

## Getting to the Top of Mind: How Reminders Increase Saving

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**ABSTRACT.** Limited attention models generate the distinct prediction that reminders can affect behavior. We provide evidence, from three different field experiments with individuals who recently opened goal-based savings accounts, that reminder messages from a financial institution increase savings balances and goal attainment. Messages that mention financial incentives or specific goals are especially effective. Other content variation, and timing variation, do not matter as much. These results do not map neatly into existing models, so we provide a simple model where limited inattention to exceptional expenses can generate our results.

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## I. Introduction

Consumption, savings and borrowing behavior is sometimes difficult to reconcile with traditional models of intertemporal choice. Calibrations of U.S. data suggest that extremely high short-term discount rates are necessary to explain observed borrowing patterns (Laibson, Repetto and Tobacman 2007). Voluntary commitment devices help increase savings (Ashraf, Karlan and Yin 2006b; Benartzi and Thaler 2004). Default options have large effects on retirement savings decisions (Madrian and Shea 2001; Beshears et al 2008). In the developing world, there is evidence of persistent borrowing at high daily rates for predictable expenses (Ananth, Karlan and Mullainathan 2007) even though access to savings accounts has been shown to increase business earnings (Dupas and Robinson 2010) and total household assets (Prina 2012). These patterns are often explained by models that emphasize time inconsistency and self-control problems (Laibson 1997; O'Donoghue and Rabin 1999; Fudenberg and Levine 2006; Banerjee and Mullainathan 2009). In such models, people can exhibit both impatience and patience, depending on the horizon or good of choice.

We provide evidence, from three field experiments and a simple theoretical model, suggesting that a different consumer psychology – limited attention – plays an important role in saving behavior. We harken back to work by Akerlof (1991), which emphasizes salience rather than costly self-control as a driver of procrastination. Our experiments show that reminders sent by three different banks in Bolivia, Peru, and the Philippines increase savings deposits, and that reminders that mention a financial incentive or a client's pre-specified goal are most effective. Our theory illustrates that these results are consistent with consumers being relatively inattentive to future "exceptional" (infrequent, and often relatively large) expenses (Sussman and Alter 2013).

Our sample includes only clients who had recently opened a "goal-based savings account": clients either made a plan to save a certain amount by a certain date or they committed to making regular deposits. In some cases, clients explicitly stated their plan for saving for a future expenditure to the bank. Plan adherence was incentivized by commitment (illiquidity until goal amount reached with the Philippines bank) and/or by a bonus for making regular deposits (higher yield in Peru, higher yield and free life insurance in Bolivia, and higher yield in the Philippines but only for a random

subset).

This sample of motivated individuals saving for a goal -has an advantage and disadvantage. It helps by allowing us to construct messages that plausibly *remind* the client about her intent to save for a goal, as opposed to providing new information and/or persuasion. We caution that this distinction is not crystal clear, as message content is difficult to cleanly categorize, whether in advertising or other forms of communication (Bagwell 2007; DellaVigna and Gentzkow 2010). Nevertheless, our sample does offer reassurance that messages such as “don’t forget your deposit this month!” or “... reach your savings goal of [client’s specific future expense]!” are relevant because everyone in the sample will have recently made a specific goal or planning about their savings. There is some disadvantage to external validity because we don’t know whether our results would hold for people without a clear savings plan and/or goal?

Pooling across the three sites, individuals randomly assigned to receive a monthly reminder via text message or letter saved more than a no-reminder control group. Account balances increased by 6%, and the likelihood of reaching the goal amount increased by 3 percentage points (or 6%). Although we lack data on other assets or more holistic measures of financial condition, our findings are nevertheless novel empirical field evidence on the influence of reminders on savings *behavior* if not on overall savings *rates*.<sup>1</sup> They build on a large body of evidence from clinical trials that reminders improve patient behavior across a variety of domains from increasing exercise (Calzolari and Nardotto 2012) to quitting smoking (Free et al 2011) to using sunscreen (Armstrong et al 2009) to adhering with kidney transplant protocols (Miloh et al 2009).<sup>2</sup>

Our experimental design also provides some evidence about what kinds of reminders are most effective. Experiments in health messaging have found that for some health behaviors, individuals respond differently when actions are framed as losses or gains (O’Keefe and Jensen 2009). However, we find no evidence that savings reminders are more effective if framed as a loss. We also see no

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<sup>1</sup>Kast et al 2012 test messages that encourage saving with feedback and peer pressure or information, on a sample of microfinance borrowers. Cadena and Schoar 2011 and Karlan, Morten, and Zinman 2013 test reminders for loan repayment. Stango and Zinman 2013, and Zwane et al 2011, find that survey content serves as reminders to avoid bank overdrafts and take-up insurance products.

<sup>2</sup>See van Dulmen et al (2007) and Krishna et al (2009) for reviews of evidence on the impacts of reminders on clinical adherence.

significant difference between messages signed by clients themselves and messages signed by the bank. Nor do we find a significant difference between messages that are sent reactively (only when a client is in imminent danger of noncompliance) and proactively (sent every month regardless of the client's status).

The most effective messages in our setting are those that mention a specific goal or incentive. Messages in Peru are effective only when they mention an individual's specific savings goal. Messages in Bolivia are only effective when they mention an extrinsic incentive (insurance coverage) for making deposits. Overall, we conclude that messages which increase the salience of the benefits of saving, whether current benefits (as in financial incentives) or future benefits (as in meeting savings goals) are highly effective. But it is *not* the case that any and every message from a bank increases deposits relative to no message, helping us rule out an informational/signaling channel.

Our empirical results do not square easily with existing models of attention and salience, which focus on various forms of rational and quasi-rational (behavioral) inattention to prices or product attributes.<sup>3</sup> We develop a simple theory where limited attention to something other than prices or product attributes can distort intertemporal allocations.

Our theory focuses on the effects of limited attention to what Sussman and Alter (2013) label "exceptional expenses." These expenses are exceptional in their relative infrequency and large size, but not necessarily in their stochasticity: exceptional expenses can be, in principle at least, perfectly forecastable. A common example for the subjects in our field experiments would be school fees; a common example for the U.S. would be car registration fees. In our model individuals face two kinds of consumption opportunities each period: an exceptional expense which occurs with certainty but can differ in each period (it could be school fees in one period, a night out in the next, etc.), and "ordinary" expenses. We make two key assumptions: 1) ordinary consumption is "top of mind": there are no foresight problems; 2) exceptional expenses are not top of mind: individuals fail to anticipate some of these future expenditure needs/opportunities, and underestimate how much they

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<sup>3</sup>Models of rational inattention include Sims 1998 and 2003; Mankiw and Reis 2002; Ball, et al 2005; and Reis 2006. Models of behavioral inattention and salience include Gabaix and Laibson 2006; Chetty, Looney, and Kroft (2009); Koszegi and Szeidl 2013; Bordalo et al 2013.

will end up spending on them.<sup>4</sup> Sussman and Alter present survey evidence in support of both of these assumptions (see also Ulkumen et al 2008). Our consumer chooses consumption to maximize her lifetime utility given the future expenditure opportunities she “attends” to, i.e., that she does not, prospectively, forget.<sup>5</sup>

A simple example illustrates our model. Suppose you hear that your favorite singer is coming to town three months from now, with (near-)certainty. This is an exceptional spending opportunity. You decide to go, and mark the concert date in your calendar. Tickets will not go on sale until the night of the show. Ideally, if your utility is concave with respect to consumption, you would finance the ticket by smoothing the expenditure shock over your lifetime – including some saving over the next three months. But if you are inattentive as in our model, you may sometimes forget your concert plan and choose to consume instead of save. Then, when the day of the concert arrives, you face the inferior options of reducing current consumption, forgoing the concert, or financing it disproportionately through debt (e.g., by charging it to a credit card or incurring a checking account overdraft fee and thus reducing future consumption even more in order to cover the financing costs). This sort of attentional failure may or may not be consequential in isolation. But lifetime consumption allocations are the result of countless such decisions, and small distortions can add up (and compound).

