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Nudging Youth to Develop Savings Habits: Experimental Evidence Using SMS Messages

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Abstract

In this working paper, we report on a field experiment articulating financial information via cellphone text messages and financial decisions among low-income youth in Colombia. For twelve months, youth accountholders are randomly assigned to receive either: (a) monthly financial education messages, (b) monthly savings reminders, (c) semimonthly reminders, or (d) control. After 12 months, account balances in monthly and semimonthly reminders groups increase by 28% and 43%, respectively, relative to controls. Financial education messages do not increase balances. Over two thirds of balance increases in reminder groups are net savings. Savings effects of reminders last eight months after youth stop receiving messages.

Key words: Financial Education, Reminders, SMS, Youth, Savings, Field Experiments

Given the growing complexity of financial products and the increased expectation of financial self-reliance in adulthood, financial capability is rapidly becoming a policy priority for countries across the world. More than fifty countries have recently developed a national financial education strategy and many others are following suit (Organisation for Economic Co-operation [OECD], 2014). The limited research to date, however, highlights the difficulty of improving youth financial capabilities through school-level financial education programs (notable exceptions are Bruhn et al., 2013; Berry, Karlan, & Pradhan, 2015). Challenges that these financial education programs face include the fact that the information they deliver rarely sticks because it is not relevant to imminent decisions, not understood, and not reinforced (e.g., Hathaway & Khatiwada, 2008; Sherraden et al., 2011). As a result, though programs typically show improved financial knowledge, attitudes and self-reported changes in behavior (e.g., tracking expenses) demonstrate positive impacts on actual savings or other financial outcomes such as wealth accumulation (e.g., Bernheim, Garret, & Maki, 2001; Bruhn et al., 2013).

At the same time, recent evidence suggests that providing low-income youth with access to savings accounts may promote asset accumulation, enhance positive aspirations, and promote educational attainment and orientation towards long-term goals (Curley, Ssewamala, & Han, 2010; Destin & Oyserman, 2009; Kalyanwala & Sebstad, 2006; Sherraden, 1991). One major drawback of these studies is their scope for scalability. Most of these savings accounts interventions implemented to date rely on matching fund strategies, all of which are costly and difficult to replicate and scale.

In this working paper, we aim to experimentally test an inexpensive, low-touch intervention that jointly addresses the challenges of traditional financial education programs and of youth savings strategies by using cellphone text messages (SMS) with financial educational content and savings

reminders. A number of innovative design features of our study make it a unique learning opportunity. The intervention is targeted to low-income youth, who typically exhibit low levels of financial inclusion and financial literacy (Lusardi, Mitchell, & Curto, 2010).¹

Unlike many existing financial capability programs, our intervention articulates financial information to actual financial decisions. We conduct our field experiment in partnership with one of Colombia's leading commercial banks, which enables us to effectively measure how different types and intensity of SMS influence the formal savings patterns of youth, something unique in the literature as most of the available research is based on self-reported savings measures.

The financial information content we deliver through cellphone SMS is aimed at tackling barriers that create patterns of behavior that are potentially time-inconsistent (e.g., Laibson, 1997). These barriers can take three forms: (1) limited information (e.g., Thaler, 1994), (2) limited self-control (e.g., Banerjee & Mullainathan, 2010), and (3) limited attention (Karlan et al., forthcoming).

We randomly allocate 10,000 youth accountholders to one of four experimental conditions. The first experimental group received 12 monthly financial education SMS in the form of nudges. The second group received 12 monthly savings reminders. The third group received 24 semimonthly savings reminders. The control group received no messages.

The “financial education” treatment provides educational content aimed at helping youth determine spending priorities and using savings heuristics to achieve savings goals. It tests the limited information hypothesis among low-income youth in a developing context. The monthly and semimonthly reminders are aimed at testing—with various degrees of intensity—the limited self-control and limited attention hypotheses. If time-inconsistent behavior in low-income youth arises from changing valuations of present versus future consumption (i.e., limited self-control), reminders will not lead to increased savings. Reminders will increase savings if time-inconsistent behavior in youth stems from forgetful behavior (i.e., limited attention, Karlan et al., forthcoming).

