting (Harding and Hsiaw 2011) and reference points (Kahneman and Tversky 1979); evidence to date shows that equilibrium decisions can be altered by framing a self-commitment around a specific objective for a behavior. We model the role of self-commitment by positing a utility cost κ that is incurred by agents if they fail to undertake a plan that they had committed to. An agent who has committed to save tomorrow will only follow through if tomorrow's penalty for breaking the self-commitment is large enough to overcome the benefits of current consumption, or if $\kappa > 1 - \beta\delta\pi$. This indicates that the parameter space for successful self-commitment savers is thus reduced to those for whom $(1 - \kappa)/\pi < \beta\delta < 1/\pi < \delta$.

Figure 1*d* shows the effect of self-commitment on equilibrium outcomes. As the penalty for breaking the self-commitment rises to be as large as the benefit of current consumption (e.g., $\kappa = 1$), then self-commitment will be just as effective as full commitment. The evidence from our sample of borrowers makes it clear that self-commitment is both demanded and effective among borrowers, and so we represent the case in which $\pi/(1 + r) > (1 - \kappa)/\pi$, meaning that some of those who previously chose borrowing will now prove able to self-commit. We see that those who were the closest to being able to save without commitment will be most able to save with self-commitment but that those individuals who most "need" commitment (in the sense that they are high δ and low β types) may be unable to self-commit if κ is small. These individuals will be unable to benefit from self-commitment, precisely because the utility benefits from reneging are so high.

This set of individuals who desire but fail to self-commit suggests an interesting redefinition of the nature of "sophistication" or "naïveté" of potential savers when we consider soft commitment savings products. Do borrowers properly understand the limits to their own ability to self-commit? If they understand them, we would expect to see the lower rectangle in figure 1*d* manifest itself through a lack of demand for the savings product. A sophisticated individual who sees that a self-commitment product will not work will simply not demand it. If, however, individuals are naive as to their own ability to self-commit, then we are likely to see uptake of the product (in the sense that these naive self-committers elect to open an account when offered the chance to do so) but that they then prove unable to accumulate savings in the face of their own inability to self-commit. We return to this theme in the results section.

D. Role of a Default Option in Decision Making

The second treatment arm in our study is the Default Treatment, under which clients are opted in to the savings account rather than having the implicit default option be that they are not prompted to save. In the Default Treatment product, an amount of 10% of the loan payment is offered as the default option. This focus on the role of the default option is motivated by Samuelson and Zeckhauser's (1988) concept of "status quo bias" and by several recent empirical papers demonstrating surprisingly large effects of opting in to savings-based financial services. Madrian and Shea (2001) and Beshears et al. (2008) examine the effects of a switch to automatic enrollment in 401(k) plans for employees of large US firms and find that both enrollment and contribution amounts are strongly driven by the defaults provided by employers. Beshears et al. (2012) show that reducing a complex choice of a retirement savings plan into a binary choice between the status quo and the preselected alternative dramatically increases participation. Tversky and Shafir (1992) and Dhar and Nowlis (1999) find that a procrastination effect 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.[8]

The potential effectiveness of the Default Treatment can be motivated via a cognitive cost incurred in altering the savings choice away from the option

[8] 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 naive 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.

provided by the bank (the material or time costs to this action are virtually nil, consisting merely of indicating on the savings form that the amount is different from 10% of the loan). Whereas previously a savings amount of 10% of the loan would have been chosen only if this was the superior option, under the Default Treatment it will be chosen unless the utility difference between the 10% and the next-best option exceeds the cognitive cost of switching. Our experiment provides relatively rich information as to the existence of this cognitive cost of reoptimization and its relationship to the role of self-commitment in savings. If clients are induced to agree to the 10% rule due to the influence of default options but self-commitment is ineffective, then the Default Treatment will see high uptake but no appreciable increase in savings. If the default option has no influence but the self-commitment is effective, then we will see uptake rates, commitment savings targets, and actual savings amounts that are similar to the Open Treatment. If both the default option and self-commitment are effective, then both uptake rates and final savings will be increased in this arm relative to the Open Treatment. Our data make it clear that this latter case prevails; both self-commitment and default options appear to be important drivers of the savings behavior in our sample.

Given the behavioral flavor of the interventions studied here, it is important to highlight an alternate explanation for the potential effectiveness of default options, namely, the endorsement effect proposed by Madrian and Shea (2001). According to this channel, individuals interpret the default 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 affects decision making, not because of the creation of a reference point at 10% savings but because it provides new information and hence influences clients' 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%. This endorsement effect may not be considered purely behavioral, insofar as it reflects the transmission of information rather than an instrument for self-control.

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. 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 serves 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

III. The Experiment and Research Design

A. The Experiment

We conducted our experiment with CHN, which currently offers a full range of financial products including mortgage credit, business loans, insurance, and microfinance lending. The microfinance department was opened in August 2006 and was growing quickly before 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 Q 122 million ($15.3 million). During those 6 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 26%. CHN charges interest on a declining balance basis, and clients are allowed to pay their loan faster and earlier than the terms without penalty, giving them full control over their indebtedness. 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.

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 are 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 linking a commitment-type savings product with a long-term microfinance loan repaid monthly over 1–3 years. 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 randomly assigned one of the three products and then offered that product for approximately 3 months before switching to another product. This design would have created multiple cohorts for comparison and allowed a difference-in-difference analysis. The experiment started mid-July 2008, with expectation of the first product rotation by mid-October 2008. From July 15 through the end of August, the portfolio continued to grow at the recent average pace of about 250–350 new loans every 2 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).[9] The lending program was essentially closed in the first week of October 2008, 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 2.5 months of active lending give us enough observations for a single difference estimation of the impact of these products. In this article, 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 most of the experimental loans were disbursed by the end of September 2008.

B. *The Savings Products*

The three financial products (Basic Savings, Open Treatment, and Default Treatment) were randomized across the 20 microfinance branches of CHN,

[9] Lending standards were not changed during September, so data are still comparable to August and July.

stratified on a baseline number of clients.[10] 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 1–2 weeks before loan disbursement.[11] The loan officers used a color brochure to promote the benefits of savings as well as explain the rules of the savings account: the savings would earn 4% interest, savings were not collateralized (could not be held or seized if the loan is in default), 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.[12] Although there was no established minimum balance, clients must maintain a nominal balance of at least Q 1 ($0.125) to prevent account closure as part of Guatemala's anti–money laundering laws. In short, there are effectively no restrictions on the account. Additionally, we developed a one-page signature form asking clients whether they understood the savings product and whether 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 preexisting accounts took on the rules of the project accounts.

The Basic Savings group was offered this savings product with no option to select an amount to be deposited and no reminders. Savings could still be induced by this offer, as it conveys the recommendation of the bank to save and provides this onetime incentive through the elimination of transactions cost and an increase in the interest rate on deposits.

In the Open Treatment group, the loan officer gave borrowers the opportunity to opt in to the savings reminders, by choosing an amount they self-committed 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 whether they would like to save their chosen amount.

[10] This was done by ranking the 20 branches by increasing size, randomly drawing the treatment of the smallest branch, and then applying the next treatment to the following branch until one reaches them all, where treatments are taken in the order Basic, Open, and Default.

[11] Agencies generally disburse funds on 1 day, about every 2 weeks.

