



## Regular Article

Better strategies for saving more: Evidence from three interventions in Chile<sup>☆</sup>Abhijit Banerjee<sup>a</sup>, Martínez A. Claudia<sup>b,c</sup>, Esteban Puentes<sup>d,\*</sup><sup>a</sup> MIT, Cambridge, MA, USA<sup>b</sup> Instituto de Economía, Pontificia Universidad Católica de Chile, Chile<sup>c</sup> Inter-American Development Bank and JPAL, USA<sup>d</sup> Departamento de Economía, Universidad de Chile, Chile

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## ABSTRACT

Individual behavioral biases can affect savings behavior. We conduct an experiment to evaluate different strategies to increase savings. We compare an automatic savings plan (or default rule), monthly reminders, and a rule-of-thumb savings package that appeals to careful spending. We find that rule-of-thumb and default rules can increase savings for one year after the intervention. In contrast, reminders can reduce account balances and debt levels. The increase in savings under the default rule is produced by a (mechanical) increase in deposits, but savings is later decreased by an increase in withdrawals.

## 1. Introduction

Despite enthusiasm in the policy community for promoting formal savings among the poor, the evidence on instruments to increase savings is not entirely encouraging. Three facts stand out from recent impact evaluations of savings interventions. First, low-income households sometimes save a large fraction of their earnings. Table A1 in Annex 1 reports average savings rates from a subset of experiments for which the data are available. The total stock of savings is more than double the savers' monthly income in several of the studies and more than 35% of their monthly income in most of them. Second, despite these findings, treatment effects from savings-promotion interventions tend to be small: Bachas et al. (2021) review the magnitude of the treatment effects for many of these interventions and conclude that none of them increase the stock of savings by more than 2% of annual income, on average. In fact,

many of them have no discernible effect. Finally, one reason the effects are limited is that take-up of the (usually subsidized) savings product on offer as a part of the intervention is often surprisingly low.

In Chile, the percentage of adults (persons aged 15 or older) with financial accounts stands at 87%, which surpasses the global average of 76% and the 39% average in low-income economies. However, only 31% of adults saved money in a financial institution in the past 12 months (Demirgüç-Kunt et al., 2022). This suggests that it is not access to financial services but use of them that is the primary issue there, particularly for savings. In contrast, savings accounts have boosted savings in countries with lower access, such as Malawi, Kenya, and Uganda, whose per capita incomes are 9%–15% of Chile's.<sup>1</sup> Additionally, Chile has relatively high trust in the financial sector: only 8% of individuals that do not have an account report that it is because they lack trust in the financial sector (compare to 21% in Peru and Uganda).<sup>2</sup>

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<sup>1</sup> Per capita GDP (PPP) in 2014 (the year of the intervention analyzed in this paper).

<sup>2</sup> Retrieved from <https://www.worldbank.org/en/publication/globalindex/Data> in February 2024.

A key to designing effective interventions is correctly positing what constrains savings. The two main candidates underlying most interventions are lack of access to formal savings opportunities and limited ability to commit to saving. The typical interventions, therefore, either provide access to a bank account (for example, [Dupas and Robinson, 2013](#) in Kenya; [Brune et al., 2017](#) in Malawi; [Prina, 2015](#) in Nepal [Dupas et al., 2018](#) in Malawi, Uganda, and Chile; and [Somville and Vandewalle, 2018](#) in India, [Pomeranz and Kast, 2022](#) in Chile, among others) or offer some kind of commitment savings product (for example, [Ashraf et al., 2006](#); [Karlan and Zinman, 2018](#) in the Philippines; and [Brune et al., 2017](#) in Malawi, [Dupas and Robinson, 2013](#) in Kenya; [Kast et al., 2018](#); [Kast and Pomeranz, 2014](#) for Chile).

Given the relatively limited success of these interventions, interest has risen in other possible strategies for encouraging savings based on behavioral foundations other than commitment problems. Prominent among them is one designed by [Karlan et al. \(2016\)](#), who argue that limited attention to low-probability but substantial expenses is a cause of undersaving. Based on this conjecture, the authors design a set of SMS-based savings reminders that encourage savers to better plan for these expenses. They show that this strategy increases savings in their pooled sample covering Bolivia, the Philippines, and Peru.<sup>3</sup>

In this paper, we introduce another reason why people may fail to save, inspired by the study by [Drexler et al. \(2014\)](#) on the impact of rules of thumb on small-business owners' cash management. They find that implementing some seemingly obvious decision rules leads to an increase in business revenues. While the authors do not find a significant effect on savings, that is not their focus. We start from a closely related theory: given the vast number of choices people need to make, they might find it helpful to have some simple rules of thumb to guide their consumption and savings choices. Based on this theory, we design an intervention that provides households with savings strategies (SS) that appeal to careful spending. The intervention includes rules of thumb to reduce expenditures on temptation goods and to encourage better budget planning. We show participants a video, give them a hard-copy calendar with monthly printed reminders about their plan, and send them monthly SMS messages about their SS over the following year.

We conducted an experiment to evaluate the SS intervention, and we compare it to the other behavioral interventions that have already been studied. The experiment was implemented between October 2015 and May 2016, included a control group and three treatment groups, and involved 6242 participants in Santiago, Chile.

The first treatment is the SS intervention described above. The second is inspired by and very similar to the savings-reminder intervention in [Karlan et al. \(2016\)](#). In this treatment group, beneficiaries are sent personalized savings reminders by SMS every month for one year. As in [Karlan et al. \(2016\)](#), the messages are tailored to each participant's savings objective as declared in the baseline survey.

The third treatment, the automatic savings plan (ASP), provides participants access to a commitment savings account. ASP is inspired by [Ashraf et al. \(2006\)](#) and the broader literature on commitment problems in savings ([Blumenstock et al., 2018](#); [Brune et al., 2017](#); [Dupas and Robinson, 2013](#); [Kast et al., 2018](#); [Somville and Vandewalle, 2018](#)). Given our study's goal of identifying the impact of various strategies to promote the use of savings accounts rather than the impact of account access, all participants have a basic transactional account known as CuentaRUT.

We use administrative data from BancoEstado and survey data to evaluate the experiment. The administrative data allow us to estimate

our program's impact on savings balances, debt levels, and transactions (withdrawals and deposits) for 17 months after enrollment. We complement these data with a household survey of a subsample of 2049 households, conducted approximately 16 months after enrollment began. The survey allows us to observe the program's impact on total savings (including informal savings and other savings outside the partner bank), debt, and expenditures.

Using administrative data, we find that the SS treatment has a significant and relatively large positive effect on formal savings of approximately US\$79 on a base of US\$521 in the control group. Although not statistically significant, the point estimates for this effect suggest that the balance increase is produced by reducing withdrawals (not by increasing deposits). Using survey data, we also find no effect on realizing the baseline savings goal or on total debt or expenditures.

We observe a significant reduction in the transactional balance kept in the CuentaRUT account in the SMS treatment. However, the effect is no longer significant when also considering the balance in savings accounts. This result contrasts with previous findings of a positive effect ([Karlan et al., 2016](#); [Abebe et al., 2018](#)) in the context of poorer countries. Using survey data, we also find a decrease in the probability of carrying retail debt and using a line of credit. This result is similar to that of [Pomeranz and Kast \(2022\)](#), who find that providing access to a savings account in Chile decreases short-term debt, and it highlights the potential fungibility between savings and credit ([Bauer et al., 2012](#)). The declines in both CuentaRUT balances and retail debt are consistent with the hypothesis that the treatment makes the saving goal more salient. Consequently, individuals withdraw funds from their account to pay for whatever they aim to purchase without adding to their existing debt. These results highlight the significance of context for evaluating the external validity of approaches aimed at promoting savings.

Turning to the ASP treatment, we find that it positively and significantly affects the average savings balances by US\$82 10 months after enrollment. This effect remains positive from month 12 onward but decreases in statistical significance and size over time. These results are consistent with the literature, which finds that default treatments have positive effects ([Bachas et al., 2021](#)). Our analysis of the deposits into and withdrawals from savings accounts shows that the balance is built by a (mechanical) increase in deposits and no effects on withdrawals up to month 9, when withdrawals pick up, consistent with a decrease in balances.

The overall evidence is promising, as both SS and ASP are light-touch interventions that cost relatively little and successfully increase savings in the first 12 months after the intervention. While not statistically significant, the positive impact of both interventions persists for an extended period. Furthermore, the intention-to-treat (ITT) effects of both SS and ASP are indistinguishable from each other in both the survey and administrative data, and therefore the novel SS intervention seems to work as well as the ASP treatment. Although this is specific to the study context, it is compelling enough to consider SS deserving of further trial. The result for ASP is remarkable, as the take-up was only 31%. Treatment-on-the-treated (TOT) calculations indicate that the increment in savings is almost 50% of the control-group average. By contrast, the SMS treatment very clearly does not increase savings, though it does decrease retail debt. The broader message is that the evidence strongly supports [Dupas et al. \(2014\)](#) view that savings interventions need to cater to the context to be effective and that it is challenging to identify universally applicable interventions.