Solving our model generates a prediction distinct from self-control models: reminders can matter. In the concert example, being reminded about the coming purchase could increase incremental savings and long-run smoothing. Reminders provided by third parties, as they are in our field experiments, can play an important role if one of two conditions hold: 1) individuals are naive about their attentional failures, as they are in our model and empirically in Koehler, White, and John (2010) and Ericson (2011); 2) third-party reminders are more cost-effective than self-provided reminders, as

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<sup>4</sup>Our model also requires that individuals are more likely to forget future expenditures than future income, and we assume perfect forecasting of income. Prior work on income forecasting has theorized that anticipatory utility might lead consumers to *overestimate* their income (Brunnermeier, Papakonstantinou, and Parker 2008); we are not aware of any theory or evidence on the *underestimation* of income.

<sup>5</sup>Our setup is related to Mullainathan (2002), where individuals fail to remember information that predicts future income, and to Schwartzstein (2010) where individuals may mistakenly only attend to information that they consider relevant for a prediction task (see Hanna et al 2013 for empirical evidence in support of this theory). It is also closely related to Holman and Zaidi (2010), which focuses on prospective memory errors in the form of failing to remember to follow-through on tasks and Taubinsky (2013) which provides a psychologically grounded model of how tasks get to the top of mind.

is likely the case in our setting, where personal digital assistants (PDAs) are beyond the means of most of our subjects.

Our model generates two related testable predictions. First, reminders will increase saving by heightening prospective memory of exceptional expenses. This could work by association; e.g., since individuals know that savings is for future expenses, the reminder need not specify any particular expenditure to induce saving. Second, building on the first prediction, reminders that do draw attention to specific benefits of saving— to incentives or to specific future consumption items— may be even more effective. Here our model provides a novel potential microfoundation for mental accounting (Thaler 1990): instead of offering a weak counter to temptation, mental labels provide a strong association between today’s saving(s) and specific future events, increasing the probability that individuals attend to those events when choosing consumption, and thereby improving smoothing. Our model also illustrates that many pro-savings treatments can be reinterpreted as operating through attention instead of through self-control with large transaction costs for undoing non-binding commitments; e.g., opt-out default (Choi et al 2004); prepaid fertilizer (Duflo, Kremer, and Robinson 2011), or deposit collection (Ashraf, Karlan and Yin 2006a). Indeed, our model generates undersaving without any role for (time-varying) impatience or commitment. Our model also suggests that overborrowing may occur in part because debt can be “salience-advantaged” relative to saving; e.g., when debt is available “on-demand,” at the moment when an exceptional expense opportunity arises (unexpectedly, due to limited attention) and is (momentarily) at the “top of mind.”

The paper proceeds as follows. Section II details the settings and design of our field experiments. Section III presents the results. Section IV details a simple theoretical model to explain our results. Section V concludes.

## II. Experimental Design

Here we describe the setting, design, and implementation for three field experiments designed to test the hypothesis that limited attention plays a role in under-saving. Each experiment involves individuals responding to a marketing offer to open a goal-oriented savings account. After an account is opened, the bank randomly assigned clients to either receive a reminder or not. Each bank also

had its personnel collect some “baseline” data prior to making the product offer.

#### EXPERIMENT 1: FIRST VALLEY BANK, WESTERN MINDANAO, PHILIPPINES

First Valley Bank (FVB), a for-profit bank operating in Western Mindanao, Philippines, worked with us to randomize reminders as part of the rollout of its Gihandom (Dream) Savings product.<sup>6</sup> Between April and August 2007, bank marketing employees conducted door-to-door marketing visits in rural and small urban areas and offered 10,056 individuals the opportunity to open a Gihandom account. As part of this marketing visit, the bank employee also conducted a brief five to ten minute survey. Bank staff used personal digital accessories (PDAs) for the baseline survey and random assignment to treatments. Of the 10,056 individuals, 2,314 (23%) opened an account. The reminders treatment was not part of the marketing of the account, and thus the analysis will be conducted only on those who took-up (and had a cell phone, as detailed below).

Gihandom allows a client to set her own savings goal amount (US\$50 or above) and goal term (from three months to two years). Once the client opens the account with a minimum deposit of US\$2.50, there is no fixed deposit schedule to fulfill. The client receives a savings lockbox and is encouraged at sign-up to make small deposits on a daily basis. When the lockbox is full, the client goes to the bank to deposit the money. The rules of the account differ from the commitment savings product described in Ashraf, Karlan and Yin (2006b) in that money in the account can be withdrawn only if the account reaches the goal amount *and* the goal term has concluded.<sup>7</sup>

Among clients with a cell phone (66% of those who opened accounts), the bank randomly assigned some clients to receive one “regular ”text message reminder to come to the bank to make a deposit each month. Among those assigned to get regular reminders, the bank also randomized whether the message used gain or loss language with respect to “making your dream come true.”The text of the reminder messages are provided in Table 1a.<sup>8</sup> Table 2 reports some validation checks on the integrity

<sup>6</sup>The bank also randomly assigned people to: a) a low interest rate, high interest rate, or low interest rate + 1.5% reward for goal attainment; b) whether clients were given offers for an individual account only, a joint account only, or the choice of individual or joint account. Requiring a joint account significantly reduced take-up and lowered savings (but the effect was not statistically significant). Neither the high interest rate nor the reward interest rate had a statistically meaningful impact on take-up. We control for these offers in our analysis of the effectiveness of reminders.

<sup>7</sup>In fact, there were 17 clients who did not comply with the rules and withdrew funds before meeting their goal. Furthermore, 23 clients deposited at least 50% of their goal amount prior to withdrawing all funds, providing some suggestive evidence that some clients who choose commitment devices may later try to un-do the commitment.

<sup>8</sup>A fourth group was randomly assigned to deposit collection service. The deposit collection was not widely used,

of the randomizations.<sup>9</sup>

Clients were also randomly assigned to receive a “late ”text message reminder or not, independently of their assignment to receive a regular reminder. The late text reminder was only sent if the client did not make any deposit in a given month. Similar to the regular text message reminders, late text messages reminders were also randomized to gain or loss frame language. If the client was assigned to receive both a regular text reminder and a late text reminder, then client always received either gain frame for both, or loss frame for both. The text of the reminders is included in Table 1a. Table 2 shows checks on the integrity of the randomization.

#### EXPERIMENT 2: BANK OF ICA, ICA, PERU

In Peru, the Government-owned bank Caja de Ica worked with us to randomize reminders as part of the rollout of a new product called Plan Ahorro (“Saving Plan ”). The bank marketed the product on television and radio, and clients signed up over the course of several months. When opening an account, Plan Ahorro clients selected a goal period (either 6 months or 12 months), a minimum amount to deposit each month, and a goal/account label from 14 pre-established categories (these savings goals appear in Appendix Table 1). Clients were required to make their planned deposit within ten days of each monthly due date in order to comply with their plan. Clients who complied were rewarded with an annualized interest rate of 8% per annum rather than the normal 4% per annum.

As in our other sites, the bank randomly assigned reminders to clients after they signed up for the product. The bank sent letters because low cell phone prevalence made text messages impractical. As in the Philippines, the bank did independent randomizations for “regular ”and “late ”reminders, which were assigned to a gain or a loss frame. The bank also randomly assigned clients to receive a message a reminder message signed by the bank and another group to receive a reminder message signed in an individual’s own hand. Table 1b shows the text of the different reminder letters.