[12] Before the month this experiment began, savings accounts earned 1.5% interest. The savings and credit operations have always been quite separate within CHN, not even sharing clients' identities, which meant that CHN credibly never seized or even put pressure on clients' savings when loans were in difficulty.

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% × Q 290 loan payment = Q 29 savings) and number of months. Like in the other options, savers had to open their savings account separately. Borrowers who had selected a nonzero 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 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 chosen savings amount broken out separately. Note that the tellers are not the credit agent and that credit agents are not responsible for or even informed of the savings balance of their clients. This comes from a division between savings and credit activities within the bank.

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 choosing a savings level under the Default and Open Treatments. Procrastination theory applies, however, to the extent that it reduces 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 a higher understanding or knowledge of what the optimal rate of savings should be. This is not necessarily an irrational assumption, given the low financial literacy of these clients. Because the offering of 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 planning-and-reminder effect, by using it as a control group.

C. *Data*

CHN provided administrative data on its lending activities, in the form of bimonthly portfolio reports. These data provide 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 pinpoint when the loan was closed within a 2-week window. Separate information on renegotiated loans, starting in December 2008, distinguishes them from loans opened by clients without a preceding, defaulted loan. 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 and age.

On the savings side, we have information on all movements for April 2008 to September 29, 2011, as well as the balance of the accounts as of that final date. CHN produced a special report linking the savings account numbers to 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 "planned deposits" as opposed to any other use of the savings account, we will attempt to analyze the effect of the treatments on deposit behavior by not counting the very small deposits that correspond to interest payments. However, comparison of the net balances includes all deposits and withdrawals.

There was no specific microfinance savings product before introduction of this experiment, and even though some savings accounts 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 who used savings accounts even when they were not promoted.

D. 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 at 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 consider the 2,237 microfinance loans extended in the preexperiment period, over March to mid-July 2008. We observe no statistically significant differences across the treatment arms on loan size, terms, purpose, or delinquency level or on borrower gender and age (table 1, panel A).

Ideally we would like to compare savings behavior among microfinance borrowers before the experiment. However, as mentioned above, there is no way to identify savings accounts that correspond to microfinance borrowers in the preexperiment period. When the experiment took place, about 10% of the clients already had a savings account with CHN. 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. We restrict the sample of preexperiment CHN savings accounts to the 3,526 accounts with an average balance over the preexperiment period below the maximum of the distribution of balances of identified microfinance savings (some of which will not belong to microfinance clients) and compare the activity recorded in these accounts over the preexperiment period in terms of number and average size of deposits and withdrawals. Panel B of table 1 shows no significant differences in the level of activities of these savings accounts across treatment arms.

We then turn to the 1,375 new microfinance loans extended after July 15, 2008, which are the object of the savings experiment. Since the treatments are not expected to have any effect on loan taking, we can compare borrower and loan characteristics. Comparisons across treatments are reported in panel C of table 1. We observe no difference on the gender of the borrower and whether she or he has taken a loan with CHN or had a savings account before the experiment or on loan size, terms, purpose, or delinquency level. Finally, we use data from the 2002 Guatemalan census, in which the smallest geographic unit "department" (or county) can be used to examine the population attributes of the residents in the vicinity of each branch. Panel D of table 1 shows these comparisons; we detect some imbalances on the population and rural share of these counties, arising from the fact that one of the branches in the Default Treatment is in the capital city and hence has a population an order of magnitude higher than the other areas. In reality, the branches of CHN are all located in urban areas and serve a predominantly urban population even in small towns, and so in the remainder of panel D we examine the cross-department balance using urban residents only and find the treatment arms to be very similar. Hence, despite the small number of randomization units, microfinance borrowers are comparable across treatment arms in their credit and pretreatment saving behavior. This validates the use of simple differences to measure the impact of the treatments.

IV. Comparison of Savings Behavior across Treatments

A. Uptake and Commitment Amounts

We define uptake as opening a new savings account or linking a preexisting account to a new loan. Table 2 reports the average uptake across treatment

TABLE 1
RANDOMIZATION TESTS

		Open Treatment		Default Treatment			Joint Test of Equality of Means in Three Groups (*p*-Value)
	Basic Savings Mean	Mean	Test of Equality with Basic Savings (*p*-Value)	Mean	Test of Equality with Basic Savings (*p*-Value)	Test of Equality with Open Treatment (*p*-Value)	
A. Preexperiment Loan Activities							
Female borrower	.66	.60	.16	.65	.79	.25	.33
Loan purpose is housing	.10	.06	.60	.08	.78	.75	.86
Loan size (US$)	2,020	1,957	.84	1,667	.14	.25	.24
Interest rate	.24	.24	.59	.24	.82	.88	.86
Loan term (months)	31.1	28.5	.49	27.7	.33	.80	.60
Monthly payment (US$)	85.4	88.0	.70	79.0	.27	.17	.31
Delinquency (no. missed payments)	6.92	8.06	.63	7.31	.86	.76	.89
No. observations	682	613		942			
B. Preexperiment Savings Account Activities							
No. deposits	1.34	1.54	.43	1.64	.42	.83	.54
No. withdrawals	1.83	2.10	.52	2.45	.11	.49	.24
Average deposit amount (US$)	188	182	.72	171	.25	.36	.42
Average withdrawal amount (US$)	151	177	.33	162	.57	.55	.60
No. observations	1,148	1,179		1,199			
C. Experiment Borrowers/Loans							
Female borrower	.74	.67	.37	.71	.58	.51	.66
Age of borrower	35.3	36.4	.08	36.9	.17	.63	.11
Borrower had a prior loan	.157	.121	.51	.149	.89	.66	.79

Borrower had a savings account before the experiment	.012	.037	.36	.020	.39	.54	.51
Loan purpose is housing	.06	.06	.89	.10	.54	.43	.72
Loan size (US$)	1,675	1,690	.95	1,478	.16	.41	.36
Interest rate	.25	.26	.21	.25	.98	.23	.37
Loan term (months)	30.3	27.7	.37	25.4	.10	.53	.22
Monthly payment (US$)	75.6	80.6	.50	77.0	.86	.73	.79
No. observations	527	379		469			
	D. Municipality Characteristics (from 2002 Census Data)						
Population	70,614	71,659	.99	188,329	.29	.31	.48
Rural share of population	.67	.35	.01	.45	.04	.34	.02
Urban population:							
School attendance among 7–15-year-olds	.89	.90	.82	.90	.66	.84	.91
Employed among 18–35-year-olds	.66	.67	.81	.64	.70	.54	.82
Share in formal employment	.11	.12	.63	.14	.25	.52	.50
Urban households:							
Share owning a kitchen	.77	.83	.22	.82	.23	.94	.37
Share owning a bathroom	.94	.93	.78	.96	.30	.20	.39
No. rooms other than kitchen	2.93	3.00	.74	2.97	.86	.87	.95
No. observations	7	6		7			

Note. Preexperiment period of activities is March 1–July 14, 2008; *p*-values are based on robust standard errors clustered at the branch level. Loans are microfinance loans. Savings accounts are accounts with a mean balance over the period below the maximum of the preexisting savings account balances of borrowers in the experiment. Branches in which savings were at times compulsory are not included in savings account activities.