Our paper makes four contributions to the literature. First, we add new evidence from Chile, a country with high access to bank accounts, to a literature that has mostly focused on more disadvantaged countries with lower access to bank accounts. Second, we look at a new intervention that aims to teach how to spend carefully; the intervention has a similar impact to the well-known default treatment. Third, we conduct a replication exercise of two interventions that have been successful in other contexts aimed at addressing behavioral biases. Furthermore, our design allows us to compare multiple treatments. We find that, as in

<sup>3</sup> Similar default payments have been shown to increase savings—for example, among factory workers in Afghanistan ([Blumenstock et al., 2018](#)), farmers in Malawi ([Brune et al., 2016](#)), and villagers in rural India ([Somville and Vandewalle, 2018](#)). Other type of interventions focus on joint decision-making ([Seshan and Yang, 2014](#)) and changes in interest rates ([Schaner, 2018](#)).

different contexts, ASP increases savings balances. The rule-of-thumb treatment also increases savings for up to a year. In contrast, perhaps surprisingly, the SMS treatment decreases CuentaRUT balances but reduces retail debt. Taken together, the results are consistent with a positive net effect on households' financial situation. Fourth, we investigate the mechanisms of successful savings interventions. ASP mechanically increases deposits in all available months and starts increasing withdrawals after a year. Therefore, the increase in savings is caused by a rise in deposits and not a reduction in withdrawals. In contrast, for SS, the mechanism of the savings increase is the conscious decision to decrease withdrawals. This intervention could be explored as a complement to traditional commitment interventions such as ASP.

## 2. The interventions: SS, SMS, and ASP

### 2.1. Recruitment and baseline survey

This study was conducted in partnership with BancoEstado, an autonomous state-owned financial institution. BancoEstado serves most of the financial needs of individuals in low-income groups in Chile, provides 92.8% of the savings accounts in the country, and holds 88.7% of the savings in such accounts.<sup>4</sup> The intervention was implemented in 23 BancoEstado branches in vulnerable urban municipalities in Chile's Metropolitan Region.<sup>5</sup>

Study participants were recruited at various BancoEstado branches. To qualify, they had to be older than 18 years of age, have an account with BancoEstado, and have or be willing to open a savings account at the branch at which they were recruited. Furthermore, individuals had to have a CuentaRUT account or be willing to open one. The CuentaRUT account (offered only by BancoEstado) is automatically connected to an individual's national identification number, known as an RUT (Rol Único Tributario). Even though a CuentaRUT account was needed for only one of the treatments, we required all study participants to have one to facilitate comparisons across treatments. For a detailed description of our offering process, see Annex 3.

There are several differences between a CuentaRUT account and a savings account that, overall, make a savings account more illiquid. First, unlike savings accounts, CuentaRUT accounts can be drawn on via debit card to buy goods, withdraw money, or pay utility bills at several retail stores (*Cajas Vecinas*). There are currently more *Cajas Vecinas* than ATMs in the Metropolitan Region (6378 versus 3503). Second, savings accounts offer between two and nine free withdrawals per year, while BancoEstado always charges a fee for withdrawals from CuentaRUT accounts. Third, overdraft fees are larger for savings accounts. Fourth, savings accounts pay interest.<sup>6</sup> These differences also imply different usage by clients—for instance, 50% (42%) of participants make a withdrawal (deposit) from (to) CuentaRUT in the three months before the offering, and the corresponding figures for savings accounts are just 9% for both withdrawals and deposits.

If a BancoEstado client met the eligibility criteria, a branch associate explained the research project and invited the individual to participate in the intervention. If the client accepted, they had to sign a consent

form that permitted us to use the bank's administrative data in our evaluation. Once the client signed the consent form, the branch associate gave them a tablet computer used exclusively for our study and played a 1-min video explaining the project. Afterward, the individual was prompted to take a baseline survey.<sup>7</sup> After completing the survey, the participant returned the tablet to the branch associate.

Individuals were then randomly assigned to a treatment based on their national identification numbers and stratified by some specific information from their survey responses. The branch associates who administered the surveys had to tap a hidden button on the tablet to see the treatment assignment.<sup>8</sup> These associates were trained on the procedures for each treatment and what to say during the offering process.<sup>9</sup> Table A2 reports the number of recruited individuals for this evaluation each month, and Fig. 1 shows the intervention calendar.

### 2.2. Experimental design

Individuals were randomly assigned to four treatments: automatic savings strategies (SS), SMS reminders (SMS), savings plan (ASP), and pure control. In Table 1, we show the treatment assignment. About 20% of the participants were assigned to the SS group ( $N = 1,237$ , 20%), 20% to SMS ( $N = 1273$ ), 30% to ASP ( $N = 1845$ ), and 30% to the control group ( $N = 1887$ ). We oversampled the control and ASP groups to increase the power because we expected a lower take-up rate for the ASP group than the other two treatments.

We asked individuals to declare their savings goals in the baseline survey. Table A3 illustrates that the two most common goals were to save for (1) purchasing a house (47%) and (2) unforeseen expenses (13%). We stratified the sample by the housing saving goal since it was the most common goal and involves a longer-term commitment and, therefore, might be associated with larger balances. We also stratified individuals based on whether they received a cash transfer since receiving one implies that they maintained a regular income flow.

We designed the SS treatment for this study, while the SMS reminders were similar to the ones used in the previous literature. Only the individuals assigned to the SS and SMS treatments were offered these services. When we conducted this study, ASP was already among the savings services BancoEstado makes available to its clients; therefore, we only randomized the offer of this service. However, anyone seeking this service could receive it at any BancoEstado branch.

### 2.3. Treatment groups

Once a BancoEstado branch associate saw an individual's treatment assignment on the tablet, the associate had to perform specific tasks depending on the assignment.<sup>10</sup>

<sup>4</sup> Retrieved May 22, 2018, from <http://www.sbf.cl/sbfweb/servlet/InfoFinanciera?indice=4.1&idCategoria=564&tipocont=905>.

<sup>5</sup> Highly vulnerable municipalities were chosen in accordance with the Priority Social Index 2014 and in agreement with BancoEstado. The number of branch associates per branch and the presence of at most two branches per municipality were taken into consideration. See Annex 2 for details. The Ministry of Social Development computes the Priority Social Index, which considers income, education, and health, to determine a municipality's level of social development.

<sup>6</sup> Overall, BancoEstado savings accounts are similar to those used in the rest of the literature. See Dupas et al. (2018) for a summary of account characteristics from other studies and Annex 4 for a description of the accounts used in our study.

<sup>7</sup> The baseline survey had 11 questions and took an average of 14 min to complete. It included questions about education, labor market participation, family structure, reasons for saving, and whether the participant received government subsidies. It had to be short to avoid hindering branch services.

<sup>8</sup> We used the last two digits of the identification number to assign the participants to each treatment. Before enrollment, we randomized the numbers that corresponded to each treatment for each stratum.

<sup>9</sup> In December 2015, after three months of recruitment, we engaged monitors at the largest bank branches to help increase enrollment. Approximately 54.2% of the participants ( $N = 3208$ ) were recruited by branch associates and 45.8% ( $N = 2715$ ) were recruited with the monitors' assistance. See Annex 3 for details.

<sup>10</sup> For every treatment, the branch associate gave participants a set of plain pencils (without a logo) as a thank-you gift for their participation. Since individuals in the SS treatment were given some items, giving all individuals a gift equalized the treatments and prevented individuals in the SMS, ASP, or control group from asking for materials not part of their treatment.

| Year | Month     |                                      |
|------|-----------|--------------------------------------|
| 2014 | July      | Design and pilot preparation         |
|      | August    |                                      |
|      | September | Administrative data first month      |
|      | October   |                                      |
|      | November  |                                      |
|      | December  | Pilot implementation                 |
| 2015 | January   | Pilot Evaluation                     |
|      | February  |                                      |
|      | March     |                                      |
|      | June      |                                      |
|      | July      |                                      |
|      | August    |                                      |
|      | September |                                      |
|      | October   | Offering process and baseline survey |
|      | November  | Treatment implementation (SMS)       |
|      | December  |                                      |
| 2016 | January   |                                      |
|      | February  |                                      |
|      | March     |                                      |
|      | April     |                                      |
|      | May       | End of offering process              |
|      | June      |                                      |
|      | July      |                                      |
|      | August    |                                      |
|      | September |                                      |
|      | October   |                                      |
|      | November  |                                      |
|      | December  |                                      |
| 2017 | January   |                                      |
|      | February  |                                      |
|      | March     | Follow-up survey                     |
|      | April     | Treatment implementation (SMS) ends  |
|      | May       |                                      |
|      | June      |                                      |
|      | July      | Follow-up survey ends                |
|      | August    |                                      |
|      | September | Administrative Data Ends             |

Fig. 1. Timeline.

**Table 1**  
Treatment assignment.

| Treatment Arm                | Participants | Take-up | Signed up for ASP |
|------------------------------|--------------|---------|-------------------|
| Control group                | 1.887        |         | 14,7%             |
| Automatic savings plan (ASP) | 1.845        |         | 31,0%             |
| SMS reminders (SMS)          | 1.273        | 92%     | 15,2%             |
| Savings strategies (SS)      | 1.237        | 93%     | 16,2%             |
| Total                        | 6.242        |         |                   |

Notes: Authors' calculations. For SMS and SS, take-up is defined as receiving at least one text message. Take-up of ASP and control groups is defined by whether individuals opted to start an ASP at the time of the offering.

### 2.3.1. Treatment 0: control group

Individuals assigned to the control group did not receive any treatment. The branch associate did not offer them any new services and only opened the account the client had requested upon arrival at the branch.