Each month, the bank sent clients assigned to the regular reminder group a letter seven days and thus the bank stopped providing the service. We include controls for individuals who were originally assigned to receive deposit collection.

<sup>9</sup>In the Philippines, we have income data based on individual reports about their income in the past seven days. A wealth index was constructed from a range of survey variables including income, whether the individual owns a home, water source, roof, and whether they have a shared pipe for water.

before the due date for that month’s scheduled deposit. As in the Philippines, clients assigned to the late reminder group got a letter only if they were late (i.e., if they still had not made a deposit three days after their scheduled deposit date).<sup>10</sup>

The bank implemented two additional treatments designed to increase the salience of the client’s specific, labeled savings goal. One treatment randomly assigned some in the reminder group to get a letter that focused on their particular goal (in addition to containing the boilerplate reminder content, see Table 1b). Another treatment independently and randomly assigned the gift clients received upon opening the account: a jigsaw puzzle of their goal, a photo of their goal, or a pen. Those in the jigsaw puzzle group received a piece of the puzzle after each deposit.

### EXPERIMENT 3: ECOFUTURO BANK, BOLIVIA

Ecofuturo, a for-profit bank in Bolivia, worked with us to implement a text message reminder program as part of its established product Ecoaguinaldo. “Aguinaldo” is the year-end bonus, equal to one month’s pay, that employers are required to pay employees in Bolivia. Ecofuturo markets Ecoaguinaldo as a product designed to help its clients, many of whom are self-employed, save up all year for their own year-end payout. The product was marketed for three months between January and March on television and radio. Clients were required to sign up for the product by March 31, and made savings deposits from the time of their enrollment until the December payout/goal date.

At sign-up, clients chose a monthly minimum deposit amount (with a floor of US\$1.41), and the bank offered a set of incentives for making the pledged, minimum monthly deposits. Clients making all of their pledged monthly deposits received a bonus interest rate of 6% for their first ten months following enrollment in the program (compared to a regular interest rate of 3%) as well as free life and accident insurance.<sup>11</sup> Clients missing one deposit, or withdrawing money before the payout date, forfeited the higher interest rate and had their insurance policies canceled.

Clients with a cell phone were randomly assigned to receive text message reminders or not.

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<sup>10</sup>Clients assigned to receive late reminders were randomly assigned to receive their late reminder if (a) they were late for any scheduled deposit, (b) they were late for any of the first four scheduled deposits, and c) they were late for any of the fifth or later scheduled deposits. These timing treatments had imprecisely estimated and statistically insignificant effects on savings.

<sup>11</sup>Ecofuturo paid the monthly premiums of \$0.13 and \$0.32 on policies that paid \$214 in the event of death and \$285 in the event of debilitating injury.

Unlike the other sites, clients did not receive late reminders. The bank began sending reminders to a randomly selected subset of the reminder group in May 2008, and continued with the entire sample from June 2008 through November 2008. In the first two months of the program following May 2008 all of the reminder clients received text message reminders, regardless of whether they had already made a deposit. In the remaining four months of the program, only clients who had not yet made a deposit received a text message reminder.<sup>12</sup>

Clients in the treatment group were further divided into one of four reminder content sub-treatments. Reminders were randomized to mention the insurance incentive or not. Reminders were also independently randomized to gain or loss frames. Table 1c shows the different scripts of the reminders.

### III. Results

#### OVERALL EFFECT OF REMINDERS ON SAVING

The central test of our attention treatment is to use data from all three experiments to identify the effect of getting any reminder.

$$Y_i = \alpha + \beta R_i + \gamma Z_i + \varepsilon_i \quad (1)$$

We measure  $Y$ , savings by client  $i$ , two different ways: the log of (1+the total amount saved in all bank accounts by their goal date),<sup>13</sup> and an indicator for whether the client reached their savings goal.<sup>14</sup> This variable has different meanings across the three experiments: in Bolivia this meant that clients made regularly scheduled deposits, in Peru this meant that clients made deposits within 10 days of scheduled deposit date and in the Philippines this meant that individuals reached their savings goal by the goal date.  $R$  is an indicator that equals 1 if the bank randomly assigned the client to receive any reminder.  $Z$  is a vector of randomization conditions, other treatment assignments, and

<sup>12</sup>In our analysis, these clients are still considered to be in the text message treatment group since they received messages in the first months of the program.

<sup>13</sup>2,592 clients had made no deposits by the end of the study and therefore had zero balances. Our results follow through if we consider identical measures with these individuals excluded. Similar magnitude and statistically significant results occur when we use level deposits with large deposits trimmed.

<sup>14</sup>69 individuals in Peru, 276 individuals in Bolivia and 112 individuals in the Philippines had multiple accounts. Our analysis focuses on the total saved in all accounts. We include controls for the number of accounts that individuals have in all regressions.

country fixed effects. We also provide specifications that show robustness to including  $X$ , a vector of the client's baseline characteristics. We report OLS estimates in the main tables; the results are robust to using probit for the binary measure of saving (see Appendix Table 2). Randomization occurred at the client level. For clients with more than one bank account we sum deposits across all accounts and include a control variable indicating the number of accounts.

Table 3 Panel A presents estimates of equation (1). Clients who received monthly reminders saved 6% more than individuals who did not, with a p-value of 0.101 or 0.082, depending on whether we include client baseline covariates (Columns 1 and 2). Reminders also made clients 3 percentage points more likely to save their targeted amount ("reach savings goal "below) by their goal date. Table 3 Panel B presents results separately for each experiment. We do not find any evidence that reminders have significantly different effects across settings. Nonetheless, these estimates are somewhat imprecise: the confidence intervals do not rule out economically meaningful differences across the three settings.

#### CONTENT VARIATION

Table 4 presents results from variation in the content of messages. Panel A shows that we do not find strong evidence of differential effects of loss vs. gain-framed reminder messages (Panel B) or of client-written vs. bank-written reminders (Panel D).

#### SALIENCE OF BENEFITS OF SAVING

Table 4 Panel C shows that reminders which mentioned the specific expenditure increased savings by an estimated 16% relative to no reminder (Columns 1 and 2), while reminders that did not mention the specific expenditure had no effect. The difference between these two reminder coefficients is significant. In contrast, we do not find significant effects, or a significant difference between the effects, of the two types of reminders on goal attainment (Columns 3 and 4), although the confidence intervals do not rule out economically meaningful effects.

Table 4 Panel D shows that reminders in Bolivia increased savings when they mentioned the account's financial incentive (continued life insurance coverage) statistically significantly more than a standard reminder.

## TIMING VARIATION

In Table 5 we consider treatments that vary the timing of reminder messages. In Panel A we consider the effectiveness of late reminders. We see no evidence that reminders sent after a deposit is late increase the probability of deposits. Individuals are not more likely to meet their savings goals or increase balances when they receive late reminders.

Panel B sheds some light on other salience treatments without the repeated nature of regular message reminders. In addition to reminders, the bank in Peru also randomly and independently assigned clients to a second treatment that was designed to increase the salience of the client's specific future expenditure. Clients in the control group received a pen from the bank, at account opening. Clients in the treatment group randomly received either a photograph of the future expenditure they used to label the account, or a piece of a jigsaw puzzle depicting the future expenditure.<sup>15</sup> Neither of these treatments significantly affected savings. Although these are imprecisely estimated zeros, these treatments were significantly less likely to increase savings than the expenditure-specific reminders.<sup>16</sup> The timing of these treatments differs from the reminders. Clients got photos *at account opening*. Clients got a puzzle piece *after* making a deposit. Clients got reminders *before* making a deposit.