We find that simple financial information delivered through SMS improves savings outcomes among youth and that message content matters. Consistent with the limited attention hypothesis, youth accountholders who receive reminders increase account balances in over 30% relative to control accountholders during the 12-month period in which they receive SMS. The financial education treatment, in contrast, does not increase savings, suggesting that limited information may not be the most binding barrier that prevents youth from saving. We calculate that no less than two-thirds of the increase in account balances among the monthly and semimonthly reminder treatment groups represents a net increase in savings and that no more than the remaining one-third represents substitution away from savings at home (Berry, Karlan, & Pradhan, 2015).

Lower account withdrawals and not higher deposits drive the higher account balances among youth assigned to either of the two reminder treatments. This finding is consistent with the idea that reminders help overcome psychological barriers preventing low-income youth from creating savings habits by bringing savings to one's immediate attention and highlighting the potential reward (Oaten & Cheng, 2007).

¹ For instance, in our initial focus-group interviews we found that low-income youth have an interest in saving and at the same time lack knowledge on how to save.

The savings effects of reminders are long-lasting: Eight months after youth stopped receiving messages, those initially assigned to savings reminders still maintained significantly higher balances in their bank account relative to the financial education treatment or control groups. The lasting impacts on savings among youth accountholders assigned to the reminder groups are not, however, the result of continued behavior changes (i.e., reduced withdrawals) but rather the lasting effect of those initial behavioral changes induced by the reminders.

None of the treatments had measurable effects on self-control over expenses, financial knowledge as measured by a question on understanding the concept of interest compounding or educational aspirations (Bruhn et al., 2013). Taken together, the results of our study highlight the difficulty of changing the long-term behavior among youth but how reminders in particular may be very effective at changing short-term savings behavior and how those initial changes in behavior may have lasting impacts on savings.

This working paper builds on recent research on approaches to increase formal savings in developing countries. Though previous studies have analyzed how SMS can promote adult savings (e.g., Kast et al., 2012; Karlan et al., forthcoming), none have explicitly analyzed whether differences in content or frequency of messages matters. Unlike prior studies, our findings are not limited to a population with prespecified and explicit savings plans or to bank accounts with built-in commitment devices. Youth in our experiment open and use a transactional account, suggesting that reminders are effective even for individuals who are not explicitly committed to savings. Our data allow us to examine both whether SMS have lasting impacts and also the channels by which they increase savings, questions unanswered until now (Bruhn et al., 2013). Our study also complements recent findings on potential substitution between home and formal banking savings among youth (e.g., Berry, Karlan & Pradhan, 2015).

We then present the background and context in which the randomized control trial took place. We detail the research questions and how we address them through our research design. We describe the data and our empirical strategy respectively. Finally, we present results and conclusions.

Background and Context

This research project began as part of the YouthSave initiative. YouthSave is a five-year project that started in 2009 aiming to demonstrate and build knowledge on how access to savings products and enhanced financial knowledge may increase savings and assets, and improve the life chances of low-income youth in four developing countries—Colombia, Ghana, Kenya, and Nepal.²

The field experiment we report in this paper takes place in the Colombia site. Colombia has levels of bank financial penetration comparable to other Latin American countries. Most Colombian banks offer a wide portfolio of services for individuals and companies, but others are more focused on institutional customers or special client groups, notably youth. For instance, nine of Colombia's 23 banks offer youth-specific financial products. These accounts typically have lower costs than savings accounts for adults and some even offer prizes (e.g., movie tickets, toys) as part of long-term fidelity strategies.

² For more information on the YouthSave initiative please visit www.newamerica.org/youthsave.

Despite being an upper middle-income country and having high levels of financial penetration, Colombia has low levels of financial inclusion, particularly among the poor and the young. For example, only 24% among the poorest 40% of individuals aged older than 15 years have an account with a formal financial institution—typically a savings account—compared to 41% in other Latin American and the Caribbean (LAC) countries and 63% in other upper middle-income countries. Similarly, only 28% of Colombian young adults (aged 15–24 years) have an account, compared to 37% in LAC and 58% in upper middle-income countries (Financial Inclusion Data, Global Findex, 2015).