TABLE 2
UPTAKE: OPENING A SAVINGS ACCOUNT AND COMMITMENT

	Opens or Links a Savings Account			Opens a Savings Account	Made a Second Deposit	Commitment, Conditional on Uptake (US$)
	(1)	(2)	(3)	(4)	(5)	(6)
Open Treatment	.044	.017	.119	.167	.202*	
	(.134)	(.125)	(.119)	(.120)	(.117)	
Default Treatment	.368**	.371**	.416**	.508***	.431**	3.119*
	(.164)	(.171)	(.161)	(.181)	(.177)	(1.718)
Intercept	.404*	.408*		.258	.139	4.785*
	(.169)	(.176)		(.197)	(.288)	(2.488)
Controls	No	No	Yes	No	No	No
Observations	1,375	1,317	1,375	1,242	1,375	532
R^2	.112	.119	.141	.190	.149	.071
Test Open = Default (p-value)	.127	.0948	.138	.116	.281	

Note. Dependent variables are indicated by the column headings. Robust standard errors are in parentheses, clustered at the branch level using the wild bootstrapping method. Uptake is equal to 1 if client opened or linked a savings account at time of new loan. Column 2 is restricted to July 15–October 11, 2008. Column 3 includes controls for borrower (gender, age, has prior loan), loan (amount, term, purpose is housing, monthly payment), and branch size. Column 4 is restricted to clients without preexisting accounts. Column 6 is restricted to the treatment branches. The intercept represents the average commitment in Open Treatment branches.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

groups.[13] 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).[14] With the sample restricted to clients who did not have any existing savings account, uptake is lower in Basic Savings branches and impact is even higher with the Default Treatment (col. 4), although not significantly more so than in column 1.

[13] Because of the small number of units over which the randomization was conducted, we use the "wild bootstrap" suggested by Cameron, Gelbach, and Miller (2008) to estimate standard errors (cgmwildboot in Stata). This results in standard errors that are larger than those generated either by normal "sandwich" clustered regression or by adjusting the standard errors using a t-distribution with 17 degrees of freedom.
[14] The results from table 2 as well as all those of tables 4–7 are robust to adding individual controls (gender, age, whether the client had a prior loan with CHN, the purpose of the loan is housing, interest rate, loan term, and monthly repayment) and the size of the branch.

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 otherwise do, as expected from theory? This is likely because the promotion to open a savings account was quite powerful. By being offered 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.[15] As described in Section III.C, we cannot distinguish in the preprogram period the savings accounts that correspond to microfinance borrowers, but the total number of new savings accounts being opened per day jumps from a preprogram average of three to almost six on July 15, when the program begins. Hence, it is in the use of the account that we expect to see the planning-and-reminder effect. Table 2, column 5, indeed shows that only 13.9% in the control group ever made another deposit into their savings account, while 34.1% did so in the Open Treatment, and 57% in the Default Treatment.

Why is uptake higher with the Default Treatment if anyone who ever intended to save or not could be induced to open a savings account by the promotion package? The answer must lie in the only difference between these two treatment arms, namely, that clients must opt in to the savings amount in Open Treatment, while they must opt out of the default savings amount in Default Treatment. This is consistent with nonzero cognitive costs to optimizing savings decisions. In the subsequent section, we will analyze whether this substantial difference in uptake translates into a meaningful difference in savings rates, for which a meaningful ability to respect one's self-commitment is necessary.

The Open Treatment was framed in monetary amounts, and hence very naturally clients planned savings 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 who opened an account planned to save the suggested 10%. The resulting commitment amounts are thus very distinct between the two arms, with the Open arm taking almost exclusively even-integer values and the Default arm mimicking the more continuous distribution of loan amounts. On average, self-committed amounts were $4.79 in the Open Treatment and substantially higher at $7.91 in the Default Treatment (table 2, col. 6, shows the regression of commitment conditional on uptake in the treat-

[15] Cole, Sampson, and Zia (2011) show that small subsidies can greatly increase the demand for and use of savings accounts, in experiments done in Indonesia and in India.

ment branches, with a coefficient on the Default Treatment significant at the 5% level).

B. *Compliance with Own Commitment*

Without any hard commitment device, the test of the efficacy of self-commitment revolves around whether a planning-and-reminder treatment is sufficient to induce regular saving behavior in the amount one has committed. The savings account bearers are still subject to the same difficult short-term decision to save, whether or not they have self-committed to regular deposits, except for the reference savings plan they gave themselves. In this section, we look at the level of compliance of the savers with their own commitment. Conditional on uptake and commitment amounts, both Open and Default Treatments consist of the same intervention, namely, a reminder to save at a set reference level. Yet, commitment amounts are different, and the Open and Default savers may not be comparable because of differential selection into opening a savings account. We therefore look at them separately.

A first striking element of this planning-and-reminder effect is the size of the deposits made relative to the committed amounts (fig. 2). While there are indeed some deposits that do not correspond to any precommitted savings amount, fully 69% of the deposits in the Open Treatment and 82% of those in the Default Treatment are within 25% of the committed amount.[16] 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 in particular be the case if the 10% default acts as an endorsement effect.

Despite the fact that both uptake levels and commitment amounts differ greatly across the two treatment arms, conformity to the commitment is very similar for Open and Default Treatments savers. Table 3 provides tests of equality between the Open and the Default arms, and it begins by confirming how much larger both uptake and commitment amounts were in the Default arm (both significant at the 1% level). The remainder of the table considers only those who elected to save. This group is endogenously selected but, if anything, is tipped against finding superior outcomes in the Default arm since this treatment induced an additional half of the sample to open a savings account. We might expect these individuals to have a lower propensity to save. Table 3 illustrates that, conditional on uptake, compliance with the commitment

[16] This excludes the initial deposit at the opening of the savings account.

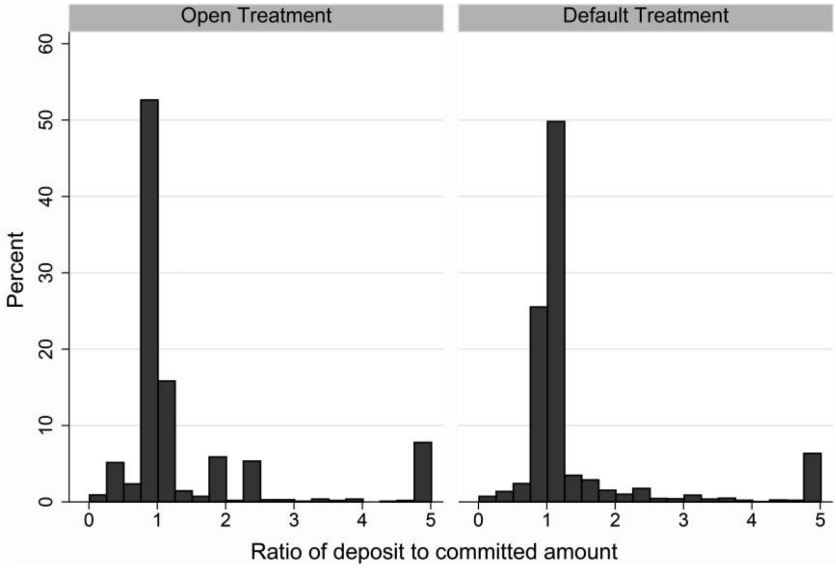

Figure 2. Deposit amount relative to committed amount, by treatment status. Excludes initial deposit; ratio above 5 is assigned to 5; highest 2% of deposits not included in mean and standard deviation. Open Treatment: mean = 2.46, SD = 7.28, median = 1.00, observations = 1,086; Default Treatment: mean = 2.07, SD = 5.03, median = 1.03, observations = 2,483.