### 2.3.2. Treatment 1: savings Strategies(SS)

We developed five strategies to help people lower their consumption

of temptation goods. These strategies were (1) identifying temptations, (2) calculating how much one could feasibly save within one year by decreasing unnecessary expenses, (3) determining a concrete savings goal, (4) developing a budget and remembering that it is not necessary to cease all spending on temptation goods, and (5) saving money in the bank. These strategies were conveyed to participants in three ways: (1) a 3-min animated video shown on a tablet provided by the branch associate; (2) a gift bag with several items intended to increase the individuals' savings, including a wallet with the program's logo and a magnet that served as a reminder of the strategies presented in the video; and (3) a calendar that reminded the individuals of a different strategy every month. Later in the treatment, individuals received monthly SMS messages that reminded them of the strategies. These monthly messages are shown in Annex 5 and correspond to the messages conveyed in the calendar. For example, the SMS messages sent in February 2016 read "[Name], if you want to save, remember that spending CLP\$4000.00 weekly on unnecessary expenses or temptation goods adds up to CLP\$208,000 per year. BancoEstado."<sup>11</sup>

### 2.3.3. Treatment 2: SMS savings reminders (SMS)

Individuals in this treatment received monthly SMS messages for one year. These messages were individualized and reminded the participants of their goals, which they had indicated in the baseline survey. For example, if the individual declared at baseline that they wanted to save for unexpected expenses, the monthly SMS message said "[Participant's Name], remember to deposit money into your savings account this month. Get closer to meeting your goal of saving for unexpected expenses! Greetings, BancoEstado." These messages were similar to those described by Karlan et al. (2016). Because the branch associates did not have to offer services or help clients open a bank account, from the bank's point of view this treatment seems no different from the control group.

### 2.3.4. Treatment 3: automatic savings plan (ASP)

In treatment 3, the branch associate explained how ASP works and offered the service. The ASP program automatically transferred money from the participant's CuentaRUT account into their savings account. The individual could specify the amount of money and the date the transfer would occur.<sup>12</sup>

Table 1 shows the take-up rates for each treatment. Regarding ASP group, take-up was defined as agreeing to enroll in ASP when it was offered; the take-up rate was 31%. Meanwhile, the take-up of ASP in the control group was 15%. Take-up for the SMS and SS treatments was defined as receiving at least one text message. The take-up rates for SMS and SS were 92% and 93%, respectively. In Table A4, we report the main predictors of take-up for each treatment. Workers, students, and younger individuals are more likely to take up ASP, and older individuals and those with larger CuentaRUT pre-offering balances are more likely to take up SMS.

## 2.4. Data

BancoEstado granted us access to transactional data for bank accounts and individual-level data on monthly savings and debt balances from September 2014 to September 2017 for all financial instruments. Since the offer process ran from October 2015 to May 2016, we have 13 months of pre-enrollment and 17 months of post-enrollment administrative data for every participant. We constructed the pretreatment data

<sup>11</sup> Corresponding to US\$6 and US\$315, respectively.

<sup>12</sup> The minimum transfer amount was CLP 1000 (approximately US\$1.50). If the individual did not have a savings account, they had to open one. If the participant had more than one savings account, they could choose which account the transfer would be made to. The only restriction was that the savings account had to be in the individual's name.



as the average for the 13 months before individuals were enrolled.

Besides the information on savings accounts, the BancoEstado data include the balances and transactions recorded in the CuentaRUT accounts. Although this account is not designed for savings purposes, individuals might maintain balances in the CuentaRUT account for this purpose. We call the sum of the balances in CuentaRUT and savings accounts total savings. These reports' details are in the data appendix (Annex 6).

To complement the administrative data, we conducted a household survey between March and July 2017, corresponding to 13–22 months after the offering, for 2049 individuals (32.8% of participants).<sup>13</sup> The survey collected information on total savings, including formal and informal savings, debt, and employment, among other variables. The savings data collected in the survey include savings amounts at all financial institutions (not just BancoEstado), allowing us to study the program's impact on savings beyond the partner bank.

## 2.5. Summary statistics

Table 2 provides the summary statistics for each treatment. Column 1 reports the number of observations. Columns 2 through 5 report the average level of each variable by treatment, and Column 6 shows the  $p$ -value for the test that all treatment and control means are the same. Panels A and B report the results for the bank data, and Panel C reports the results from the baseline-survey variables. The variables related to balances and transactions were top-censored at the 99th percentile to eliminate outliers (similar to Bachas et al. (2021), De Mel et al., 2013; Karlan et al., 2016).

The average savings of the control group in the savings accounts is US\$224.40.<sup>14</sup> In Column 6, the  $p$ -value of the equality of means of savings balances is 0.669, which indicates balance across treatments. The average CuentaRUT account balance is US\$78.20 for the control group, which is balanced across treatments ( $p$ -value = 0.104).<sup>15</sup>

We added the balances in all of the savings accounts and CuentaRUT accounts for each individual to create an indicator of the amount of resources individuals have in relatively liquid formal instruments; the sum is almost US\$314.50 for the control group, with no statistical differences among the treatment groups.<sup>16</sup>

Regarding nonmortgage debt levels, the average amount of debt among the control group at baseline is US\$169.40, with 6.6% of the control group carrying some debt at baseline.

In Table 2, Panel C reports the means and the balance test for the individual characteristics gathered from the baseline survey. The first two variables (that is, saving for a house and subsidy recipient) define the stratification cells; 47% of the participants in the control group report saving for a home, and 42.1% report receiving subsidies. Both variables are balanced across treatments. Among the control group, 29.4% are male, the average age is 34, and the most common educational achievement level is high school, which 52% of the control group completed. Most participants had worked the week prior to enrollment (63%), and the average monthly per capita household income for the control group was US\$276. All variables are balanced, except for gender

and the probability of being a student.

Overall, considering the number of hypotheses tested, the random assignment seems to have provided comparable groups, which supports the internal validity of the results. Moreover, we perform a regression to see whether covariates can predict any treatment. Table 2, Panel D shows the  $p$ -value of the F-test that all covariates are zero. For all comparisons, the null is not rejected.

## 2.6. Empirical strategy

We estimate the ITT effects of the SS, SMS, and ASP treatments on outcomes  $Y_i$  for each individual  $i$ . The identification strategy relies on the random assignment of each eligible individual to either a treatment group or the control group. This approach ensures that individuals in each group are, on average, similar. The main estimated equation is as follows:

$$Y_i = b_0 + b_1 * ASP_i + b_2 * SMS_i + b_3 * SS_i + a_1 * X_i + u_i \quad (1)$$

Here, *ASP*, *SMS*, and *SS* are indicators of the treatment status.  $X_i$  is a set of dummy variables indicating the stratification cell (defined by the intention to save for a house and receipt of subsidies) and the variables that control for the characteristics of the offer process: a dummy that identifies whether the monitor or branch associate served as a recruiter, dummies for the branch associate's name, and offering-month and branch fixed effects.<sup>17</sup> We also include the set of variables selected by Post-Double-Selection (PDS) Least Absolute Shrinkage and Selection Operator (LASSO) analysis for each outcome.<sup>18</sup> We report all results with robust (Eicker-Huber-White) standard errors. We also use this equation (without the variables selected by PDS LASSO) to perform a balance test on each of the 13 months before enrollment for all dependent variables.<sup>19</sup>

## 3. Results

To facilitate our analysis, we report the parameters from Equation (1) in figures instead of tables for each month with administrative data. As mentioned above, we also use Equation (1) to test the monthly balance on the variables for 13 months before enrollment and 17 months after enrollment completion. In each graph, we plot the ITT for each treatment and compare it to the control group, indicating whether it is significant at the 5% and 10% level. Savings balances in the control group increased from US\$282.30 before the month of enrollment to US\$521.98 one year after the offering date. Therefore, all effects should be considered relative to this trend.

### 3.1. Administrative data

#### 3.1.1. Savings balances at partner bank

We report results on savings accounts, CuentaRUT balances, and their sum. Although the CuentaRUT account is not intended to function as a savings account, individuals can use it for that purpose. In fact, in the follow-up survey, 22% of individuals mentioned that CuentaRUT accounts could be used for savings. Since we required all participants to have (or open) a CuentaRUT account, we report the impact of the

<sup>13</sup> We sent the entire experimental sample to the survey firm. The survey firm intended to contact the whole sample but could only reach 2049 people. Therefore, the survey sample was not selected randomly. We present in Section 3 a discussion of the implications for the analysis of the survey data.

<sup>14</sup> All amounts report real prices in USD for the same month in September 2014.

<sup>15</sup> However, the SMS group has a higher balance than the SS group ( $p$ -value = 0.04) and SMS ( $p$ -value = 0.03). In Table 2 we only report the test of the control group with each treatment group; the tests between groups that are mentioned in the text are available upon request.

<sup>16</sup> After the sum was generated, all categories were winsorized, which is why the mean of "Total Savings and CuentaRUT Account" is not equivalent to the sum of these two means.

<sup>17</sup> We also included a dummy indicating the 55 cases in which the same branch service associate offered a product to more than one person on the same date and at the same time. A given branch service associate offered could potentially have enrolled two individuals at the same time, which is what this variable indicates. We imputed the average value if there was a missing value in the independent variables and included a dummy indicating this.

<sup>18</sup> We included in the process all variables presented in Table 2.

<sup>19</sup> The first month after enrollment corresponds to the month in which the offer was made because dependent variables are measured at the end of the month.