Financial capabilities among Colombian youth are also comparatively low. Relative to youth in a pilot sample of other Latin American and OECD countries, Colombian youth score relatively poorly on dimensions such as saving; nonimpulsivity; future orientation; and financial knowledge on concepts such as the time value of money, interest, and compounding (Bruhn, Reddy, & Tan, 2013).

Banco Caja Social (BCS bank)—the partner bank in the YouthSave research agenda—is one of Colombia’s oldest banks. Established in 1911 by the Jesuit community, BCS bank aims to provide financial services to micro, small, and medium-sized enterprises and to low- and medium-income households. It continues to target financial services primarily towards low-income urban populations in Colombia. Of the bank’s 4.8 million clients (the 8th largest nationwide), about half earn less than the national average of USD 440 per month, and about one-third earn less than the minimum statutory wage of US 250 per month. These shares of low-income clients are the highest among all banks with the exception of the government’s rural bank. Over 80% of BCS bank’s branches and clients are in cities.

Tuticuenta and *Cuenta Amiga* are the two bank accounts BCS bank offers the youth market. We chose *Tuticuenta* account holders as the population of our study for two reasons. First, the *Tuticuenta* account is a transactional account similar to other accounts available to youth in Colombia and other countries. *Tuticuenta* charges no monthly fees, no ATM transaction fees, and no fees for online transactions. *Tuticuenta* also has a very low minimum opening balance of USD 4. *Cuenta Amiga*, by contrast, has a higher opening balance of USD 10, imposes withdrawal restrictions, and charges fees for certain transactions.³

Second, *Tuticuenta* has been in existence since 1997 whereas *Cuenta Amiga* has only been offered to clients since 2012. Therefore, BCS bank salespersons are more proficient at selling *Tuticuenta* accounts. For example, a typical month sees about 4,000 youth open a *Tuticuenta* account whereas about only 200 open a *Cuenta Amiga* account. Statistical power and sample size considerations implied that only with *Tuticuenta* accounts would we be able to detect economically meaningful minimum effect sizes.

³ BCS bank markets the two accounts differently. *Tuticuenta* is marketed as a transactional account whereas *Cuenta Amiga* is marketed as a savings account with commitments.

Research Questions and Experimental Design

In this study, we causally address six research questions using a field-experimental research design:

1. How does information that reinforces and is intimately tied to savings decisions affect savings outcomes?
2. Which type of information is better at reinforcing savings decisions?
3. How does the intensity of reminders affect savings?
4. How does content or varying intensity interact with youth characteristics such as age and gender?
5. Do the marginal benefits of exposure start to decrease at some point?
6. How long the effects (if any) last beyond the treatment period?

These questions and the experimental design are important for a number of reasons. First, most financial education interventions are not embedded in real financial decision making contexts (e.g., Berry, Karlan, & Prahdan, 2015; Bruhn et al., 2013). Our intervention enables us to explore whether simple financial information tied to savings decisions improves actual savings outcomes among youth. Second, we are also able to test whether specific forms of financial information lead to actual behavior changes with respect to formal savings. Specifically, we will be able to address questions about the relative effectiveness of different content, varying frequency and temporal dimensions associated with the persistence and optimality of financial information. Third, it is not clear whether interventions—such as reminders—that have been successful among adult populations can be similarly effective among youth, especially because youth and adults’ neurological processes differ (Blakemore & Chowdury, 2006). Our project is, to our knowledge, the first to use cellphone SMS technology to increase financial capabilities among youth.

Our experimental design has three treatments and one control condition. In the “financial education” treatment, *Tuticuenta* accountholders receive a monthly SMS with a savings nudge for one year. The “financial education” messages strive to promote awareness about the importance of saving as a way to achieve goals and offer clear, practical information and tips to promote and accomplish these goals. Microfinance Opportunities (MFO) designed the content and language of the each message. Based on MFO’s extensive financial education curricula for youth and market research in Colombia conducted by BCS bank and Save the Children for YouthSave the key themes of the SMS messages are (1) the prioritization of spending and difference between wants vs. needs; (2) the reduction of unnecessary expenditures; (3) the importance of budgeting and planning ahead; (4) the development of a savings habit and, (5) saving in secure places and with social support. Appendix Table A1 shows the content, order, and MFO rationale for each message.