The results presented suggest that both the timing and content of shocks to attention impact their effects on behavior. We discuss some implications for further research in the conclusion.

## ALTERNATIVE EXPLANATIONS

Perhaps reminders impact saving because they are a signal from the bank that saving is important, or that the bank values the client's relationship? The regular communication in the form of a reminder may also have increased clients' trust of the bank. These alternatives to limited attention could explain the main effect of reminders, but not the differential impact of reminders that mention the client's goal. Nor do these alternatives explain why (well-timed) reminders are more effective than gifts like the photo, puzzle, or pen (although naturally these alternative treatments may simply have been ineffective, i.e., perhaps they did not successfully act as a signal or generate higher levels

<sup>15</sup>Most pictures were self-explanatory. When individuals were saving for an "emergency," the picture of their goal was a hospital emergency room. For individuals saving for the goal "other," the picture of their goal was the logo of the "Plan Ahorro" savings account.

<sup>16</sup>The comparison of expenditure specific reminder to puzzle has F-statistic =8.10 and the comparison of the expenditure specific reminder and photo treatment has F-statistic =10.27.

of trust).

Another explanation for the effectiveness of reminders would be a two-part argument: individuals do not have consistently time-inconsistent preferences as traditionally modeled (Laibson 1997; O’Donoghue and Rabin 1999), but are rather stochastically quasi-hyperbolic, with reminders reducing present-bias in a given time period. This mechanism is not so different from our model here, where the reminder operates on expectations rather than preferences. Empirically, we do not see any evidence that reminders are more effective when individuals make time inconsistent hypothetical choices in a baseline survey.

Lastly, Soman and Zhao (2011) argue that savings messages are more effective when they trigger an implementation mindset instead of a deliberative mindset. It could be that incentives focusing on specific goals and those focusing on incentives to save were effective because they encouraged individuals to take action. However, we find that an implementation mindset is not enough to trigger increased savings rates. We conclude instead that the most motivating messages were those that focused on the benefits to saving.

#### HETEROGENEITY IN THE EFFECTIVENESS OF REMINDERS

Models based on time-inconsistent preferences do not generally predict that reminders to save will affect behavior. Yet empirically, measures of time-inconsistency are strongly correlated with more discretionary borrowing (Meier and Sprenger 2010) and less saving (Ashraf, Karlan and Yin 2006b). A common method for measuring time-inconsistency is to give individuals multiple hypothetical choices between a smaller payoff at time  $t$  and a larger payoff at time  $t+1$ , where the choices vary  $t$  (e.g.,  $t$  might be “today” in one choice, and “six months from now” in another choice). When the same individual prefers the smaller payoff when  $t = \text{today}$ , but prefers the larger payoff when  $t$  is sometime in the future, we say that person is time-inconsistent. But if individuals are credit constrained, such time-inconsistency may be borne of limited attention rather than unstable preferences. That is, individuals may be more prefer immediate payoffs to satisfy current credit constraints, while preferring larger future payoffs because of inattention to future credit constraints. Our entire sample is plausibly credit constrained, so we test this prediction by simply estimating the interaction between

reminders and a measure of time-inconsistency obtained in the Philippines baseline survey. Table 6 shows that we see no difference in the response to reminders among a sub-sample of individuals who appear inconsistent.

#### COST EFFECTIVENESS OF REMINDERS

The variable cost of sending direct mail reminders is nontrivial (almost a dollar in the Peru context). Given our estimated treatment effect (a 6% increase in bank balances) and the small average balances (\$100 or less), mailing reminders is not cost-effective for banks under reasonable assumptions about rates of return on deposited funds. Indeed the one bank here that experimented with mailing reminders discontinued them after the study. However, sending reminders by text message has near zero marginal cost. And indeed Ecofuturo in Bolivia has continued sending the reminders. Direct mail costs and the recent emergence of low-cost text messaging may help explain why most banks have not (yet) offered reminders to save.

#### IV. Model

In order to provide intuition for how reminders might generate increases in savings, we consider a model of limited attention in the context of lifetime consumption. We model individual consumption over a finite horizon period with  $3 \leq T < \infty$ . In each period, individuals receive constant income  $y$ . We assume for simplicity that individuals do not discount the future so that the discount rate  $\delta = 1$ .

Individuals derive utility from consumption and from discrete (“lumpy”) expenditure opportunities. The utility from consumption spending is represented by the function  $u$  which is increasing and concave in consumption. Individuals face one expenditure opportunity in every period. Lumpy expenditure opportunities differ in terms of their composition in each time period (e.g., medical one period, car registration the next), but always have a unit cost of 1. So “forecasting” a lumpy expenditure opportunity is equivalent to “remembering” that one will arise. Individuals who make the lumpy expenditure receive additive utility  $\bar{u}$ . The purchase decision is represented by the binary variable  $x_t$ , where  $x_t = 1$  if individuals buy and  $x_t = 0$  otherwise.

To maximize lifetime utility, individuals choose current period consumption  $c_t$  and whether to

make the lumpy expenditure  $x_t$ .

$$\sum_{t=1}^T (u(c_t) + x_t \bar{u})$$

subject to:

$$w_{t+1} = w_t + y - c_t - x_t \text{ for all } t$$

$$w_1 = 0 \text{ and } w_{T+1} = 0$$

where  $w_t$  represents the wealth at the start of a period. We assume that individuals start and end with zero wealth. Individuals may save or borrow, and borrowed money must be repaid by life's end. For simplicity, we assume that there is no interest charged on loans or earned on savings.

#### FULL ATTENTION BENCHMARK

Fully “attentive” individuals correctly forecast all future expenditure opportunities from the first period, and, given concavity with respect to consumption, will optimize by smoothing:  $c_t = c^*$  in all periods. Backward induction provides the intuition that consumption in each period will be a function of the number of number of expenditures financed.

$$c = y - \left( \sum_{t=1}^T x_t \right) / T$$

Let us denote  $k_t = \sum_{\tau=t+1}^T x_\tau$  as the total number of future expenditures to be financed after  $t$ . In the first period, individuals will optimally chose to satisfy  $k_1^* + x_1^*$  lifetime expenditures such that:

$$u' \left( y - \frac{k_1^* + x_1^*}{T} \right) \leq \bar{u} < u' \left( y - \frac{(k_1^* + x_1^* + 1)}{T} \right)$$

That is, individuals will finance expenditures until they are indifferent between the utility from financing an additional expenditure and the marginal utility from consumption (assuming individuals are not constrained by their lifetime income constraint  $k_1^* + x_1^* \leq Ty$ ). Perfectly attentive individuals will smooth their consumption by consuming  $c_t = y - \frac{k_1^* + x_1^*}{T}$  in each period. For fully attentive

individuals, consumption and savings plans will never deviate from the optimal plan made in the first period.

#### INATTENTION TO FUTURE EXPENDITURES

In practice, individuals may not be fully attentive to all lumpy expenditure opportunities. We assume that inattentive individuals attend perfectly to consumption and current period lumpy expenditure opportunities, but only attend to future lumpy expenditure opportunities with some probability  $\theta \in [0, 1)$ .

Inattentive individuals then choose their current period consumption  $c_t$  and whether to satisfy current period expenditure  $x_t$  in order maximize their lifetime utility, as perceived in that time period (i.e., considering only those lumpy expenditures they take into account in the current period).

$$u(c_t) + x_t \bar{u} + \sum_{\tau=t+1}^T (\theta [u(c_\tau) + x_\tau \bar{u}] + (1 - \theta)u(c_\tau))$$

subject to:

$$\begin{aligned} w_{t+1} &= w_t + y - c_t - x_t \text{ for all } t \\ w_0 &= 0 \text{ and } w_{T+1} = 0 \end{aligned}$$

We assume that individuals are unaware of their inattention to expenditures: people believe they are optimizing utility as they would in the rational model, but they actually underforecast the number of lumpy expenditure opportunities. While not all individuals will be fully naive about their inattention, our model provides a framework for considering those individuals who are either unaware of their inattention, overly optimistic about their ability to perfectly forecast, or otherwise unable to provide themselves with reminders as (cost-)effectively as a third-party could.