**Table 2**

Variable means and difference test between treatment groups.

|                                           | [1]   | [2]                | [3]                     | [4]           | [5]                          | [6]                    |
|-------------------------------------------|-------|--------------------|-------------------------|---------------|------------------------------|------------------------|
|                                           |       | Level              |                         |               |                              |                        |
| Product Category                          | N obs | Control            | Savings Strategies (SS) | SMS Reminders | Automatic Savings Plan (ASP) | p-value ASP = SMS=SS=0 |
| <i>Panel A: Amounts (US\$)</i>            |       |                    |                         |               |                              |                        |
| Balance in savings accts.                 | 6242  | 224.4<br>(755.7)   | 234.3                   | 242.9         | 254.6                        | 0.669                  |
| Balance in CuentaRUT                      | 6242  | 78.16<br>(194.7)   | 71.59                   | 91.35         | 72.43                        | 0.104                  |
| Total balance (savings acct. & CuentaRUT) | 6242  | 314.5<br>(845.0)   | 317.76                  | 352.24        | 337.60                       | 0.770                  |
| Total debt                                | 6242  | 169.4<br>(957.0)   | 156.04                  | 202.54        | 170.80                       | 0.694                  |
| <i>Panel B: Probability (&gt;0)</i>       |       |                    |                         |               |                              |                        |
| Balance in savings accts.                 | 6242  | 0.512<br>(0.5)     | 0.51                    | 0.52          | 0.51                         | 0.916                  |
| Balance in CuentaRUT                      | 6242  | 0.714<br>(0.4)     | 0.72                    | 0.70          | 0.70                         | 0.258                  |
| Total balance (savings acct. & CuentaRUT) | 6242  | 0.854<br>(0.3)     | 0.84                    | 0.83**        | 0.83*                        | 0.0651                 |
| Total debt                                | 6242  | 0.066<br>(0.2)     | 0.05                    | 0.07          | 0.06                         | 0.510                  |
| <i>Panel C: Baseline Variables</i>        |       |                    |                         |               |                              |                        |
| Saving for a home                         | 6242  | 0.47<br>(0.50)     | 0.46                    | 0.45          | 0.46                         | 0.608                  |
| Subsidy recipient (1 = receives)          | 6242  | 0.421<br>(0.49)    | 0.44                    | 0.42          | 0.42                         | 0.789                  |
| Gender (1 = male)                         | 6242  | 0.294<br>(0.46)    | 0.323*                  | 0.321         | 0.323*                       | 0.173                  |
| Age                                       | 6242  | 34.00<br>(13.92)   | 33.66                   | 33.74         | 33.82                        | 0.939                  |
| Highest educational level                 |       |                    |                         |               |                              |                        |
| Primary                                   | 6242  | 0.11<br>(0.31)     | 0.10                    | 0.10          | 0.12                         | 0.336                  |
| Secondary                                 | 6242  | 0.52<br>(0.50)     | 0.53                    | 0.54          | 0.51                         | 0.165                  |
| Tertiary                                  | 6242  | 0.34<br>(0.47)     | 0.35                    | 0.33          | 0.36                         | 0.401                  |
| Working                                   | 6148  | 0.63<br>(0.48)     | 0.62                    | 0.62          | 0.63                         | 0.897                  |
| Studying                                  | 6148  | 0.11<br>(0.31)     | 0.12*                   | 0.12          | 0.13**                       | 0.118                  |
| Retired                                   | 6148  | 0.02<br>(0.15)     | 0.03                    | 0.02          | 0.021                        | 0.874                  |
| Household per capita income               | 5849  | 275.56<br>(261.38) | 280.24                  | 266.09        | 271.82                       | 0.331                  |
| <i>Panel D: F-Test</i>                    |       |                    |                         |               |                              |                        |
| ASP vs C                                  | 0.258 |                    |                         |               |                              |                        |
| SMS vs C                                  | 0.406 |                    |                         |               |                              |                        |
| SS vs C                                   | 0.617 |                    |                         |               |                              |                        |
| ASP vs SMS                                | 0.148 |                    |                         |               |                              |                        |
| ASP vs SS                                 | 0.636 |                    |                         |               |                              |                        |
| SMS vs SS                                 | 0.109 |                    |                         |               |                              |                        |

*Notes:* Column 1 shows the number of observations. Columns 2–5 show the mean values for the control group, savings strategies, SMS reminders, and automatic savings plan, respectively. Column 2 also shows standard deviations in parentheses. Columns 6–11 report the *p*-values of the regressions of treatment assignment controlling by strata. Standard deviations are in parentheses. Variables in Panel A are in US dollars, using the exchange rate of September 2014 (USD=CLP 593.47). Regressions include dummies for strata (defined by savings motive and receipt of subsidy), fixed effects for date of offering, branch service associates fixed effects, branch fixed effects, and a dummy indicating whether the individual was recruited by an enumerator or a branch service associate. We also include a dummy variable to control for rare cases in which branch service associates offered the program at the same hour. We use robust standard errors. Data in Panels A and B come from the partner bank's administrative data, and Panel C's data come from the baseline survey. The sample size varies because of missing values. In comparing treatment and control groups, \*\*\* denotes a difference significant at the 1% level, \*\* at the 5% level, and \* at the 10% level.

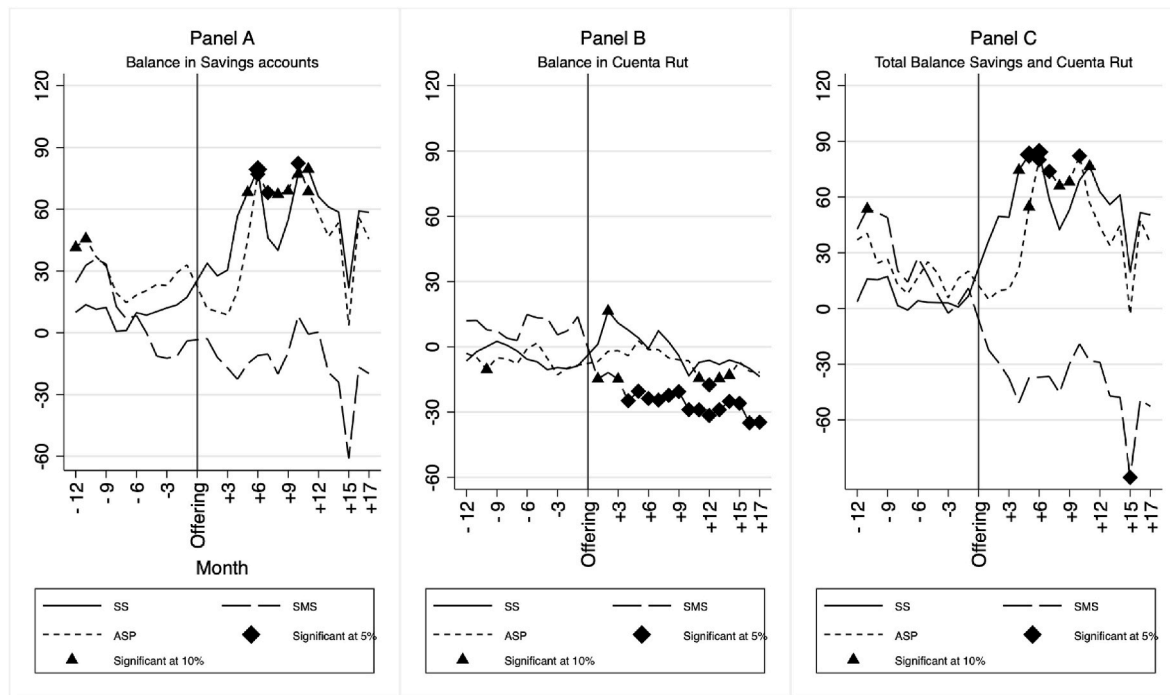
treatments on this transactional account for two reasons: (1) to identify potential savings in this account, and (2) to study the potential shift of balances from CuentaRUT accounts to savings accounts.

Panel A in Fig. 2 shows that the ASP treatment increases savings account balances up to 10 months after treatment began and then decreases them. The effects of ASP are significant from months 6–12 and reach US\$83 in month 10. The effects of SS are significant during months 5–6 and 10–11, with a maximum impact of US\$79. The SMS coefficients, in contrast, are mostly below 0 but are never significant.

The coefficients reported in Fig. 2, Panel B show that ASP decreases

the CuentaRUT balance almost every month (with a maximum point estimate of –US\$13.6 in month 17), whereas the effect of SMS is consistently negative. This negative effect is significant for SMS for 16 of the 17 months when the balances reach a level of –US\$35 relative to the control group. For SS the effect on CuentaRUT accounts is less consistent and never statistically significant.

In Fig. 2, Panel C presents the results for both savings accounts and CuentaRUT accounts. ASP continues to have a positive effect on balances, which build up for 10 months after the offering, with the greatest effect observed in month 10 at US\$82. Moreover, the SS treatment



**Fig. 2.** ITT Effects Using Administrative Data.

*Notes:* The figure reports coefficients from the regression of savings and CuentaRUT account amounts on the treatments. Panel A reports coefficients on the balance in savings accounts, Panel B reports coefficients on the balance in CuentaRUT accounts, and Panel C reports coefficients on total balance (savings and CuentaRUT accounts). All variables are measured in real US dollars based on the exchange rate of September 2014. Variables are top-coded at the 99th percentile. All regressions include dummies for strata (defined by savings goal and receipt of subsidy), fixed effects for enrollment date, branch-associate fixed effects, branch fixed effects, and a dummy indicating whether an enumerator or a branch associate recruited the individual. We apply PDS LASSO to select relevant controls from the variables included in Table 2, including dummies indicating missing values. We use robust standard errors.

follows a similar pattern to ASP and is marginally significant 3 months after the offering, reaching a US\$76 impact on the balance. In contrast, the SMS coefficients are always negative and statistically significant only for month 15.

In Table A5, Panel A, we also present the impact on savings by taking averages over several months. The analysis is presented in two periods: from month 1 to month 12, during which individuals received SMS messages, so we can study the effects while individuals received the treatment; and from month 13 to month 17, a period after the treatment ended that coincides with the timing of the survey, conducted on average 16 months after the intervention. The table summarizes what is observed in Fig. 2.

Coefficients for SS show a large positive and significant effect on savings accounts in months 1–12, with no impact on CuentaRUT balances. When both accounts are considered, the effect size increases and is still significant (at the 10% level). However, the coefficient size declines and is not significant when considering months 13–17.

Column 3 shows that the SMS treatment significantly decreases CuentaRUT balances in both periods, although the effect on total balances is negative but not significant. Column 4 indicates that ASP leads to a 9.7% increase in savings balances during months 1–12. However, once CuentaRUT balances are included, the effect is not significant.