amount was virtually identical between the two arms and that, as a result, the difference in commitment amounts translates directly into differences in median cumulated deposits.[17] In the final three rows of the table, we show that compliance with the commitment is similar for each loan maturity and that those taking 12- or 18-month loans fell short of their cumulative savings goal by only 33%–44%, whereas those taking longer-term loans typically accumulated less than half of the originally committed amount. Figure 3 shows that this noncompliance has a strong time signature, illustrating that, while the fraction of savers making a deposit starts at very close to 100% (particularly in the Default arm), this rate decays rapidly. As of the third month, only 40% of the treated savings account bearers make a deposit (except for the 12–18-month loans in the Default Treatment). And this share further declines to 20% by 1 year into the loan. Figure 3 also reports the percentage of control savers who make a deposit each month, as an indication of behavior without a plan and reminders. Note that these comparisons are only descriptive because selection into opening a savings account varies across treatment arms.

[17] We use median tests for the distribution of cumulated deposits because the presence of certain very large deposits and withdrawals generates substantial skewness in this variable.

TABLE 3
SAVING BEHAVIOR OF SAVINGS ACCOUNT HOLDERS

	Open Treatment	Default Treatment	Test of Equality between Open and Default Treatments (*p*-Value)
Uptake: open a linked account	.449	.772	.000
Among those who opened a linked savings account:			
Committed amount (US$)	4.79	7.90	.000
Cumulated deposits at loan term:			
In excess of commitment (median %)	−56.4	−53.2	.642
Amount (median US$)	32.8	63.0	.020
Cumulated deposits at loan term, in excess of commitment (median %):			
12–18-month loans	−44.4	−33.5	.447
24-month loans	−58.3	−61.9	.877
36-month loans	−55.6	−52.3	.957

Note. Test of equality for the median is performed using the continuity-corrected Pearson test.

We do a proper estimation of causal impact on deposit behavior in the next section.

In conclusion, while uptake and commitment amounts differ strongly, compliance conditional on commitment is very similar across the two treatments. CHN microfinance borrowers typically deposit in amounts close to what they have committed, even when this amount was suggested to them, as in the Default Treatment. But the regularity of deposits faded rapidly, suggesting limits to the salience of self-commitment. Over the entire loan term, savers deposited about half of what they had committed to.

C. *Deposit and Withdrawal Behavior*

In this section, we look at the intention-to-treat impact of the treatments on deposit and withdrawal behavior. Most of these results are readily understood from the two components of uptake and behavior conditional on uptake analyzed in the previous two sections. Uptake and commitments are higher in the Default Treatment, but conditional deposit behavior is the same in the two treatments. As seen in panel A of table 4, the treatment effect on the number of deposits is large. While borrowers in the Basic Savings arm make on average 0.78 deposits during the 3 years of the observations, those in Open and Default Treatments make 2.57 and 5.36 more deposits, respectively. These differences carry through when examined by loan term (cols. 2–4). These aggregate numbers include borrowers who have ceased to take loans, others who have renewed their contract with a new loan and continued commitment to savings, and so on.

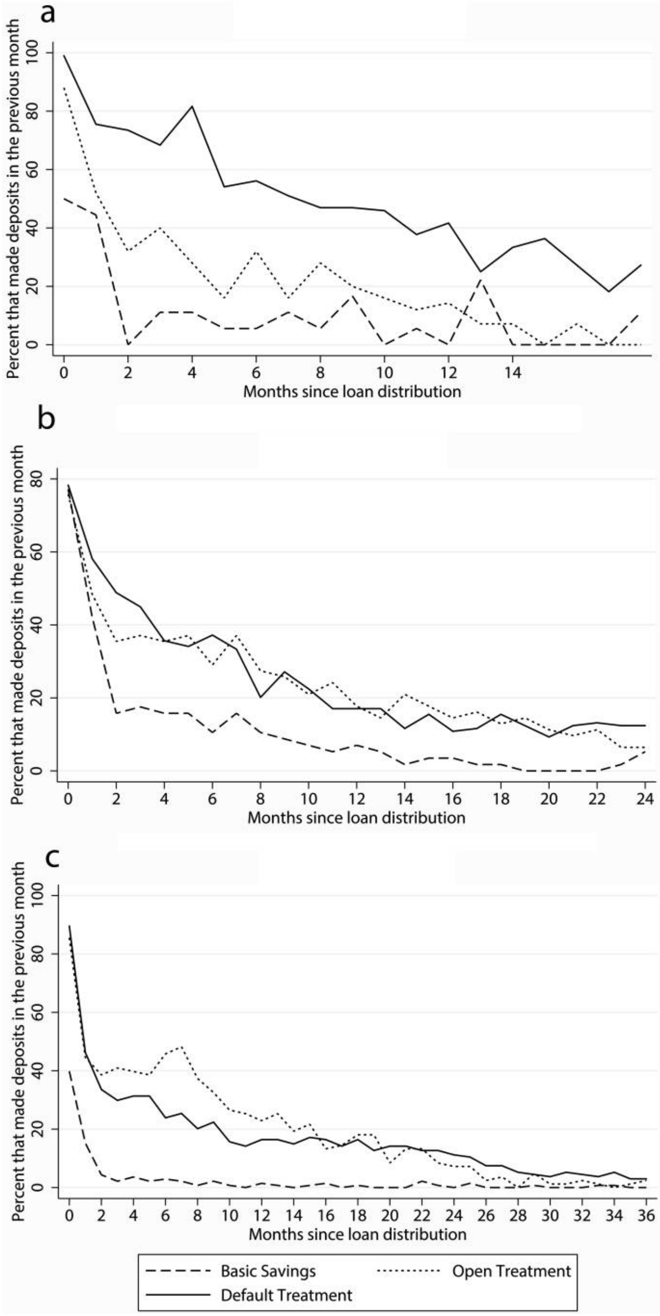

Figure 3. Percentage of savings account holders who make a deposit, by treatment status: *a*, 12–18-month loans; *b*, 24-month loans; *c*, 36-month loans.

TABLE 4
DEPOSIT AND WITHDRAWAL BEHAVIOR

	All Loans (1)	12–18-Month Loans (2)	24-Month Loans (3)	36-Month Loans (4)
	A. Total Number of Deposits			
Open Treatment	2.567*	1.153	2.236	3.356
	(1.390)	(1.524)	(1.821)	(4.134)
Default Treatment	5.357*	6.483***	4.249	5.443*
	(3.206)	(2.29)	(2.838)	(2.945)
Intercept	.782	.920	1.256	.502
	(4.87)	(.716)	(3.971)	(4.462)
	B. Number of Deposits during Loan Term			
Open Treatment	2.384*	.699	2.064	3.350
	(1.241)	(.739)	(1.662)	(4.01)
Default Treatment	4.973*	6.008***	3.718*	5.406*
	(2.931)	(2.12)	(2.188)	(2.924)
Intercept	.732	.740	1.155	.502
	(4.491)	(.512)	(3.104)	(4.36)
	C. Number of Withdrawals during Loan Term			
Open Treatment	−.195	−.0985	−.214	−.126
	(.344)	(.746)	(.340)	(.954)
Default Treatment	.874***	.190	.650*	1.811***
	(.31)	(.199)	(.345)	.643
Intercept	.770*	.440	.792*	.812
	(.31)	(.305)	(.351)	(.728)
Observations	1,375	251	484	640
	D. Has Made at Least One Deposit after Loan Closes (for Closed Loans Only)			
Open Treatment	.0569	−.0212	.0321	.0697***
	(.0690)	(.843)	(.0621)	(.0247)
Default Treatment	.0921	.000439	.0981	.0648
	(.0955)	(.00499)	(.101)	(.0699)
Intercept	.0638	.175	.0992	.0163
	(.0387)	(.117)	(.156)	(.0155)
Observations	974	219	367	388

Note. Robust standard errors are in parentheses, clustered at the branch level using the wild bootstrapping method. Dependent variables are indicated by the panel titles.
* $p < .1$.
*** $p < .01$.