Youth accountholders in treatment 2 receive a monthly savings reminder SMS for one year (i.e., 12 reminders). The “monthly reminder” SMS is the same every month. The message states: “Remember to save in your *Tuticuenta*! This way you will be one step closer to your goals and make your dreams come true. Banco Caja Social.”⁴ Youth accountholders in the “semimonthly reminder”

⁴ We worked closely with BCS bank and Save the Children in the exact wording of the messages.

treatment received the same reminder message as those in the “monthly reminder,” but semimonthly instead of monthly for a period of one year (i.e., 24 reminders).⁵

We used a stratified randomization design to assign accountholders to the different experimental conditions. Each stratum is defined by month of account opening and bank branch. This stratified design helps us balance socioeconomic characteristics across the four experimental conditions and improves statistical power.⁶ Youth who opened a *Tuticuenta* account in February, March, or April of 2012 in any of the 263 bank branches nationwide were initially eligible to participate in the experiment.⁷ A total of 14,788 youth are part of this initial selection.

We impose two additional restrictions on the final experimental sample. First, because the delivery channel for the treatment is through SMS, we only included youth accountholders who at the time of account opening registered a personal cellphone number in the account application form. This eliminates 3,442 youth account holders from those in the initial selection.

Second, among youths with a cellphone, we only included youths who opened a *Tuticuenta* account in a branch in which at least three other youths opened *Tuticuenta* accounts. This restriction guaranteed that for each stratum we would have at least one youth assigned to each of the four experimental conditions. This restriction further eliminates 1,293 youth from the experimental sample. Appendix Table A2 shows average characteristics of youth included and excluded from the experimental sample after imposing our two restrictions. Youths excluded from the experimental sample tend to be, on average, younger, predominantly male and predominantly attending primary school. As expected, these younger accountholders were typically less likely to have a cellphone at the time of account opening.

The final experimental sample contains 10,053 accounts. Table 1 shows the distribution of accounts in this sample by experimental condition and month of opening. Twenty three percent of youths in the final sample are assigned to the “financial education” treatment, 26% to the “monthly reminders” treatment, 24% to the “semimonthly reminders” treatment, and 28% to the control respectively.

⁵ All youth, including those in the control group received one initial welcome text message that congratulated them for opening the account.

⁶ As noted, about 4,000 youth nationwide open a *Tuticuenta* account in a given month. Our power calculations indicated that we needed around 10,000 youths to attain enough statistical power (80%) to detect a 5% average change in outcomes of interest in any pairwise treatment comparison (reminders vs. financial educational content, monthly vs. semimonthly reminders), 80% power to detect a 5% difference in any particular treatment versus control, and close to 90% power to detect a 5% average increase in any outcome of interest for comparisons between treatment relative to the control condition. Given that power calculations suggested we needed only 10,000 individuals we actually randomly chose 80% of the youth who opened the account in April 2012.

⁷ The three-month block we chose was the earliest one possible given administrative issues such as when agreements between BCS bank and the research partners were concluded or when the SMS were designed. Analyzing the number of *Tuticuenta* accounts opened in other months of the year we find a similar trend for all months except for December when the number of accounts opened dropped to 2,660 or in May when they increased to 6,403. Figure A1 in the appendix depicts the timeline of *Tuticuenta* number of accounts opened and the months were the youths in the RCT were chosen.

Table 1. Randomization of accounts into treatment and control groups by month of account opening

Group	February	March	April	Total
Financial education	711	738	809	2,258
Monthly reminder	827	868	900	2,595
Semimonthly reminders	769	801	850	2,420
Control group	890	923	958	2,780
Total accounts	3,200	3,343	3,517	10,053

Note: We used a stratified randomization design to assign accountholders to the different experimental conditions. Each stratum is defined by month of account opening and bank branch. Youth who opened a BCS *Tuticuenta* account in February, March or April of 2012 in any of the 263 BCS bank branches nationwide were initially eligible to participate in the experiment. A total of 14,788 youth are part of this initial selection. We imposed two additional restrictions on the final experimental sample that jointly eliminate 4,735 accounts from the sample. First, we only included youth accountholders who at the time of account opening registered a personal cellphone number in the account application form (3,442 accounts). Second, among youths with a cellphone, we only included youths who opened a *Tuticuenta* account in a branch where at least three other youths opened *Tuticuenta* accounts (1,293 accounts).