Our findings indicate an increase in savings balances and a decrease in CuentaRUT account balances for SS and ASP, which is consistent with a transfer of funds from transactional accounts to savings accounts. However, for the ASP treatment this transfer is partly mechanical since transfers from CuentaRUT accounts to savings accounts occur automatically. Given that the SS and ASP effects exhibit a similar pattern, we test (Table A5, Panel B) the hypothesis that all coefficients for both treatments are the same. We cannot reject the null of similar effects for balances in savings accounts and total balances, with a  $p$ -value of above 0.7 in both cases (see Table A5, Panel B). We do reject the null that SMS

has the same effect size as SS and ASP.<sup>20</sup>

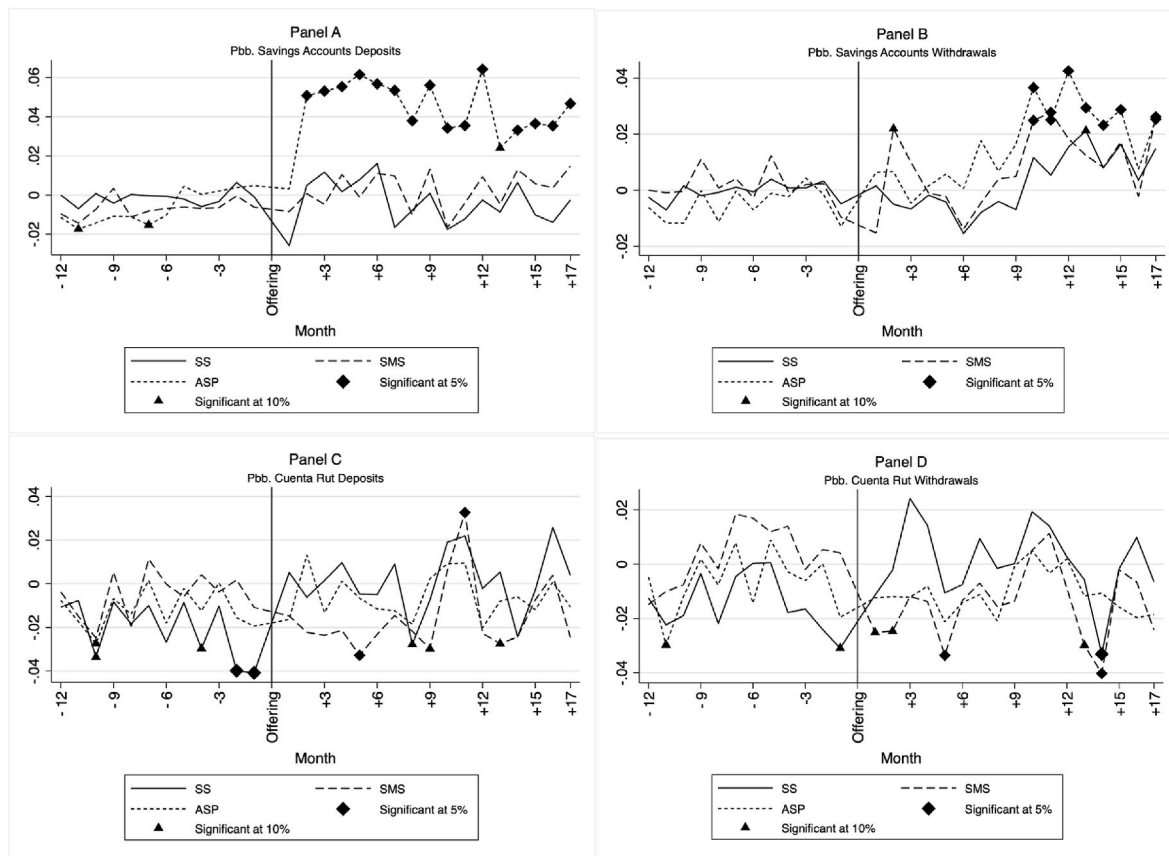
For a robustness check, we present in Table A6 the results without controls. The results are qualitatively similar, and the confidence intervals overlap with the LASSO specification. We prefer the LASSO approach to increase power.

Finally, considering that ASP has a substantially lower take-up than SS and SMS, and considering that 15% of the control group open ASP, the ITT results for ASP are mainly due to a change in savings from a fraction of the individuals assigned to that treatment. Then, we compute its TOT by instrumenting its take-up by treatment assignment. As expected, Table A7 shows that the coefficients for ASP more than sextuple, while the estimates are more imprecise. In the case of savings, the effects are almost 50% of the mean of the control group for the whole period. This is a substantial effect for an intervention that only offered a default option once, with no additional incentives. We focus our discussion on the ITT, as it better represents the result of a policy intervention and allows us to compare our results with the literature.

### 3.1.2. Effects on transactions at partner bank

To gain insight into transaction behavior and how savings accumulate and decline over time, we examine the impacts of the treatments on the probability of making deposits and withdrawals in Fig. 3. The effects

<sup>20</sup> We also find statistically significant differences between SMS and the other two treatments. Analyzing the extensive margin, we find that no treatment has an impact on the probability of having positive balances in the savings accounts. The point estimates for CuentaRUT accounts are positive and significant for SS over several months, which implies that individuals in these treatment arms maintained positive but smaller balances in their CuentaRUT accounts compared to the control group (results available upon request). The effect on account possession is irrelevant because all study participants were required to have one.



**Fig. 3.** ITT Effects on the Probability of Making Deposits and Withdrawals Using Administrative Transactions Data

*Notes:* The figure reports coefficients from the regression on the probability of making deposits or withdrawals from savings and CuentaRUT accounts. It includes transfers among BancoEstado accounts. General notes from Fig. 2 apply.

on account balances may be a result of different deposit and withdrawal patterns.

While not statistically significant, the point estimates for SS suggest that the rise in savings levels reported in the previous section may be associated with a decrease in withdrawals up to month 9 (see Fig. 3, Panel B). This effect is relevant, as it aligns with the advice provided by the rules of thumb aiming to induce careful spending. For all treatments, including SS, we observe a slight uptick in withdrawals from savings accounts after the ninth month, which is in line with the drop in savings balances in these treatment groups.

We also study whether individuals in the ASP treatment group withdraw their funds more frequently than those in the control group, thereby undoing the treatment, or whether they overlook the fact that money is being automatically transferred from their CuentaRUT accounts to their savings accounts, as hypothesized in the savings-default literature. Fig. 3, Panel A shows that the probability of deposits for ASP rises throughout the period, which is consistent with the default literature.<sup>21</sup> However, the point estimates for the probability of withdrawals

are positive but not significant for most of the first nine months, after which they become significant in most months. Thus, in the medium term, participants do not drop out of the default rule but do offset it indirectly by increasing withdrawals. These patterns align with the balance change for ASP and suggest that the decrease in savings after month 10 is due to an increase in withdrawals, not a decline in deposits.

Regarding the probability of making a deposit to or withdrawal from a CuentaRUT account (see Panels C and D), SMS exhibits negative and significant effects on both deposits and withdrawals. Therefore, the decrease in CuentaRUT balances observed in the SMS treatment appears to be due to a reduction in deposits rather than an increase in withdrawals.

The results suggest that different treatments lead to distinct transactional behavior. SS seems to have no effect on deposits but decreases withdrawals, consistent with the rule of thumb. ASP, in contrast, builds savings through an increase in deposits throughout the 17-month period after treatment and an increase in withdrawals only after the 10th month. This implies that the nudge has the expected effect on deposits, but this effect is offset by an increase in withdrawals in the medium term. In contrast, SMS results in a reduction in deposits to and withdrawals from both CuentaRUT and savings accounts. Hence, the hypothesis that lack of attention constrains savings is not supported by the

<sup>21</sup> To study the mechanical effect, we would need to identify the transfers from the CuentaRUT accounts to the savings accounts. We are unable to do so, however, because this type of transaction is not recorded in the transactional data. Yet since the number of monthly deposits increased by approximately 0.05, and since the difference in take-up between the ASP group and the control group was approximately 0.18, the change in the number of monthly deposits of those participating in ASP was, on average, 0.28. Since this number is less than 1, the estimated impact is less than the expected mechanical effect. As the monthly deposits start being less than the mechanical effect, we argue that this difference is due not to individuals' canceling the transfer but to the substitution for the transfer that would have been made in the absence of the treatment.



savings behavior observed.,<sup>22,23</sup>

### 3.2. Survey data

We have three objectives in using the survey data. First, we aim to study the effect on overall savings, which encompasses informal savings and savings outside of the partner bank. This allows us to test whether the effects observed in the administrative bank data result from participants' transferring funds to BancoEstado accounts from other financial institutions or informal savings. We aim second to assess treatment compliance and third to explore downstream outcomes and changes in spending patterns.

#### 3.2.1. Survey sample

In this study, 2049 individuals participated in the survey. As those who were interviewed might not constitute a random sample of all participants, we study the degree to which the survey sample reflects the study population. We do so in two ways. First, Table A9 presents the correlations between not being included in the sample and the treatment assignments without controls, with controls (baseline characteristics), and with controls interacting with the treatments. We find no case in which the treatment assignment predicts whether the participant was surveyed. Hence, there is no evidence for differential attrition by treatment.<sup>24</sup>

Second, we estimate Equation (1) including a dummy taking the value of 1 if the participant was surveyed and 0 otherwise. Fig. A2 reports the coefficients on the interactions between this dummy and each treatment-assignment dummy, with balance in savings, balance in CuentaRUT, and total balance as dependent variables. The point estimates are statistically significant in very few cases, indicating that individuals in SS that respond to the survey have larger savings balances than those that do not.