As seen in table 4, panel B, almost all deposits were made during the period of the loan. Panel C shows that while borrowers in the Default Treatment made more deposits, they also withdrew more often, especially those who had long 24- or 36-month loans.

Of the 1,375 borrowers in the experiment, 974 have paid off the initial loan taken during the experiment (table 4, panel D). The remaining 401 loans are in arrears, most of them 36-month loans with an expected end in August 2011 or later. Of these 974 borrowers who completed their loans in good standing, 11.4% have made at least one deposit after having paid off their loan. This is 6.4% in the Basic Savings arm, increasing to 12.1% and 15.6% for the Open and the Default Treatments, respectively. The point estimates of the treatment effects are large, and particularly for long-term loans the fraction of clients making subsequent deposits is more than four times as high in the treatment arms as it is in the control. While we lack the statistical evidence to make definitive statements, these results suggest that self-commitment savings have effects that last beyond the initial loan term.

D. Savings Accumulation

While savers largely meet their commitments with regular deposits, the ultimate ability of CHN clients to accumulate meaningful savings will depend on a combination of uptake, deposit behavior, and the frequency 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 borrowers received their loan.[18] Averages by treatment are represented in table 5 and figures 4 and 5. Because the treatments were linked to a loan, we separate the loans by the length of their term.

The pattern of savings of the 12–18-month borrowers in figure 4 shows a sharp accumulation under the Default Treatment, which is suddenly canceled at the end of the loan. Upon further investigation, this corresponds to the savings and withdrawal pattern of loans not renewed. The pattern of savings accumulation of the 24-month borrowers in figure 4*b* is similar, with a large decline after the term of the loans to reach the level of accumulation under the Open Treatment. As for the 36-month borrowers, most of them had their expected loan closing time just before our last observation of September 2011. There is no sharp decline to be observed yet. Despite these observed declines around the end of the loan term, the treatment has a clear impact of savings accumulation. At the end of the 3 years of observation, borrowers from the treatment groups accumulated \$10–\$20, while the borrowers from the Basic Savings group have no real savings. Figure 5 shows the cumulative distribution function of final savings balances across the three arms (the figure is truncated at \$150 on the *X*-axis for clarity of viewing). The stochastic dominance of the treatment arms is visually clear, and a Kolmogorov-Smirnov test rejects the similarity of any two of these distributions at the 1% level.

[18] These balances reflect not only the deposits and withdrawals initiated by the savers who we analyze in the previous section but interest payments, penalties, fees, and any other adjustments.

TABLE 5

NET ACCUMULATED SAVINGS (US$)

	All Loans (1)	12–18-Month Loans (2)	24-Month Loans (3)	36-Month Loans (4)
	A. All Borrowers (Individual-Level Analysis with Wild Bootstrap)			
Open Treatment	11.43	2.544	10.37	16.58
	(8.912)	(3.218)	(9.394)	(12.07)
Default Treatment	21.60*	29.33**	18.62	18.93*
	(12.93)	(11.97)	(15.66)	(11.15)
Intercept	4.158	3.397	5.690	3.313
	(23.34)	(12.52)	(23.58)	(11.32)
Observations	1,371	251	484	636
Test Open = Default (p-value)	.517	.0317	.652	.886
	B. All Borrowers (Branch-Level Analysis)			
Open Treatment	11.5	2.54	10.4	16.6
	(9.9)	(9.0)	(13.4)	(11.9)
Default Treatment	21.65**	29.33***	18.6	18.9
	(9.3)	(8.5)	(12.2)	(12.0)
Intercept	4.08	3.40	5.69	3.313
	(6.41)	(7.10)	(8.83)	(7.02)
Observations	20	15	20	19
R^2	.241	.615	.122	.172
Test Open = Default (p-value)	.331	.00295	.538	.865
	C. Savers (Branch-Level Analysis)			
Open Treatment	25.00*	10.1	16.4	34.13*
	(12.6)	(7.7)	(21.2)	(16.2)
Default Treatment	23.24**	30.30***	18.4	19.5
	(10.5)	(6.4)	(18.3)	(14.0)
Intercept	10.09	9.436	16.77	7.418
	(8.32)	(5.84)	(15.28)	(9.80)
Observations	20	11	20	17
R^2	.256	.794	.058	.252
Test Open = Default (p-value)	.879	.00651	.912	.385

Note. Robust standard errors are in parentheses, clustered at the branch level using the wild bootstrapping method in panel A. Dependent variable is final balance as of the expected due date of the loan (four loans were due after September 30, 2011).

* $p < .1$.

** $p < .05$.

*** $p < .01$.

While these individual-level nonparametric tests of the similarity of distributions indicate very large treatment effects on final savings balances, when we attempt to account for the design effect in the randomization we are confronted with twin estimation issues. First, the small number of clusters in this study (the 20 branches over which the randomization was conducted) generate a low-powered test when we properly account for the design effect. Cameron et al. (2008) illustrate that the usual "sandwich" estimator is likely to underestimate standard errors with so few clusters. Second, we have a dependent