Youth assigned to each experimental treatment began receiving cellphone SMS the month following account opening. (Youth who opened the account during February [March/April] of 2012 received their first SMS in March [April/May] of 2012 and their last one in February [March/April] of 2013.) The first monthly message was sent to all treatment groups on a workday between the 15th and 20th calendar day of the month. Youth accountholders in the “semimonthly reminder” treatment received the second reminder on a workday at the end of the month.⁸

Data and Balance Checks of Randomization Design

Data

We use three sources of data. The first two sources are bank administrative data from baseline account opening application forms and monthly account balance and transactions data. The third data source is a phone survey we administered to a subsample of experimental subjects in December 2012 nine months after we sent the last SMS to the treated groups.

Account opening data

We obtained de-identified baseline information on all 10,053 accountholders in the experimental sample from BCS bank’s standard account opening form. This information includes gender, age, educational attainment, whether the youth is currently enrolled in school, marital status, socioeconomic strata of residence,⁹ whether the youth has ever migrated, bank branch where the account was opened, whether the youth has an email account, and whether the youth has a cellphone (and, if so, the number).

⁸ In some months, we were not able to send the messages in these exact periods because of specific Colombian holidays or during the New Year holiday where the second message for the all youth belonging to the third treatment group was actually sent in early January 2013.

⁹ Colombia has six different wealth strata wherein stratum one has those households residing in the poorest neighborhoods in the country and stratum six those in the wealthiest ones. Its main objective is the cross-subsidization of public services.

Transactional data

We received from BCS bank de-identified matched data with monthly account information on all 10,053 accountholders in the experimental sample for up to 20 months after initial account opening. These data include account status (active, dormant, closed), account balance, number and value of deposits, and number and value of withdrawals. Bank transactional data enable us to estimate impacts on actual savings outcomes. This overcomes many of the challenges of prior studies based on self-reported outcomes (e.g., Harter & Harter 2007; Schug & Hagedorn, 2005) and outcomes only immediately after the intervention ends (e.g., Loke, Choi, & Libby 2015).

Follow up phone survey data

One drawback of only analyzing BCS bank transactional data is that we otherwise lack information on savings elsewhere. To circumvent this challenge, nine months after the last SMS was sent, BCS bank contacted a random sample of about 1,600 of the 10,053 account holders in the experimental sample and administered a short telephone survey. The survey also enabled us to measure the extent to which youth received the SMS messages, their educational expectations and to collect information on one simple financial knowledge question related to interest compounding. Appendix Table A3 presents the phone survey questions.

Baseline balance checks on randomization design

Our stratified randomization design successfully balanced average characteristics across the four experimental groups (Table 2). The last column in Table 2 shows the p-value of a joint test of equality of means across our three treatments and control groups. As expected from randomization, groups are balanced in terms of age, gender, socioeconomic stratum (a proxy for household income based on residential location), marital status, school attendance, and past migration. On average, youth in our sample are aged 12 years and are equally distributed among boys and girls. The vast majority belongs to a low economic stratum household and are currently attending school either in primary or secondary level. Finally, almost 25% of these youth are migrants.