Inattentive individuals reoptimize their savings plan in every period depending on the realization of  $\tilde{K}_t$  which is a random variable representing the number of future expenditures an individual attends to in period  $t$ .  $\tilde{K}_t$  has expected value  $E(\tilde{K}_t) = \theta(T - t)$ . Instead of saving the same fixed amount in each period, individuals will consider both their current period wealth and the set of

future expenditures they attend to when choosing consumption. Because individuals may forecast a different number of future expenditures in every period, they must recalibrate their savings plan as they are faced with unexpected expenditures. In doing this, individuals will either forgo some lumpy expenditures (illustrated in example 1) or curtail consumption (illustrated in example 2), depending on how much utility individuals get from each lumpy expenditure ( $\bar{u}$ ).

As with fully attentive individuals, concave utility implies that inattentive individuals will plan to smooth consumption so that  $\tilde{c}_t^* = \tilde{c}_\tau^*$  for all  $t, \tau$ . By backward induction, we can see that consumption for the inattentive individual will be:

$$\tilde{c}_t = y + \left[ \tilde{w}_t - \tilde{x}_t - \theta \left( \sum_{\tau=t+1}^T \tilde{x}_\tau \right) \right] / (T - t + 1)$$

Let us denote the number of future expenditures an individual plans to purchase in period  $t$  as:

$$\tilde{k}_t = \theta \sum_{\tau=t+1}^T \tilde{x}_\tau. \text{ Individuals will choose whether to purchase the current expenditure } (\tilde{x}_t^*) \text{ and plan}$$

to purchase future expenditures ( $\tilde{k}_t^* = \theta \sum_{\tau=t+1}^T \tilde{x}_\tau^*$ ):

$$u' \left( y + \frac{\tilde{w}_t - (\tilde{k}_t^* + \tilde{x}_t^*)}{T - t + 1} \right) \leq \bar{u} < u' \left( y + \frac{\tilde{w}_t - (\tilde{k}_t^* + \tilde{x}_t^* + 1)}{T - t + 1} \right)$$

Provided they are not constrained by their lifetime budget constraint in period  $t$  ( $\tilde{w}_t + \tilde{k}_t^* + \tilde{x}_t^* \leq [T - t + 1]y$ ), individuals will finance expenditures until they are indifferent between the utility from financing an additional expenditure and the marginal utility from consumption.<sup>17</sup>

## SAVINGS AND INATTENTION

The inattentive consumer's savings in period  $t$  is:

$$\tilde{s}_t^* = \frac{\tilde{k}_t^* + \tilde{x}_t^*}{T - t + 1} - \tilde{x}_t^*$$

We can now compare expected savings for inattentive and attentive individuals. Individuals can

<sup>17</sup>When individuals are budget constrained they will plan to finance fewer expenditures than  $k_t^*$  and the intuition of our main result remains the same. While the model is agnostic about *when* expenditures will be financed, we make the assumption that as long as individuals still gain positive marginal utility from financing expenditures, they will finance expenditures happening in the current period first. That is, as long as  $k_t^* + \tilde{x}_t^* \geq 1$ ,  $\tilde{x}_t^* = 1$ .

only plan to purchase weakly less than the future expenditures they foresee:  $\tilde{k}_t^* \leq \tilde{K}_t$ . Recall that in our full attention benchmark, the consumer simply spends her income in each period, for a constant savings rate of zero. In contrast the inattentive consumer borrows in some period(s):

$$E(\tilde{s}_t^*) = \frac{E(\tilde{k}_t^*) + x_t^*}{T - t + 1} - x_t^* \leq \frac{[\theta(T - t) + 1]}{T - t + 1} - 1 < 0 = s_t^* \quad (2)$$

So the inattentive consumer has a negative expected savings rate that is lower than the full-attention consumer's.

For simplicity, we have assumed that expenditures occur with certainty. Our model would easily generalize to allow for uncertain expenditures, provided that the subjective probability that an expenditure will appear in an individual's forecast of future expenditures is always lower than the objective probability that an expenditure will occur. However, if expenditures are sufficiently uncertain, it could be that individuals actually subjectively overforecast expenditures. Therefore, our model and predictions best apply to individuals saving for predictable expenditures. Evidence suggests that individuals undersave and overborrow even when facing predictable expenditures (Ananth, Karlan, Mullainathan 2007). For example, Choi, Laibson, Madrian and Metrick (2004) present survey evidence suggesting that two-thirds of individuals feel that they undersave for the predictable expenditure of retirement.

#### EXAMPLE

Consider an example in three periods,  $T = 3$ . Suppose that fully attentive individuals prefer to finance all 3 expenditures. That is, suppose that

$$3u(y - 1) + 3\bar{u} > 3u\left(y - \frac{2}{3}\right) + 2\bar{u}$$

Now suppose that an inattentive consumer fails to attend to just one lumpy expenditure occurring in the future. Because she (incorrectly) forecasts only 2 total expenditures, she borrows to finance part of the expenditure she faces in period 1. In period 2, when faced with an unplanned expenditure, she realizes her mistake. The inattentive consumer then has two options: she can either cut consumption to finance all 3 expenditures or she can forgo one expenditure. She will finance an unexpected

expenditure if and only if financing the expenditure affords greater utility than maintaining higher consumption. That is, she will finance the expenditure if and only if:

$$u\left(y - \frac{2}{3}\right) + 2u\left(y - \frac{7}{6}\right) + 3\bar{u} > 3u\left(y - \frac{2}{3}\right) + 2\bar{u}$$

Otherwise, she will forgo the unexpected expenditure and maintain consumption. Inattention in the first period ultimately reduces lifetime utility, whether because of lower consumption or through purchasing fewer total lumpy expenditures.

In models of costly self-control, present-biased preferences imply that today's self has a relatively low but true valuation of future consumption compared to future selves. In our model, today's self has a relatively low valuation of future consumption that is mistaken because of the failure to forecast future lumpy expenditure opportunities. As in a self-control, our model predicts that inattentive individuals will undersave or overborrow. Our model also generates the following distinct predictions.

#### REMINDERS

In models with costly self-control, individuals decide to consume more in the current period while fully accounting for all future expenditures. Time-inconsistency arises from changing valuations, not from changing perceptions of the opportunity set. Hence reminders should have no impact on consumption decisions: people do not forget! In contrast, if time-inconsistency arises from under-forecasting future needs, reminders can increase savings.

We model reminders as an exogenous increase in the probability that individuals attend to future lumpy expenditure opportunities:  $\theta_r > \theta_{nr}$ . In turn reminders affect the expected number of future expenditure opportunities attended to in a current period:

$$E_{nr}(\tilde{K}_t) = \theta_{nr}(T - t)$$

$$E_r(\tilde{K}_t) = \theta_r(T - t)$$

with  $E_r(\tilde{K}_t) > E_{nr}(\tilde{K}_t)$ . As before, individuals only plan to purchase lumpy expenditures they

foresee, and the optimal number of planned expenditures in future periods will be less than or equal to the number of expenditures attended to:  $\tilde{k}_t^* \leq \tilde{K}_t$ . Therefore the expected number of expenditures an individual plans to satisfy is higher in the presence of reminders:  $E_r(\tilde{k}_t^*) > E_{nr}(\tilde{k}_t^*)$ . From equation (1) we can then see that expected savings will be increasing in  $\theta$ , and hence higher after a reminder is introduced:  $E_r(\tilde{s}_t^*) > E_{nr}(\tilde{s}_t^*)$ .