#### 3.2.2. Evidence on the first stage

To ensure that the treatments were delivered as planned, we asked participants whether they had an ASP, received an SMS from the bank, and received gifts when they visited the bank. In Table 3, Panel A, we observe that individuals assigned to both the SS and SMS treatment groups report receiving more SMS messages than the control group.<sup>25</sup> Additionally, participants in the SS group are more likely to receive individualized messages related to strategies, while those in the SMS group are more likely to receive general strategic reminders. Moreover, individuals in the SS group are more likely to report receiving the treatment gifts, and more individuals in the ASP treatment report signing up for the ASP than does the control group. These results indicate that the intervention was implemented according to the protocol and that treatment-assignment randomization was followed.

<sup>22</sup> To understand what caused balances to increase (more deposits or fewer withdrawals) and to determine whether the treatments affected these patterns, we also study whether the withdrawal pattern is associated with the days on which we sent text messages. The SMS and SS texts were sent on the same day. We do not find evidence of this behavior for SS and SMS (see Annex 7).

<sup>23</sup> We also examine the savings-balance data to address whether the changes in savings balances were due to large withdrawals. To do this, we create an indicator variable that equals 1 if the absolute balance change was larger than 90%. Our results suggest that, in the first nine months after enrollment, the SS treatment was less likely to result in large withdrawals compared to the control group, which is consistent with the observed increase in balance during the same period.

<sup>24</sup> Column 2 shows that men and those with greater per capita income were more likely to participate in the survey.

<sup>25</sup> The survey question was "During the last year, did you receive a SMS message from BancoEstado?"

#### 3.2.3. Effect on savings

As previously stated, the results obtained from the survey data might differ from those obtained from the partner-bank data. This is because the survey includes savings from all financial institutions and informal savings, whereas the partner-bank data only capture figures from the partner bank. A comparison between formal savings balances obtained from the survey data and administrative data suggests that the survey data might capture savings from more financial institutions. For example, the average formal savings balance for the control group is US \$544.20 in the survey, compared to US\$526 in the administrative data (in month 16, which is the average month in which the survey was conducted).<sup>26</sup> The balance information on the CuentaRUT accounts was not explicitly asked for in the survey and may or may not have been included in the respondents' reported savings balances. Also, there is sample variation, as we did not survey all participants. Nevertheless, we find no statistical differences between savings account balances from the survey data and total bank balances for individuals in the surveyed sample (see Fig. A2).

Furthermore, the survey also gathered information on informal savings, which includes savings kept at home, in participants' businesses, with a Rotating Savings and Credit Association, or held by someone else. Given our access to data on informal savings, we can study whether participants opted to transfer their informal savings to formal savings accounts in response to the treatments.

Table 4 presents the treatments' ITT impacts on savings balances in the survey data (Panel A) and administrative data using the data from the closest month to when the survey was taken (Panel C) for comparison. Panel A shows the effect on participants' total formal savings and their total individual savings (including informal savings). Column 1 shows that the individual average savings for the control group is US \$544.2, which indicates that 82% of the control group's savings are formal. Column 2 presents the ITT coefficient for SS, showing a significant positive impact on savings accounts with a 28% rise in savings balances. The coefficient size is very similar—and remains significant—when informal savings are included, indicating that the savings increase is not due to shifting from informal to formal instruments. Comparable coefficients with administrative data (Table 4, Panel C) are remarkably similar, with a point estimate of US\$154. This estimate is more than twice the effect reported in Table A5 for SS, which is consistent with the results in Fig. A2 that show that individuals in SS that answer the survey have larger balances than those that do not.

Table 4, Panel A, Column 3 shows that the SMS treatment has a nonsignificant effect on decreasing savings balances. The coefficient size increases when informal savings are included, but it remains nonsignificant. Column 4 shows that ASP results in an 18% increase in formal balances ( $p$ -value = 0.13). However, once informal savings are included, the coefficient size declines substantially, its variance increases, and the impact is no longer significant.

In Table 4, Panel B, the test's  $p$ -values of the difference between each treatment are reported. We reject the null that SMS has the same effect size as SS, while for ASP we do not reject it, but the  $p$ -value is 0.106. Additionally, we cannot reject the hypothesis that ASP has the same effect size as SS, with  $p$ -values of 0.506 for formal savings and 0.289 for total savings.

Overall, the survey and administrative results suggest that both ASP and SS have the potential to increase formal savings when considering all financial institutions.

#### 3.2.4. Interpreting the results

Using administrative data, both SS and ASP have positive and significant effects that are not statistically different from each other. From

<sup>26</sup> There is no significant difference between savings balances in the administrative data (month 12) and survey data for the control group (available upon request).

**Table 3**

ITT effects on treatment components using survey data.

|                           | [1]<br>Control Mean | [2]<br>Savings Strategies (SS) | [3]<br>SMS Reminders | [4]<br>Automatic Savings Plan (ASP) | [5]<br>Sample Size |
|---------------------------|---------------------|--------------------------------|----------------------|-------------------------------------|--------------------|
| <i>Panel A: Processes</i> |                     |                                |                      |                                     |                    |
| Receives SMS              | 0.227<br>(0.419)    | 0.541***<br>(0.028)            | 0.520***<br>(0.029)  | 0.019<br>(0.025)                    | 1957               |
| SMS reminders             | 0.099<br>(0.300)    | 0.241***<br>(0.028)            | 0.520***<br>(0.029)  | 0.007<br>(0.019)                    | 1785               |
| SMS strategies            | 0.061<br>(0.240)    | 0.343***<br>(0.028)            | 0.041**<br>(0.020)   | −0.009<br>(0.016)                   | 1785               |
| Has ASP                   | 0.100<br>(0.300)    | 0.013<br>(0.020)               | 0.022<br>(0.020)     | 0.137***<br>(0.021)                 | 2028               |
| Receives treatment gifts  | 0.195<br>(0.397)    | 0.455***<br>(0.029)            | 0.029<br>(0.028)     | 0.010<br>(0.024)                    | 1957               |
| <i>Panel B: P-values</i>  |                     |                                |                      |                                     |                    |
|                           | [1]<br>SS=SMS       | [2]<br>SS = ASP                | [3]<br>SMS = ASP     |                                     |                    |
| Receives SMS              | 0.501               | 0.000                          | 0.000                |                                     |                    |
| SMS reminders             | 0.000               | 0.000                          | 0.000                |                                     |                    |
| SMS strategies            | 0.000               | 0.000                          | 0.000                |                                     |                    |
| Receives treatment gifts  | 0.000               | 0.000                          | 0.510                |                                     |                    |
| Signed up for ASP         | 0.664               | 0.000                          | 0.000                |                                     |                    |

Notes: Data for “SMS reminders” and “SMS strategies” come from a different question from “Receives SMS”; therefore, the coefficients do not necessarily add up. ASP take-up is measured at the time of the survey. SS and SMS indicate whether participants received messages in the last 112 months. The table reports the means for the control group for the follow-up survey, intent-to-treat (ITT) estimates, and standard errors (in parentheses) of program assignment. Variables are top-coded at 99%. Regressions include dummies for strata (defined by savings motive and receipt of subsidy), fixed effects for date of offering, branch service associate fixed effects, branch fixed effects, and a dummy indicating whether the individual was recruited by an enumerator or a branch service associate. We also include a dummy variable to control for rare cases in which branch service associate offered the program at the same hour. We apply PDS LASSO to select relevant controls from the variables included in Table 2, including dummies indicating missing values. Panel B reports the *p*-values of the comparison between the three treatment groups. We use robust standard errors. The sample size varies because of missing values. \*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.

**Table 4**

ITT effects on savings stock using survey and administrative data.

| <i>Panel A: Survey Data Outcomes</i>         | [1]<br>Control Mean | [2]<br>Savings Strategies (SS) | [3]<br>SMS Reminders | [4]<br>Automatic Savings Plan (ASP) | [5]<br>Sample Size |
|----------------------------------------------|---------------------|--------------------------------|----------------------|-------------------------------------|--------------------|
| Total formal savings                         | 544.2<br>(1117)     | 152.987*<br>(82.811)           | −22.290<br>(70.911)  | 97.991<br>(64.606)                  | 2045               |
| Total savings (including informal savings)   | 658.8<br>(1220)     | 151.277*<br>(91.242)           | −58.541<br>(77.569)  | 54.838<br>(70.572)                  | 2046               |
| <i>Panel B: P-values</i>                     |                     |                                |                      |                                     |                    |
|                                              | [1]<br>SS=SMS       | [2]<br>SS = ASP                | [3]<br>SMS = ASP     |                                     |                    |
| Saving accounts and saving for a home        | 0.0454              | 0.506                          | 0.106                |                                     |                    |
| Total savings (including informal savings)   | 0.0291              | 0.289                          | 0.162                |                                     |                    |
| <i>Panel C: Administrative-Data Outcomes</i> |                     |                                |                      |                                     |                    |
|                                              | [1]<br>Control Mean | [2]<br>Savings Strategies (SS) | [3]<br>SMS Reminders | [4]<br>Automatic Savings Plan (ASP) | [5]<br>Sample Size |
| Balance in savings accounts                  | 525.7<br>1247       | 154.092**<br>(74.723)          | −39.890<br>(66.826)  | 71.475<br>(61.462)                  | 2045               |
| Balance in CuentaRUT                         | 104.1<br>265.5      | 3.862<br>(13.680)              | −15.202<br>(14.194)  | 14.742<br>(13.271)                  | 2045               |
| Total balance (savings acct. & CuentaRUT)    | 644.6<br>1364       | 147.205*<br>(76.082)           | −62.519<br>(70.722)  | 76.168<br>(65.055)                  | 2045               |
| <i>Panel D: P-values</i>                     |                     |                                |                      |                                     |                    |
|                                              | [1]<br>SS=SMS       | [2]<br>SS = ASP                | [3]<br>SMS = ASP     |                                     |                    |
| Balance in savings accounts                  | 0.0223              | 0.293                          | 0.134                |                                     |                    |
| Balance in CuentaRUT                         | 0.207               | 0.447                          | 0.0349               |                                     |                    |
| Total balance (savings acct. & CuentaRUT)    | 0.0162              | 0.381                          | 0.0765               |                                     |                    |

Notes: The table reports the means for the control group for the follow-up survey, intent-to-treat (ITT) estimates, and standard errors (in parentheses) of the program assignment. All the amounts are measured in real US dollars (using the exchange rate as of September 2014). Panel A reports the effects on total formal savings (saving accounts and saving for a home) and total savings. Total savings include formal savings and informal savings, which include the following: saving for one's home or business, saving with another person, or savings in a *polla*. Survey was implemented between 13 and 22 months after the intervention. We present the administrative data for the same months. See also notes for Table 3.

survey data, we found that SS has positive effects that are not statistically different from ASP's. The mechanisms for the increase in balances seem to depend on the treatment arm. For the ASP treatment, we observed a permanent (within the observed period) increase in deposits and no change in withdrawals until month 10, when withdrawals begin to increase and savings balances to decrease. For SS, the patterns suggest

no effects on deposits and an increase in withdrawals after month 10. In contrast, SMS reminders have—if anything—a negative effect on savings balances and a consistent and negative impact on CuentaRUT account balances.