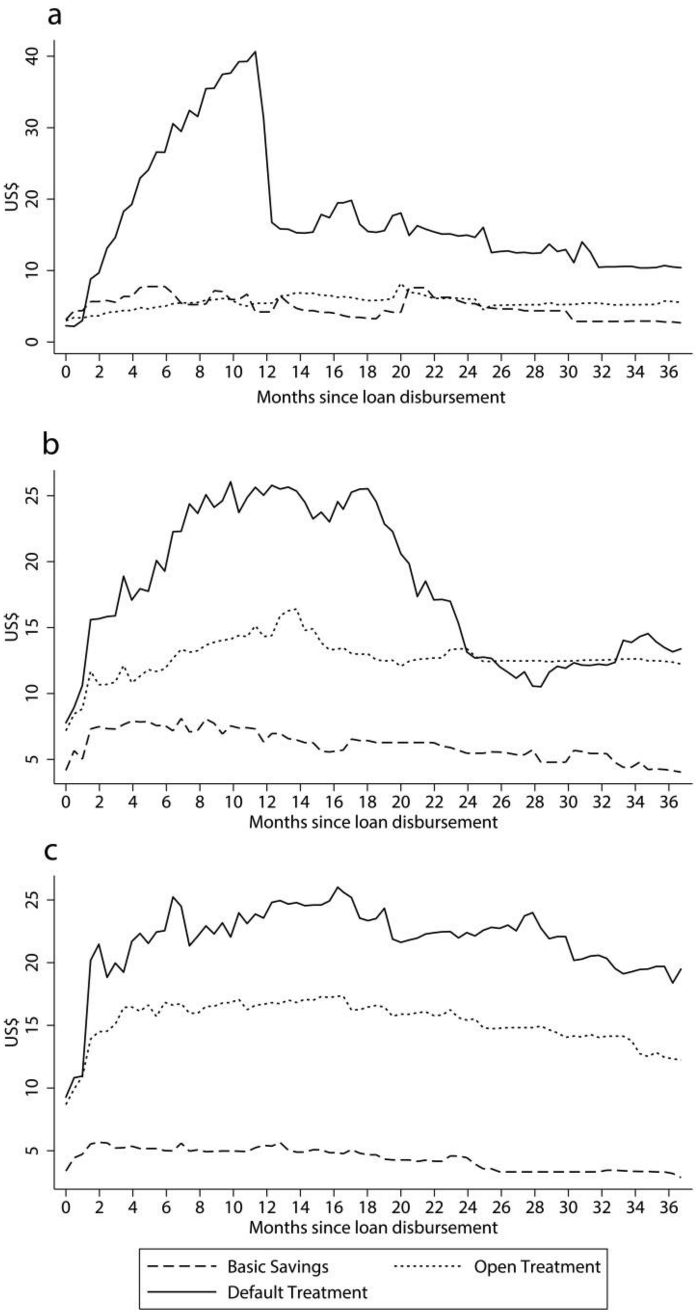

Figure 4. Running savings balance by treatment status: *a*, 12–18-month loans; *b*, 24-month loans; *c*, 36-month loans. Top 1% excluded.

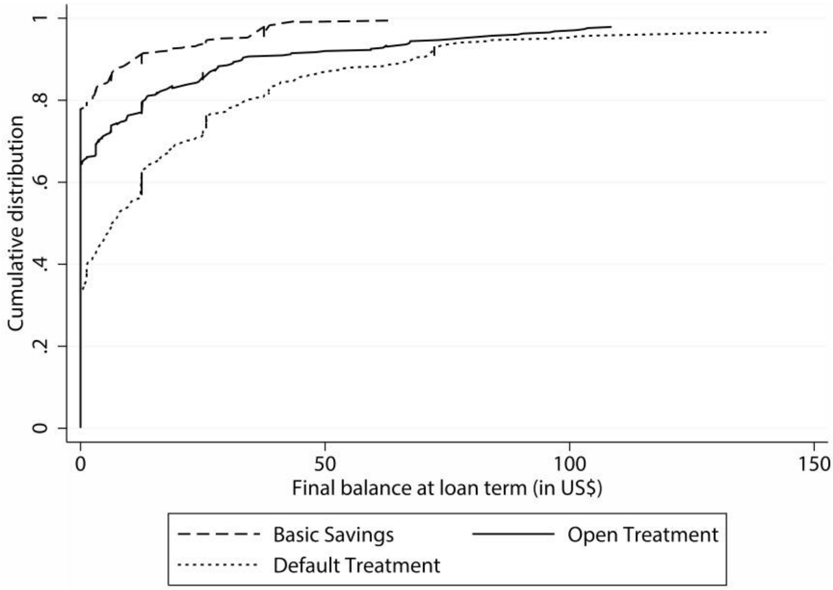

Figure 5. Cumulative savings balances by treatment arm (data truncated at $150)

variable that is strongly skewed: the median savings balance in all three treatment arms is zero, but some very large balances exist, creating a highly heteroskedastic variable with correspondingly large standard errors. We deal with this pair of issues in two separate ways. First, we can use the "wild bootstrap" estimator for standard errors, eliminating the small-cluster bias that might otherwise cause us to overreject. Second, we can simply calculate cluster-level means and analyze the experiment with 20 observations. For the simple intention-to-treat effect, these two methods provide almost exactly comparable point estimates because we use no individual-level covariates. The standard errors are actually slightly smaller when analyzed at the cluster level, presumably because the distribution of average savings balances is quite normal, while the distribution of individual savings balances is highly skewed.

This is presented in a regression framework in table 5, where we estimate the overall (intention-to-treat) impact of the treatments on the accumulated savings at the expected term date of each loan. Borrowers from the Basic Savings arm have accumulated just over $4, while borrowers from the Open and Default Treatments have accumulated $15.6 and $25.7, respectively. This pattern is similar across loan terms. Point estimates are large, but so are standard errors, and so despite these very large effects, only some of the Default Treatment savings are significantly different from the Basic Savings. Panel B of table 5 repeats the analysis presented in panel A but at the branch level rather than the individual level.

Panel C of table 5 uses branch-level analysis to show accumulated savings at loan term conditional on uptake of the savings account to average \$10.1, \$35.1, and \$33.3, in the Basic Savings, Open Treatment, and Default Treatment, respectively. Both treatment effects are significantly different from zero, but all point estimates remain small in comparison with loan sizes. Remember, however, that the experiment took place in a period of financial turmoil that was not favorable to savings overall. It is also important to remember that savings accumulation is not the only benefit of having a savings account. The ability to withdraw small amounts when needed would bring substantial welfare, if savers can avoid using a moneylender, forgoing a purchase opportunity, or being penalized for missing a monthly loan payment. Unfortunately, we do not observe this broader set of behaviors and hence cannot document any such benefits.[19] However, figure 6 provides suggestive evidence, illustrating that while the overwhelming majority of savings deposits take place within a day of the intended loan repayment date, the timing of withdrawals is almost perfectly uniform over time. This trajectory is consistent with the fact that the soft commitments are helping clients to save and that withdrawals are being used to smooth out a set of other shocks whose incidence is unrelated to the timing of loan payments. Certainly, the Default Treatment savers have made many more transactions on their accounts than the Open Treatment or the Basic savers.

These results broadly conform to the theoretical predictions presented in Section II. The demand for this form of soft commitment is strong, its use has induced an increase in savings, and the framing effects surrounding the default savings amount have strong impacts on the chosen commitment amounts. Furthermore, savings balances tend to fall rapidly once the loan period has ended, suggesting that the combination of frequent interaction with the bank plus reminders to save were necessary components in the generation of these savings balances.

E. Capital Repayment and Default

One obvious concern with this savings product is that, by making additional demands on the liquidity of borrowers, it may somehow damage 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 a 26% inter-

[19] There is no pattern in the withdrawals of the Default Treatment savers that would suggest that they withdrew money from their accounts to meet their savings commitments or to pay their monthly dues or that they withdrew their commitment deposits after having put them in.