Note that models of temptation would only make the prediction that reminders increase savings rates under the additional assumption that reminders affect preferences or the cost of self-control. Although this might be a natural assumption to make for reminders or other exogenous, Pavlovian stimuli for *current consumption* (Laibson 2001), there is little if any psychological or neurological evidence that such stimuli can change the marginal utility of *saving* (or future consumption).

## V. Conclusion

We provide evidence that limited attention places a role in savings behavior. We tested the effect of reminders on savings in field experiments with three banks in Peru, Bolivia and the Philippines. We find that reminders increase savings balance as well as the probability of meeting savings goals. We develop a simple model which illustrates how limited attention can lead to under-savings and reminders could increase savings rates. The model generates several phenomena that overlap with other behavioral models, including low or negative savings rates, mental accounting, and sticky defaults. Our model also makes the unique predictions that reminders to save will increase savings, which is not predicted by models of self control. We also provide evidence about the kinds of messages that are effective. We find that some content variation (gain-loss frames, late messages and sending a message from the bank or from yourself) have no impact on the effectiveness of reminders. However, messages that increase the salience of the benefits of saving: mentioning a specific savings goals or incentives for saving, are especially effective in increasing savings rates. While the fact that reminders which mention a specific savings expenditure are especially motivating is consistent with our model of imperfect forecasting, the fact that reminders which mention a savings incentive are also especially effective suggests a broader role for how reminders increase the salience of savings.

One key question going forward is the relationship between present-biased attention and present-

biased preferences. Are both biases prevalent, and correlated with each other? Or does one dominate decision making (in certain domains)? Our results open up the possibility that phenomena attributed to unstable time preference may in fact be due to limited attention, but more work is needed to address this possibility rigorously.

A closely related issue is measuring a broader set of outcomes that might be affected by interventions designed to correct limited attention. If limited attention takes particular forms, or if consumers have additional behavioral biases, then attention-getting treatments could have countervailing and even perverse effects. Reminders from one bank may crowd-out savings in other instruments, or even induce (expensive) borrowing to offset lost consumption, thereby reducing savings on net.

Understanding the market for attention is critical. For example, only one of the banks that implemented reminders in this study has continued reminding its clients to save. Might the market under-supply reminders, particularly if consumers are naive about their limited attention? Do lenders exploit attentional failures by providing financing “on-demand,” that is tied to specific expenditures (as is common in durables financing), and comes with built-in reminders (e.g., required monthly payments)?

Deriving the optimal content and timing of attention treatments also offers rich possibilities for future work. Our results hint that reminders are most effective when they focus on the *benefits* of savings (e.g. an incentive for saving or the goal achieved if enough savings is accumulated). But our results suggests that other content variations do not move behavior. Differences in framing, the source of messages and the timing of messages had no statistically significant impact on the role reminders played in increasing savings.

The interaction between different types of limited attention is another important line of inquiry. Our model focuses on inattention to future expenditure opportunities and assumes that individuals attend perfectly to income. If individuals are also inattentive to income, this could mitigate the welfare losses we have identified here. Indeed some individuals may actually cultivate some inattention to their income as a way to save more. For example, individuals may set up automatic savings deposits, or take fewer tax exemptions than permitted, as a means of decreasing the amount of disposable income that is salient.

We also speculate that the frequency and source of attention shocks plays an important role. Attention may interact with habit formation; e.g., if reminders to save induce consumers to adopt pro-savings routines. Conversely, some consumers may eventually “tune out” repeated reminders.

These dynamics suggest that reminders or other attention shocks may be particularly effective when they focus on inducing a one-time change with “sticky” consequences (e.g., 401k enrollment, fertilizer prepayment, or automatic payment of annual car registration fees). Ultimately, the welfare implications of limited attention depend not only on how a consumer responds to a given attention shock, but on how shocks are generated (endogenously) and interact. It should be fruitful to build bridges between models of limited attention individuals and models where firms (and other agents) compete for consumer attention.

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Table 1a: Message Treatments

| Philippines    |             |  |
|----------------|-------------|--|
| Timing         | Frame       | Message  |
| <i>Regular</i> | <i>Gain</i> | Frequent deposit into the Gihandom Savings account will make your dream come true. A reminder from 1st Valley Bank.  |
|                | <i>Loss</i> | If you don't frequently deposit into the Gihandom Savings account, your dream will not come true. A reminder from 1st Valley Bank                              |
| <i>Late</i>    | <i>Gain</i> | You didn't deposit in the 1st Valley Gihandom account for 30 days. Don't forget to deposit, so you can reach your savings goal, make your dream come true!     |
|                | <i>Loss</i> | You didn't deposit in the 1st Valley Gihandom account for 30 days. If you forget to deposit, you cannot reach your savings goal and make your dream come true. |

Table 1b: Message Treatments

| Peru           |   |                                      |             |  |
|----------------|---|--------------------------------------|-------------|--|
| Timing         | Message   | Focus                                | Frame       | Message  |
| <i>Regular</i> | We would like to remind you that your next Plan Ahorro deposit should be made on [Date].  | <i>Standard Reminder</i>             | <i>Gain</i> | <i>Regular</i> + If you make all of your deposits, you will receive a total of [Amount] in additional interest rate incentive!   |
|                |   |                                      | <i>Loss</i> | <i>Regular</i> + If you miss a payment, you will lose a total of [Amount] in additional interest rate incentive!   |
|                |   | <i>Specific Expenditure Reminder</i> | <i>Gain</i> | <i>Regular</i> + If you make all of your deposits, you will receive a total of [Amount] in additional interest rate incentive that you will be able to use to reach your savings goal of [Goal]! |
|                |   |                                      | <i>Loss</i> | <i>Regular</i> + If you miss a payment, you will lose a total of [Amount] in additional interest rate incentive that you will be able to use to reach your savings goal of [Goal]!               |
| <i>Late</i>    | We would like to remind you that your Plan Ahorro deposit should have be made on [Date]. If you wish to continue in Plan Ahorro you should make your deposit as soon as possible. | <i>Standard Reminder</i>             | <i>Gain</i> | <i>Late</i> + If you make all of your deposits, you will receive a total of [Amount] in additional interest rate incentive!  |
|                |   |                                      | <i>Loss</i> | <i>Late</i> + If you miss a payment, you will lose a total of [Amount] in additional interest rate incentive!  |
|                |   | <i>Specific Expenditure Reminder</i> | <i>Gain</i> | <i>Late</i> + If you make all of your deposits, you will receive a total of [Amount] in additional interest rate incentive that you will be able to use to reach your savings goal of [Goal]!    |
|                |   |                                      | <i>Loss</i> | <i>Late</i> + If you miss a payment, you will lose a total of [Amount] in additional interest rate incentive that you will be able to use to reach your savings goal of [Goal]!                  |

Table 1c: Message Treatments

| Bolivia                   |             |  |
|---------------------------|-------------|--|
| Focus                     | Frame       | Message  |
| <i>Incentive Reminder</i> | <i>Gain</i> | Ecofuturo reminds you: Maintain your Ecoaguinaldo life insurance! Don't forget your deposit this month! You will keep your insurance by making all of your deposits on time.                 |
|                           | <i>Loss</i> | Ecofuturo reminds you: Don't lose your Ecoaguinaldo life insurance! Don't forget your deposit this month! You will lose your insurance if you don't make all your deposits on time.          |
| <i>Reminder</i>           | <i>Gain</i> | Ecofuturo reminds you: Your Ecoaguinaldo is within reach! Don't forget your deposit this month! You will be one step closer to your savings goal.  |
|                           | <i>Loss</i> | Ecofuturo reminds you: Don't fail to reach your Ecoaguinaldo! Don't forget you deposit this month! If you don't make your deposit you increase the chance of not reaching your savings goal. |