Note that our estimates are ITT effects. As most people received the text messages, while only one-third of the ASP treatment group signed

up for the ASP, the similarity in the estimated impacts of the SS and ASP treatments suggests that the ASP treatment has a more substantial impact on a smaller subset of individuals.

### 3.2.5. Effects on spending and borrowing patterns

We study the effects on spending and borrowing patterns, as they can be affected differently by each treatment. Also, the pattern of total balances over time—an initial rise followed by a decline—suggests that individuals may have reached their savings target and then withdrawn funds from their accounts.

The low take-up of ASP and small sample size of some of these outcomes affect the power of the estimations. Considering the minimum detectable effects reported in Tables A11 and A12, we refrain from drawing conclusions about ASP for these outcomes.

In the household survey, we asked each individual whether they had made any expenditures on the baseline goals they were saving toward in the past 12 months. We created a dummy variable that indicates whether an individual had spent money on the goal. As shown in

**Table 5**  
ITT effects on other outcomes using survey data.

|                                                | [1]                | [2]                           | [3]                 | [4]                                | [5]            |
|------------------------------------------------|--------------------|-------------------------------|---------------------|------------------------------------|----------------|
|                                                | Control<br>Mean    | Savings<br>Strategies<br>(SS) | SMS<br>Reminders    | Automatic<br>Savings<br>Plan (ASP) | Sample<br>Size |
| <i>Panel A: Expenditure</i>                    |                    |                               |                     |                                    |                |
| Has an expenditure budget                      | 0.494<br>0.500     | −0.025<br>(0.032)             | −0.045<br>(0.032)   | 0.007<br>(0.029)                   | 2049           |
| Pr. spending on baseline goal (last 12 months) | 0.336<br>0.473     | −0.006<br>(0.034)             | 0.021<br>(0.035)    | 0.026<br>(0.031)                   | 1253           |
| Expenditures on temptation goods (last month)  | 43.901<br>66.187   | −1.763<br>(4.016)             | −0.787<br>(4.126)   | 7.788**<br>(3.846)                 | 2045           |
| Total expenditure (last 12 months)             | 700.470<br>424.700 | −22.714<br>(28.415)           | −24.601<br>(27.521) | −26.787<br>(23.840)                | 2046           |
| Durable assets                                 | 417.409<br>303.991 | 7.429<br>(19.792)             | −2.737<br>(19.083)  | −0.508<br>(16.639)                 | 2010           |
| <i>Panel B: P-values</i>                       |                    |                               |                     |                                    |                |
|                                                | [1]<br>SS=SMS      | [2]<br>SS = ASP               | [3]<br>SMS = ASP    |                                    |                |
| Financial security                             | 0.231              | 0.004                         | 0.109               |                                    |                |
| Has an expenditure budget                      | 0.574              | 0.318                         | 0.111               |                                    |                |
| Pr. spending on baseline goal                  | 0.491              | 0.360                         | 0.884               |                                    |                |
| Expenditures on temptation goods               | 0.820              | 0.019                         | 0.044               |                                    |                |
| Expenditures on electronic durable goods       | 0.636              | 0.682                         | 0.906               |                                    |                |
| Total expenditure                              | 0.951              | 0.885                         | 0.936               |                                    |                |

*Notes:* The table reports the mean for the control group for the follow-up survey, intent-to-treat (ITT) estimates, and standard errors (in parentheses) of program assignment. All the amounts are measured in real US dollars (using the exchange rate as of September 2014). *Has an expenditure budget* is a dummy that takes the value 1 if the interviewee has a budget for the expenditures they want to make and 0 if they do not. Durable assets include washing machines, refrigerators, ovens, and microwaves. Panel B reports the *p*-values of the comparison between the three treatment groups. We use robust standard errors. Variables are top-coded at 99%. See notes for Table 3. The sample size varies because of missing values. \*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.

Table 5, Panel A, 33.6% of the control group reported spending money on the spending category stated at baseline in the past 12 months. However, we do not observe significant differences in goal achievement among the treatment groups.

We examine the impact of the treatments on spending on temptation goods (for example, cigarettes, alcohol, and entertainment) in the month before the survey was conducted. We also assess the effects on durable assets and total consumption in the previous month. We find that the SS and SMS treatments do not affect spending on temptation goods.

Table 6 presents our analysis of the treatments' effect on total debt and the probability of holding different types of debt.<sup>27</sup> We use self-reported data to identify the type of debt held by participants, including bank credit, line(s) of credit, retail credit card(s), consumer

**Table 6**  
Stock of debt and probability of positive debt (survey data).

|                                                             | [1]              | [2]                           | [3]                  | [4]                                | [5]            |
|-------------------------------------------------------------|------------------|-------------------------------|----------------------|------------------------------------|----------------|
|                                                             | Control<br>Mean  | Savings<br>Strategies<br>(SS) | SMS<br>Reminders     | Automatic<br>Savings<br>Plan (ASP) | Sample<br>Size |
| <i>Panel A: ITT Effects</i>                                 |                  |                               |                      |                                    |                |
| Total debt amount                                           | 1590<br>(3572)   | −11.067<br>(238.758)          | 40.271<br>(248.394)  | 31.762<br>31.762                   | 2038           |
| Bank credit                                                 | 0.111<br>(0.315) | 0.014<br>(0.023)              | 0.028<br>(0.023)     | 0.012<br>(0.020)                   | 1795           |
| Line of credit                                              | 0.069<br>(0.253) | −0.020<br>(0.016)             | −0.033**<br>(0.016)  | −0.011<br>(0.016)                  | 1754           |
| Retail credit cards                                         | 0.349<br>(0.477) | −0.018<br>(0.032)             | −0.090***<br>(0.032) | −0.016<br>(0.029)                  | 1850           |
| Consumption credit (bank, financial institution, or retail) | 0.108<br>(0.310) | −0.013<br>(0.021)             | −0.000<br>(0.021)    | −0.015<br>(0.019)                  | 1782           |
| Mortgage credit                                             | 0.055<br>(0.228) | −0.022*<br>(0.013)            | −0.012<br>(0.016)    | −0.012<br>(0.014)                  | 1728           |
| <i>Panel B: P-values</i>                                    |                  |                               |                      |                                    |                |
|                                                             | [1]<br>SS=SMS    | [2]<br>SS = ASP               | [3]<br>SMS = ASP     |                                    |                |
| Total debt amount                                           | 0.849            | 0.863                         | 0.973                |                                    |                |
| Bank credit                                                 | 0.560            | 0.940                         | 0.473                |                                    |                |
| Line of credit                                              | 0.397            | 0.550                         | 0.129                |                                    |                |
| Retail credit cards                                         | 0.033            | 0.950                         | 0.017                |                                    |                |
| Consumption credit (bank, financial institution, or retail) | 0.552            | 0.940                         | 0.479                |                                    |                |
| Mortgage credit                                             | 0.508            | 0.471                         | 0.997                |                                    |                |

*Notes:* The table reports the mean for the control group for the follow-up survey, intent-to-treat (ITT) estimates, and standard errors (in parentheses) of program assignment. Output variables consider the total debt amount reported by the respondent and dummies that take the value 1 if the participant reports having debt in the corresponding category. All data are collected at the time of the survey. Panel B reports the *p*-values of the comparison between the three treatment groups. We use robust standard errors. The sample size varies because of missing values. See also notes for Table 3. \*\*\**p* < 0.01, \*\**p* < 0.05, \**p* < 0.1.

credit, and mortgage credit. Total debt is also self-reported. The SMS treatment has a significant or sizable impact on debt, with a significant reduction in the likelihood of borrowing from a line of credit and a retail credit card. We also use administrative data to examine the impact of

<sup>27</sup> The high variance in the amounts of debt resulted in imprecise estimates.

each treatment on debt owed to the partner bank. We do not observe any significant impact for any treatment (see Fig. A3).<sup>28</sup> Finally, we conduct a difference-in-differences analysis using administrative data, with the period before the offering as the reference, analyzing whether there was an effect on debt levels 1–13 months or 14–17 months after the offering. The results, presented in Table A13, show that the SMS treatment leads to a decrease in total debt by US\$38.40 after month 13. Note that the reduction in debt observed in the survey data for the SMS treatment might not be captured in the administrative data. Thus, these results from both sources are complementary.

The expenditure results mentioned above complicate our ability to interpret the impacts of the interventions. We find no impact on achieving the saving goal for any of the treatments. Furthermore, we do not find the expected impact of the SS treatment on expenditures on temptation goods. However, we find a reduction in debt associated with the SMS treatment.