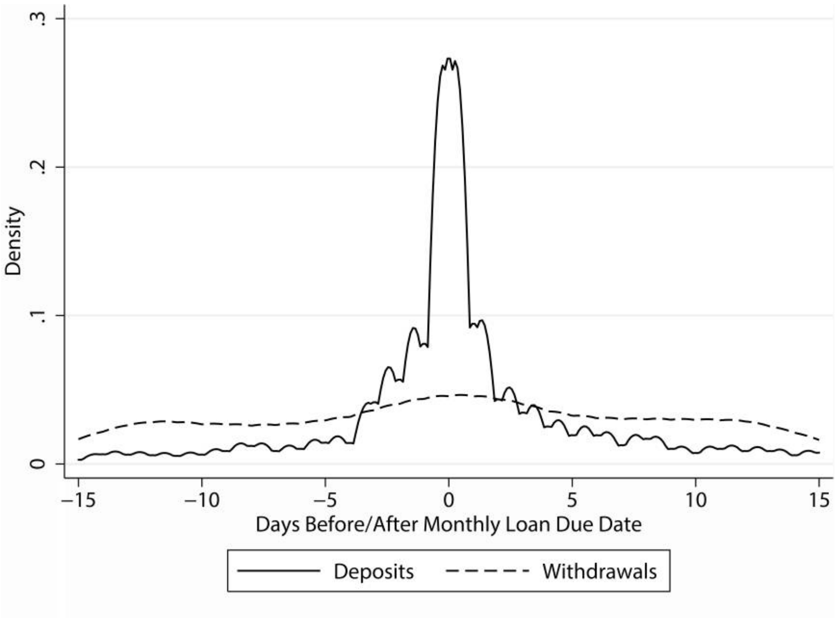

Figure 6. Timing of deposits and withdrawals, relative to loan payment date

est on the loan. Is use of this savings product slowing down the rate at which their loans are being repaid? If so, this could create a heavy interest cost on the client. Alternatively, it is possible that the presence of liquid savings helps the borrower to smooth shocks and thus improves repayment performance.

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 treatment is randomized, and therefore variables like having opened a savings account or the 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 the expected half-term and term dates. Problems encountered by the Microfinance Department of CHN are illustrated by this result. In the control group, borrowers are on average behind their principal payment by 34.2% (col. 1). Note, however, that both treatment groups are lagging much less in their repayments. Column 2 shows that clients with a higher savings rate repay their loans faster. Column 3 shows that the improved repayment rates, notably under the Open Treatment, all take place

TABLE 6
CAPITAL REPAYMENT RATE AND LOAN DELINQUENCY

	Capital Repayment Rate							
	At Half Term			At Term	Delinquent		Missed Payments	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Open Treatment	.221*	.188*	−.0402	.0994	−.153	−.0929	−.0511	−.0583
	(.108)	(.0960)	(.141)	(.0801)	(.111)	(.0851)	(.0739)	(.0722)
Default Treatment	.159	.0918	.0941	.102	−.178	−.0559	−.0939	−.0818
	(.126)	(.101)	(.103)	(.0897)	(.142)	(.0879)	(.0536)	(.0660)
Male borrower			.131**	.102**		−.135***		−.0913*
			(.0540)	(.0468)		(.0553)		(.0503)
Savings/owed capital		1.008*		.0609		−1.525***		−1.167**
		(.612)		(.114)		(.723)		(.770)
Heterogeneity of treatment effect:								
Open Treatment:								
24-month loans			.129***					
			(.0458)					
36-month loans			.390***					
			(.151)					
Default Treatment:								
24-month loans			.0225					
			(.0664)					
36-month loans			−.00469					
			(.0623)					
Intercept	−.342***	−.313***	−.184	−.350***	.596***	.442***	.609***	.773***
	(.122)	(.111)	(.122)	(.124)	(.140)	(.087)	(.053)	(.065)
Loan term fixed effects	No	Yes	Yes	Yes	No	Yes	No	Yes
Observations	1,375	1,375	1,375	1,371	1,375	1,375	1,375	1,375
R^2	.039	.086	.089	.113	.027	.136	.007	.054

Note. Dependent variables are indicated by the column headings. Robust standard errors are in parentheses, clustered at the branch level using the wild bootstrap method. Capital repayment rate is the ratio of excess repayment over the loan size. Delinquency is being at least 30 days behind capital repayment at midterm. Missed payments are the fraction of the bimestrial balance that shows at least one missed payment. The savings to owed capital is computed at half term, except in col. 4 where it is at term. In col. 4, four loans have a maturity date beyond our last observation of September 30, 2011.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

among the 24- and 36-month loans. Improved capital repayment as of the expected term date under the treatments is smaller and not significant but still equal to one-third the base value. Columns 5–8 show no increase in delinquency (defined as being at least 30 days behind payments at half term) or in the number of missed payments induced by the savings treatments and a negative correlation between the amount saved and repayment problems.

The conjecture that inducing microfinance borrowers to save may delay their loan repayments or jeopardize their ability to make their monthly payments is not borne out by the experiment. 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 for borrowing and saving.

F. Loan Renewal and the Use of Balances When the Loan Cycle Ends

Three years after the beginning of the experiment, most loans have reached their maturity date, although 401 loans, almost 30% of the experiment loans, are still outstanding. In this section, we examine the probability of loan renewal for the clients whose loans have come to term as of late August 2011. By that time, 856 loans had been paid off.[20] Of these, 161, or 18.8%, have been followed by another loan by the time of our last observation, September 30, 2011. Results in table 7, column 2, show no significant difference across treatment arms, although point estimates show moderate positive effects of the two treatments. We also show in column 3 that in fact clients with a larger accumulation of savings before closing their loan are more likely to renew it. This is true whether we use the savings balance relative to the initial loan size (as reported), the accumulated savings balance itself, or even simply whether the client had opened a savings account (results not reported). It does not seem, though, that savings accumulation is the true driver of nonrenewal. In column 4, we attempt to measure the causal effect of savings by instrumenting for it with the treatment variables. Assuming that treatment had no effect on renewal except through the induced accumulated savings, and hence that the instruments are valid, we find no significant effect of accumulated savings on the probability to renew a loan.

Partitioning the sample by loan duration, we have 125 completed 12-month loans, 319 24-month loans, and then a group of 328 36-month loans that had been paid off. Results on the probability of a new loan being taken after the closure of this initial loan are reported in table 7, columns 5–7. For those small 12-month loans, the Default Treatment decreases the probability of renewal, despite the fact that their accumulated savings is still only equal to 5% of their loan size (note that there are only 15 such loans in the Basic Savings arm, and hence the results cannot be given too much weight). But for the majority of the loans, which are either 24 or 36 months long, we have the same result of no significant effect of the treatment on renewal. Closed loans are of course a selected sample since most of the loans that are not paid off are in arrears. As a robustness check, we estimate in column 1 the probability of renewal for all loans whose maturity date was at least 1 month before our last observation. Results are essentially the same: the treatments have no effect on renewal of loans.

In conclusion, while treatments induce a higher level of savings, they have no effect on the relationship between the bank and its borrowers at the end of

[20] This does not include the 96 loans that have been renegotiated.