Table 2: Summary Statistics from Baseline Survey and Orthogonality Verifier

|  | Pooled Sample       |       |   |  | Peru |       |   |  | Bolivia            |      |   |  | Philippines |     |   |  |
|--|---------------------|-------|---|--|------|-------|---|--|--------------------|------|---|--|-------------|-----|---|--|
|  | Mean                | Obs   | P-value from regression of characteristic on treatments | F-Test from regression of characteristic on treatments | Mean | Obs   | P-value from regression of characteristic on treatments | F-Test from regression of characteristic on treatments | Mean               | Obs  | P-value from regression of characteristic on treatments | F-Test from regression of characteristic on treatments | Mean        | Obs | P-value from regression of characteristic on treatments | F-Test from regression of characteristic on treatments |
| Panel A: Demographic Characteristics         |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Female, Proportion                           | 0.642<br>(0.479)    | 14006 | 0.592   | 0.708<br>(0.455)                                       | 2835 | 0.928 | 0.594<br>(0.491)  | 9650   | 0.826<br>(0.379)   | 1521 | 0.069   |  |             |     |   |  |
| Age  | 34.775<br>(12.257)  | 13827 | 0.643   | 38.201<br>(13.709)                                     | 2657 | 0.449 | 34.191<br>(11.929)                                      | 9652   | 32.491<br>(10.337) | 1518 | 0.823   |  |             |     |   |  |
| Completed High School, Proportion            | 0.436<br>(0.496)    | 14016 | 0.082   | 0.752<br>(0.432)                                       | 2844 | 0.025 | 0.305<br>(0.460)  | 9652   | 0.674<br>(0.469)   | 1520 | 0.957   |  |             |     |   |  |
| Wealthy                                      | 0.721<br>(0.448)    | 4365  | 0.567   | 0.693<br>(0.461)                                       | 2844 | 0.564 |   |  | 0.773<br>(0.419)   | 1521 | 0.876   |  |             |     |   |  |
| Married, Proportion                          | 0.207<br>(0.405)    | 11159 | 0.994   |  |      |       | 0.140<br>(0.347)  | 9638   | 0.633<br>(0.482)   | 1521 | 0.996   |  |             |     |   |  |
| Has Saved Formally Before                    | 0.195<br>(0.396)    | 11173 | 0.816   |  |      |       | 0.154<br>(0.361)  | 9652   | 0.454<br>(0.498)   | 1521 | 0.288   |  |             |     |   |  |
| Weekly Income                                | 37.645<br>(55.842)  | 1521  | 0.286   |  |      |       |   |  | 37.645<br>(55.842) | 1521 | 0.286   |  |             |     |   |  |
| Hyperbolic Discounting = 1                   | 0.158<br>(0.365)    | 1521  | 0.763   |  |      |       |   |  | 0.158<br>(0.365)   | 1521 | 0.763   |  |             |     |   |  |
| Did Not Save As Much As I Want = 1           | 0.728<br>(0.445)    | 1480  | 0.848   |  |      |       |   |  | 0.728<br>(0.445)   | 1480 | 0.848   |  |             |     |   |  |
| Spent Before I Saved = 1                     | 0.251<br>(0.434)    | 1480  | 0.374   |  |      |       |   |  | 0.251<br>(0.434)   | 1480 | 0.374   |  |             |     |   |  |
| Panel B: Marketing Offers (Philippines Only) |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Low Interest Rate                            |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| High Interest Rate                           |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Reward Interest Rate                         |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Single Account                               |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Joint Account                                |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Joint/Single Account                         |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Deposit Collection                           |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Panel C: Savings Balance                     |                     |       |   |  |      |       |   |  |                    |      |   |  |             |     |   |  |
| Amount Saved by Goal Date                    | 86.751<br>(197.877) | 14017 | 0.314   | 105.915<br>(193.580)                                   | 2844 | 0.354 | 90.205<br>(210.974)                                     | 9652   | 29.000<br>(65.217) | 1521 | 0.731   |  |             |     |   |  |

Table 3: Effect of Any Reminder, by country

|  | Log (Amount saved by Goal Date+1) |                   | Reached Savings Goal By Goal Date |                     |
|--|-----------------------------------|-------------------|-----------------------------------|---------------------|
| Panel A: Pooled Sample   |                                   |                   |                                   |                     |
| Pooled Sample  | 0.060<br>(0.036)                  | 0.062*<br>(0.036) | 0.031***<br>(0.009)               | 0.031***<br>(0.009) |
| Baseline Controls  | No                                | Yes               | No                                | Yes                 |
| Mean of Dep Var  | 3.535                             | 3.535             | 0.551                             | 0.551               |
| N  | 14017                             | 14017             | 14017                             | 14017               |
| Panel B: Countries   |                                   |                   |                                   |                     |
| Peru (n = 2,968)   | 0.030<br>(0.059)                  | 0.021<br>(0.060)  | 0.034<br>(0.027)                  | 0.030<br>(0.027)    |
| Bolivia (n = 9,652)  | 0.060<br>(0.042)                  | 0.060<br>(0.041)  | 0.032***<br>(0.010)               | 0.032***<br>(0.010) |
| Philippines (n = 1,547)  | 0.095<br>(0.107)                  | 0.136<br>(0.106)  | 0.015<br>(0.028)                  | 0.021<br>(0.028)    |
| Baseline Controls  | No                                | Yes               | No                                | Yes                 |
| Mean of Dep Var  | 3.535                             | 3.535             | 0.551                             | 0.551               |
| N  | 14017                             | 14017             | 14017                             | 14017               |
| P-value from f-test of joint significance of country-level reminder effect | 0.380                             | 0.273             | 0.008                             | 0.006               |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01. Huber-White standard errors in parentheses. Reminder messages sent by text message in Bolivia and Philippines. Reminder message sent by mail in Peru. All regressions include controls for marketing offers in the Philippines (interest rate, joint/single account, deposit collection), number of accounts per individual and country fixed effects. Baseline controls include the full set household demographics listed in Table 1 as control variables.