### 3.2.6. Understanding SS's effect

In the baseline survey, we asked participants whether they needed to decrease their spending on alcohol and tobacco.<sup>29</sup> Fig. 4 shows the SS treatment's impact on savings relative to the control group for two subgroups: those who wanted to reduce their alcohol and tobacco consumption (33% of the sample) and those who did not. The results indicate that the effects of the SS treatment on savings account balances and total savings are larger for, and only significant for, the former group. These findings align with the SS message, which emphasized responsible spending.

Overall, the treatment has a positive impact on savings in the short term and seems to promote greater awareness of spending. The effects are particularly pronounced for those individuals who aimed to decrease their consumption of temptation goods.

### 3.2.7. Understanding the negative SMS effect

Several hypotheses are consistent with the negative effect of the SMS treatment on CuentaRUT accounts. First, Medina (2021) finds that reminders of credit card payments reduce late-fee payment but increased overdraft fees. According to the author, this behavior is consistent with the salience produced by the SMS message: "When a prospective task becomes exogenously more salient and receives more attention, consumers overweight the importance of that one task." Second, Pomeranz and Kast (2022) study the impact of offering a free savings account and find a negative impact on debt and an unclear and sometimes negative impact on saving balances. They hypothesize this is because individuals use savings and debt as substitutes when the savings motive is precautionary. Our results are consistent with these results since individuals could use the more liquid instrument (CuentaRUT) for debt payment or to smooth consumption, but it is unclear why the text message would induce this behavior.

Alternatively, text messages may have annoyed participants, leading them to withdraw their balances from BancoEstado. However, the SS treatment also included monthly (albeit different) text messages, which

did not have a negative effect on CuentaRUT account balances. Therefore, it is likely that the SMS content—not the messages themselves—had a negative impact.

A third hypothesis is that the SMS treatment made the end goal of saving too salient; consequently, instead of inducing savings, it generated consumption. To test this hypothesis indirectly, we study the effect of spending on the savings goal reported at baseline. Our findings, presented in Table 6, Panel A, show a positive but not statistically significant impact of SMS on spending on the original goal ( $p$ -value = 0.55). There is also a substantial decrease in the probability of bearing retail debt (Table 6). Therefore, while the SMS intervention had a negative effect on CuentaRUT accounts, it did decrease retail debt.

Therefore, the evidence suggests that individuals in the SMS treatment not only read and comprehended the messages but also used their CuentaRUT balances to consume instead of resorting to debt to finance consumption. As a result, the treatment may have had a positive impact on their overall net wealth.

## 4. Conclusion

Financial inclusion and savings encouragement are critical aspects of social protection and promotion because they increase lower-income families' ability to guard against adverse economic shocks. In this paper, we evaluated several treatments aimed at promoting savings: financial services previously studied in the literature (default options and reminders) and a new intervention providing individuals with rules of thumb to encourage careful spending. Our findings indicate that both the default option and rule-of-thumb intervention had a positive impact on savings in the medium term, while the reminders had some negative effects on savings levels but may have had positive effects on net wealth as debt decreased. These results are promising, considering that the treatments represented small nudges and the savings increase was sustained for to a year after the intervention.

Different savings-promotion strategies operate via different mechanisms. ASP, by definition, increases savings by default but accumulates balances until withdrawals catch up, which starts happening in our experiment in month 10. Savings reminders decrease account balances but simultaneously decrease retail debt. The rule-of-thumb intervention operates by reducing withdrawals from savings rather than increasing deposits.

Our results are in line with previous research on the impact on savings relative to annual household income, at least for ASP and SS. Using administrative data, we found that the ITT effect on the average total balance in the first 12 months after the offer, relative to annual household income, was 0.5% for SS, −0.3% for SMS, and 0.4% for ASP. However, only the effect for SS was statistically significant. In the case of ASP, using TOT estimates, the effect relative to annual income is 2.7%.

Both the SS and ASP treatments are cost-effective. The cost of implementing SS ranges from US\$13.00 to US\$16.00. Considering that the SS intervention's maximum impact on savings balances is US\$79, the benefit-to-cost ratio is 4.9–6.0. Meanwhile, the cost to implement the ASP is negligible, making the intervention's maximum balance increase (US\$82) a net benefit.<sup>30</sup>

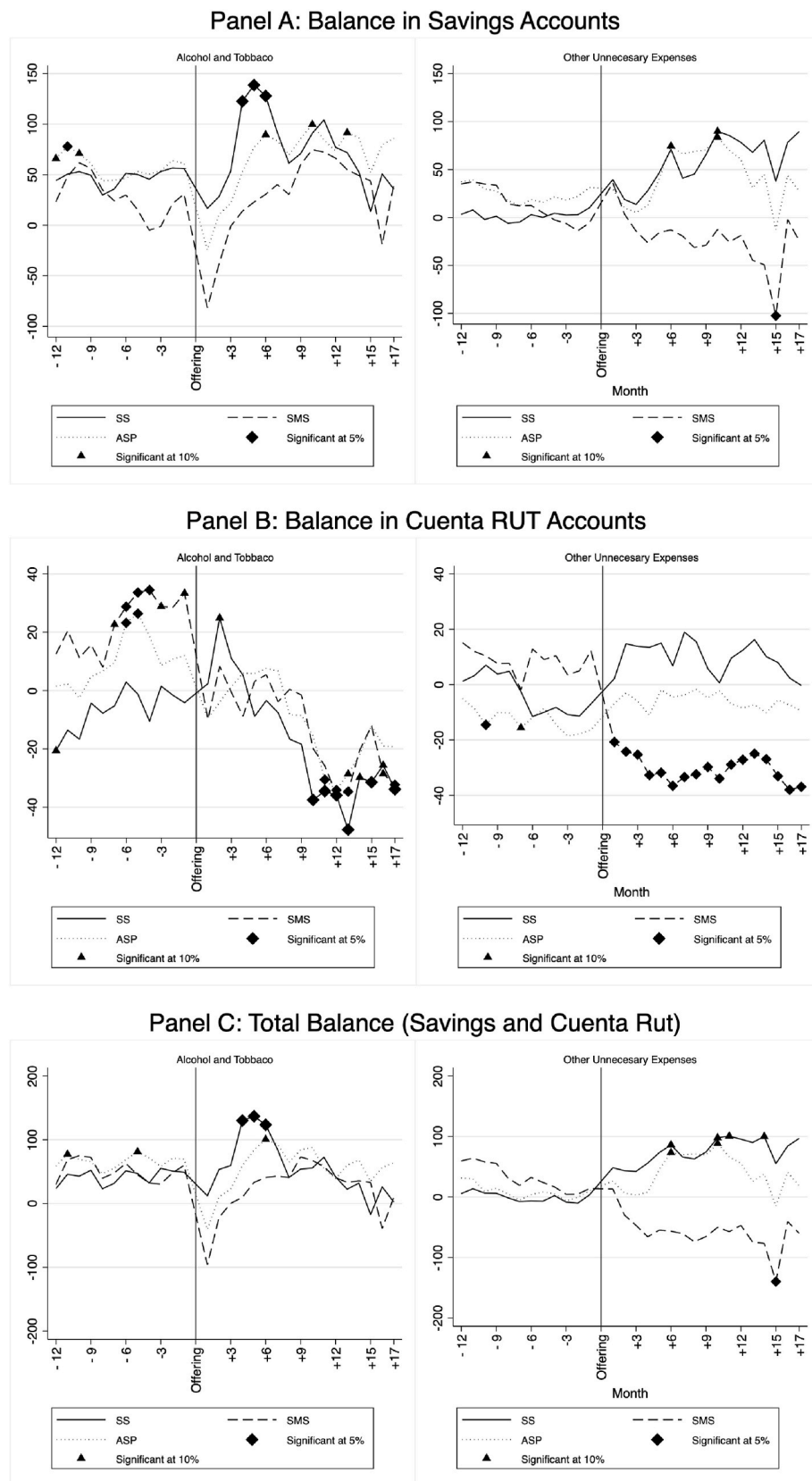
Taken together, these results show that simple and cost-effective interventions can have a sizable impact on savings. However, they also reinforce doubts about the efficacy of savings-promotion strategies to generate sustainable savings in the long run.

<sup>28</sup> We calculate net savings by adding savings, the balance in CuentaRUT, and the balance in other checking accounts and then subtracting debt. Fig. A3 shows the results for the net-savings variable. We find a similar pattern to that for the effect on total savings. The ASP and SS treatments have a positive effect, with a peak around month 10 after the offering and decreasing afterward. The SMS treatment has mostly a negative effect. However, because of the variable's variability, almost none of the coefficients are significant.

<sup>29</sup> The question was "In which of the following categories do you think you have unnecessary expenses that you could reduce? (Check only one option)." The categories were housing, clothing, communications, recreation, food, transportation, household maintenance, health and medicine, education, alcohol and tobacco, and other expenditures. We generated a dummy taking the value of 1 if the individual responded, "Alcohol drinks and tobacco" and 0 if they responded with another category or if the value was missing.

<sup>30</sup> The higher amount of US\$16.00 represents all costs, including the production of the video. Once made, however, the video can be shown to many individuals without increasing the intervention cost. For this reason, we include the lower intervention cost of US\$13.00.





**Fig. 4.** SS Treatment Heterogeneity by Type of Expenditures Participants Aimed to Decrease at Baseline

*Notes:* The figure reports coefficients from the regression of savings and CuentaRUT balances interacted with the type of expenditures individuals declared that they wanted to decrease at baseline. General notes from Fig. 2 apply.

## CRedit authorship contribution statement

**Abhijit Banerjee:** Conceptualization, Methodology, Writing – original draft. **Martínez A. Claudia:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Esteban Puentes:** Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Writing – original draft, Writing – review & editing.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jdeveco.2024.103405>.

## Data availability

Data will be made available on request.

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