TABLE 7
RENEWAL OF LOAN AFTER CLOSURE

	All Borrowers (1)	All Closed Loans (2)	(3)	IV Estimates (4)	12–18-Month Closed Loans (5)	24-Month Closed Loans (6)	36-Month Closed Loans (7)
Open Treatment	.0149	.0442	.0201		−.176	.0274	.0514
	(.0447)	(.0855)	(.0672)		(.277)	(.0665)	(.0993)
Default Treatment	.0427	.0119	−.0427		−.389***	.0426	−5.69E − 05
	(.0578)	(.0589)	(.0813)		(.136)	(.0883)	(.00101)
Saving balance 30 days before closing/loan size			1.472***	−.0594	.765	2.565**	2.298
			(.570)	(1.294)	(1.105)	(1.304)	(2.614)
Intercept	.174*	.177*	.173*	.198***	.458***	.187**	.0880
	(.0943)	(.103)	(.101)	(.0476)	(.053)	(.0909)	(.0678)
Loan term fixed effects	Yes	Yes	Yes	Yes			
Observations	1,204	856	856	856	125	319	328
R^2	.018	.023	.055	.020	.113	.036	.030
Test Open = Default (*p*-value)	.703	.755	.552		.491	.891	.605
Mean of renewal	.188	.188	.188		.176	.251	.122

Note. Dependent variable is the renewal dummy. Column 1 includes loans with maturity date no later than August 31, 2011; cols. 2–7 include closed accounts as of August 31, 2011, excluding the loans that were renegotiated. In col. 4, instruments are treatment variables.
* $p < .1$.
** $p < .05$.
*** $p < .01$.

one loan cycle. Our theory predicts that sophisticated hyperbolic borrowers should be using commitment as a way of escaping the debt-financed equilibrium. Are these two in tension? Several things suggest that they may not be. First, one loan cycle is obviously insufficient to build accumulating savings that can substitute for a loan, even if the clients had met a 10% commitment. The accumulated savings (30 days before closing the loan) are 1.6% of the loan size for all borrowers and 3.5% for the savers of the treated groups. It would take several cycles or a larger savings rate to reach a point at which accumulated savings can substitute for a loan. Second, for those borrowers with the smallest loans and the greatest savings accumulation (12–18-month loans in the Default Treatment), the relationship is in the hypothesized, negative direction. Finally, a large share of those who took a second loan requested to have savings reminders on the subsequent loan when offered them, and these uptake rates are strongly differential across treatment arms (only 29% for the control vs. 45% for the Open and 65% for the Default Treatment). This suggests that even for those borrowers who were not able to transition to self-financing after a single loan/savings cycle, there was a strong demand for savings reminders during subsequent loans.

G. Heterogeneity of Treatment Effects

In this section, we look for possible heterogeneous effects of the treatments along three dimensions: gender of the client, whether this client has had a prior loan with CHN, and the loan amount. We find no differential treatment effect by gender on opening a savings account. In general, women committed to a lesser amount but not differentially across treatment arms. Women savers use their savings account somewhat less, with fewer deposits and withdrawals, but at the end, their unconditional savings is not different from that of men or differentially affected by the treatments. Female repayment performance on loans is overall somewhat worse than that of men, but the female/male repayment differential is similar across treatment arms. In conclusion, women do have somewhat different savings and repayment behavior, but they are not differentially affected by the treatments.

Of the 1,375 experiment borrowers, 157, or 11.4%, had a loan from CHN before the experiment, and a quarter of them even had a savings account. While potentially quite different from new borrowers, they have no differential compliance conditional on uptake and reach the same accumulated savings as new borrowers. Finally, we found no heterogeneity of treatment effects by loan size in any of the dimensions we have analyzed in this article.

V. 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 the 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, that is, 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 \$1,000 thus typically generate an equivalent savings balance of \$6–\$28 in the Basic Savings, \$14–\$40 in the Open Treatment, and \$16–\$48 in the Default Treatment among savers (cols. 2–4). With the reserve ratio of 15% that applies to commercial banks in Guatemala, this provides the institution with funds for

TABLE 8
SAVINGS MOBILIZATION

Loan Term	Average Amount of Outstanding Loan (% of Loan Amount) (1)	Average Savings Balance in Percentage of Loan Amount (Savers Only)			Potential Lending from Savings Balance (% of Loan Amount)		
		Basic (2)	Open (3)	Default (4)	Basic (5)	Open (6)	Default (7)
12 months	56.1	2.8	4.0	4.8	7.4	12.0	24.8
24 months	56.0	2.2	2.1	3.7	5.8	6.4	18.9
36 months	57.3	.6	1.4	1.6	1.7	4.3	8.2

Note. 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 .15.

lending that can reach 8.2%–24.8% of the loan amount under the Default Treatment (cols. 5–7).[21]

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 26% over a declining capital balance, the average outstanding debt is only 56.1% of the loan amount, if the loan term is 12 months, and 57.3%, if the loan term is 36 months (table 8, 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 $248 with the Default Treatment, half of the outstanding loan. These calculations are not ideal, as we lack long-term data on savings balances and the interval over which we observe savings was a period of substantial economic tumult. They nonetheless suggest that the bank would be able to leverage substantial additional lending capital with the savings balances generated by the treatment.

VI. Conclusion

Despite a rapidly accumulating evidence base for the importance of commitment in savings, few commercial banks have experimented with scalable, market-oriented products informed by behavioral economics. 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 two, clients could plan to regularly deposit a chosen amount in a savings account when paying the monthly amount due on their loan. They would be

[21] The reserve ratio is as of 2005 and is taken from Schatan and Rivera (2008).

reminded of their self-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 an exercise in planning with reminders. 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, even if the experiment had to be discontinued earlier than desired with the advent of the financial crisis. 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%. The total number of deposits was quadrupled by the Open Treatment and multiplied by 6 by the Default Treatment. Of the microfinance clients, 13.9% had an active savings account in the Basic Savings promotion group, 34.1% in the Open Treatment, and 57% in the Default Treatment. Deposits were most often within a small range of the committed amounts, despite the fact that uptake and commitment amounts were both substantially higher in the Default arm than either the Open arm or the control.

Activity in these savings accounts also shows numerous withdrawals, particularly in the Default Treatment. After 3 years of observation, net accumulated savings is $4 in the Basic Savings group, $16 in the Open Treatment, and $26 in the Default Treatment. Among those who opened a savings account, savings are $10 on average in the control and roughly $35 in both the Open and Default arms. 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. A back-of-the-envelope estimate indicates that universal implementation of the Default product would allow the bank to generate half of the liquidity required for short-term loans and 15% of the liquidity required for long-term loans through this savings product alone. Further, we uncover no evidence that these larger savings balances in any way damage loan repayment; if anything, the reverse is true.

An alternate piece of evidence that is quite compelling in showing client satisfaction with this self-commitment approach to savings is the reuptake rate. Of the 162 subjects in the study who paid off their first loan in good standing and then decided to take an additional loan, 48% chose to retain a commitment savings product linked to their second loan. These percentages are strongly different across the treatment and the control groups (only 29% for the control vs. 45% for the Open and 65% for the Default Treatment), and the reuptake rate in the Default Treatment is significantly higher than that in the Open Treatment (t-statistic on difference = 2.08). Compared to an initial uptake rate of 77% in the Default arm, this indicates that the large majority of those electing to save the first time were sufficiently satisfied with the product to desire to use it again. Furthermore, the fact that the arm that saw the highest initial uptake and the most rapid accumulation of savings also sees the highest reuptake rate is inconsistent with the idea that clients felt coerced to save by the program, suggesting rather that this form of soft commitment helped them to achieve their own savings goals.

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. While our experiment took place during the onset of the financial crisis in Guatemala and hence may reflect conditions unique to this circumstance, the product appears to be benefiting both borrowers and the bank.

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 article 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 showed that this apparently contradictory combination of high-price credit and low-reward savings can make sense from a theoretical point of view, and we demonstrated empirically that savings are being generated in a way that is directly complementary with both the speed and the 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.

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