Table 4: Role Played by Content

|   | Log (Amount saved by<br>Goal Date+1) | Log (Amount saved by<br>Goal Date+1) | Reached Savings Goal<br>By Goal Date | Reached Savings Goal<br>By Goal Date |
|---|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| <b>Panel A: Loss vs. Gain</b>                               |                                      |                                      |                                      |                                      |
| Gain-Framed Reminder  | 0.04<br>(0.041)                      | 0.045<br>(0.040)                     | 0.024**<br>(0.010)                   | 0.024**<br>(0.010)                   |
| Loss-Framed Reminder  | 0.042<br>(0.041)                     | 0.037<br>(0.039)                     | 0.015<br>(0.011)                     | 0.015<br>(0.011)                     |
| P-value test of Gain = Loss                                 | 0.98                                 | 0.63                                 | 0.91                                 | 0.63                                 |
| Baseline Controls   | No                                   | Yes                                  | No                                   | Yes                                  |
| Mean of Dependent Variable                                  | 3.535                                | 3.535                                | 0.551                                | 0.551                                |
| N   | 14017                                | 14017                                | 14017                                | 14017                                |
| <b>Panel B: Client Written vs. Bank Written (Peru only)</b> |                                      |                                      |                                      |                                      |
| Bank Written Reminder                                       | 0.048<br>(0.061)                     | 0.045<br>(0.061)                     | 0.03<br>(0.028)                      | 0.048<br>(0.037)                     |
| Client Written Reminder                                     | -0.034<br>(0.041)                    | -0.037<br>(0.041)                    | 0.018<br>(0.020)                     | 0.013<br>(0.021)                     |
| P-value test of Bank = Client                               | 0.31                                 | 0.74                                 | 0.30                                 | 0.76                                 |
| Baseline Controls   | No                                   | Yes                                  | No                                   | Yes                                  |
| Mean of Dependent Variable                                  | 4.115                                | 4.115                                | 0.688                                | 0.688                                |
| N   | 2884                                 | 2884                                 | 2884                                 | 2884                                 |
| <b>Panel C: Specific Expenditure Focused (Peru Only)</b>    |                                      |                                      |                                      |                                      |
| Standard Reminder   | -0.006<br>(0.059)                    | -0.009<br>(0.061)                    | 0.028<br>(0.028)                     | 0.026<br>(0.028)                     |
| Specific Expenditure Focused Reminder                       | 0.160***<br>(0.042)                  | 0.157***<br>(0.042)                  | 0.025<br>(0.020)                     | 0.026<br>(0.020)                     |
| P-value test of Standard = Specific                         | 0.04                                 | 0.04                                 | 0.94                                 | 0.99                                 |
| Baseline Controls   | No                                   | Yes                                  | No                                   | Yes                                  |
| Mean of Dependent Variable                                  | 4.115                                | 4.115                                | 0.688                                | 0.688                                |
| N   | 2884                                 | 2884                                 | 2884                                 | 2884                                 |
| <b>Panel D: Incentive Reminder (Bolivia only)</b>           |                                      |                                      |                                      |                                      |
| Standard Reminder   | 0.011<br>(0.052)                     | 0.009<br>(0.051)                     | 0.012<br>(0.012)                     | 0.012<br>(0.012)                     |
| Incentive Reminder  | 0.097<br>(0.059)                     | 0.105*<br>(0.057)                    | 0.040***<br>(0.014)                  | 0.041***<br>(0.014)                  |
| P-value test of Standard = Incentive                        | 0.39                                 | 0.24                                 | 0.32                                 | 0.21                                 |
| Baseline Controls   | No                                   | Yes                                  | No                                   | Yes                                  |
| Mean of Dependent Variable                                  | 3.006                                | 3.006                                | 0.564                                | 0.564                                |
| N   | 9652                                 | 9652                                 | 9652                                 | 9652                                 |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01. Huber-White standard errors in parentheses. Reminder messages sent by text message in Bolivia and Philippines. Reminder message sent by mail in Peru. All regressions include controls for marketing offers in the Philippines (interest rate, joint/single account, deposit collection), number of accounts per individual, and country fixed effects. Omitted variable in all regressions is "no reminder."

Table 5: Role Played by Timing

|  | Log (Amount saved by Goal Date+1) |                   | Reached Savings Goal By Goal Date |                   |
|--|-----------------------------------|-------------------|-----------------------------------|-------------------|
| <b>Panel A: Late vs. Regular (excluding Bolivia)</b> |                                   |                   |                                   |                   |
| Regular Reminder                                     | 0.066<br>(0.068)                  | 0.08<br>(0.068)   | 0.031<br>(0.022)                  | 0.034<br>(0.022)  |
| Interaction: Any Reminder * Late                     | -0.016<br>(0.053)                 | -0.023<br>(0.053) | -0.01<br>(0.023)                  | -0.016<br>(0.023) |
| Baseline Controls                                    | No                                | Yes               | No                                | Yes               |
| Mean of Dependent Variable                           | 4.704                             | 4.704             | 0.523                             | 0.523             |
| N  | 4365                              | 4365              | 4365                              | 4365              |
| <b>Panel B: Salience Gifts (Peru Only)</b>           |                                   |                   |                                   |                   |
| Puzzle of Goal                                       | -0.028<br>(0.043)                 | -0.008<br>(0.047) | 0.008<br>(0.021)                  | 0.009<br>(0.021)  |
| Photo of Goal  | -0.017<br>(0.047)                 | -0.021<br>(0.047) | 0.003<br>(0.023)                  | -0.003<br>(0.022) |
| Baseline Controls                                    | No                                | Yes               | No                                | Yes               |
| Mean of Dependent Variable                           | 4.115                             | 4.115             | 0.688                             | 0.688             |
| N  | 2884                              | 2884              | 2884                              | 2884              |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01. Huber-White standard errors in parentheses. Reminder messages sent by text message in Bolivia and Philippines. Reminder message sent by mail in Peru. All regressions include controls for number of accounts per individual, and country fixed effects (when relevant). Omitted variable in Panel A is "no reminder." Omitted variable in Panel B is receiving a pen.

Table 6: Heterogeneity of Treatment Effect

|  | Log (Amount saved by Goal Date+1) |                  | Reached Savings Goal By Goal Date |                   |
|--|-----------------------------------|------------------|-----------------------------------|-------------------|
| Panel A: "Hyperbolic Inattentive" (Philippines only) |                                   |                  |                                   |                   |
| Any Reminder Message                                 | 0.095<br>(0.107)                  | 0.086<br>(0.115) | 0.125<br>(0.108)                  | 0.099<br>(0.117)  |
| Hyperbolic Inattentive                               |                                   | -0.25<br>(0.236) |                                   | -0.218<br>(0.250) |
| Interaction: Any Reminder * "Hyperbolic/Inattentive" |                                   | 0.099<br>(0.269) | 0.184<br>(0.281)                  | 0.087<br>(0.070)  |
| Baseline Controls                                    | No                                | No               | Yes                               | No                |
| Mean of Dependent Variable                           | 5.805                             | 5.805            | 5.805                             | 5.805             |
| N  | 1521                              | 1521             | 1521                              | 1521              |
|  |                                   |                  | 0.015<br>(0.028)                  | 0.003<br>(0.030)  |
|  |                                   |                  |                                   | -0.078<br>(0.062) |
|  |                                   |                  |                                   | 0.021<br>(0.028)  |
|  |                                   |                  |                                   | 0.008<br>(0.030)  |
|  |                                   |                  |                                   | -0.062<br>(0.066) |
|  |                                   |                  |                                   | 0.099<br>(0.073)  |
|  |                                   |                  | No                                | Yes               |
|  | 5.805                             | 5.805            | 0.214                             | 0.214             |
|  | 1521                              | 1521             | 1521                              | 1521              |

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01. Huber-White standard errors in parentheses. Reminder messages sent by text message in Bolivia and Philippines. Reminder message sent by mail in Peru. All regressions include controls for marketing offers in the Philippines (interest rate, joint/single account, deposit collection), number of accounts per individual, and country fixed effects. Omitted variable in all regressions is "no reminder."

Appendix Table 1: Savings Expenditures in Peru

| Savings Goal                    | Frequency | Percentage of Sample |
|---------------------------------|-----------|----------------------|
| 1. Purchase equipment and tools | 15        | 0.51                 |
| 2. Buy merchandise              | 19        | 0.64                 |
| 3. Purchase a moto taxi         | 21        | 0.71                 |
| 4. Purchase land                | 31        | 1.04                 |
| 5. Purchase vehicle(s)          | 22        | 0.74                 |
| 6. Purchase housing             | 45        | 1.52                 |
| 7. Education                    | 458       | 15.43                |
| 8. Emergency/Contingency        | 1294      | 43.60                |
| 9. Purchase household equipment | 105       | 3.54                 |
| 10. Social and family events    | 78        | 2.63                 |
| 11. Starting a business         | 97        | 3.27                 |
| 12. Improve business            | 27        | 0.91                 |
| 13. Improve housing             | 101       | 3.40                 |
| 14. Other                       | 655       | 22.07                |