Table 2. Randomization Balance

Youth Characteristic	Control	Monthly Financial Education	Monthly Reminder	Semimonthly Reminder	P-value of joint test of equality of means across four treatment groups
Age	12.43 (2.93)	12.26 (2.84)	12.25 (3.06)	12.33 (2.88)	0.108
Male	0.47 (0.50)	0.49 (0.50)	0.48 (0.50)	0.49 (0.50)	0.609
Strata 1 or 2	0.27 (0.44)	0.28 (0.45)	0.27 (0.45)	0.29 (0.45)	0.623
Strata 3 or 4	0.38 (0.49)	0.36 (0.48)	0.38 (0.49)	0.37 (0.48)	0.406
Strata 5 or 6	0.03 (0.17)	0.02 (0.15)	0.03 (0.17)	0.02 (0.14)	0.202
Strata missing	0.32 (0.47)	0.34 (0.47)	0.32 (0.47)	0.32 (0.47)	0.522
Unmarried	0.99 (0.06)	0.99 (0.05)	0.99 (0.07)	0.99 (0.05)	0.385

Not in school	0.01 (0.10)	0.01 (0.10)	0.01 (0.10)	0.01 (0.09)	0.870
Attending primary school	0.47 (0.50)	0.49 (0.50)	0.50 (0.50)	0.49 (0.50)	0.254
Attending secondary school	0.49 (0.50)	0.48 (0.50)	0.47 (0.50)	0.48 (0.50)	0.511
Attending vocational college	0.01 (0.11)	0.01 (0.08)	0.01 (0.11)	0.01 (0.10)	0.401
Attending university	0.01 (0.11)	0.01 (0.10)	0.01 (0.09)	0.01 (0.10)	0.556
Migrant	0.24 (0.42)	0.25 (0.43)	0.25 (0.43)	0.25 (0.43)	0.503
Number of accounts	2,780	2,258	2,595	2,420	

Notes: Table shows tests of equality of means of key socioeconomic variables across four treatment groups. These variables are obtained from BCS bank's account application form and include age, gender, socioeconomic stratum (classification of residential property should receive public services, it is performed mainly to charge differentially public services), marital status, education level, and migrant (it is a dummy variable and it is true if accountholder opened Tuticuenta account in a different municipality of his birth). Socioeconomic stratum is a proxy for household wealth based on residential location taking the values of 1 (lowest) to 6 (highest).

Empirical Strategy

Our empirical strategy exploits the randomization design and structure of the transactional data to maximize efficiency. Specifically, for each transactional data outcome, we estimate by the method of seemingly unrelated regressions (SUR) the following system of equations:

$$Y_{i,m} = \gamma_{1,m}FE_i + \gamma_{2,m}MR_i + \gamma_{3,m}SMR_i + X'_i\beta_m + \rho_{b,m} + \varepsilon_{i,m}$$

$Y_{i,m}$ represents the savings outcome of interest (account status, withdrawals, deposits, account balance) of youth i in each month m during the 12 months of the intervention; FE_i , MR_i and SMR_i represent dummy variables indicating if the youth i belongs to the financial education, the monthly or the semimonthly reminder treatment group respectively (the control group is the omitted category). We pool all data and normalize m to represent number of months since account opening rather than calendar month since not all youth in the experimental sample opened the account in the same month. We estimate the system of equations separately for financial outcomes during the first 12 months in which youth in the treatment groups receive messages and for financial outcomes in months 13 through 20, during which youth in the treatment groups no longer receive messages. System of equations also includes account opening baseline controls and branch (b) by month of opening (m) fixed effects $\rho_{b,m}$ to account for the stratified random assignment design; $\varepsilon_{i,m}$ are error terms allowed to arbitrarily covary for each youth across equations.

The coefficients of interest are of course $\gamma_{1,m}$, $\gamma_{2,m}$, and $\gamma_{3,m}$, which provide estimates of the causal effect of being eligible to receive a particular kind of SMS message on the outcomes of interest in each month m . In other words, they correspond to Intent-to-Treat effect estimates.

The simplest null hypothesis to test is whether for each treatment and month of exposure its impact is equal to zero, that is if $\gamma_{j,m} = 0$ for each treatment j and month of exposure m . Under SUR however we can further test two additional hypotheses related to our research questions. First, we can test if the coefficients of interest for *all* months for each of the treatments are different from zero. Second, for each month we are able to estimate whether there is any difference on the impact between any two particular treatments. For example, we can test if there are differential impacts according to the intensity of the treatment (comparing monthly vs. semimonthly reminders) or on

the type of information and message delivered (comparing for example financial education and monthly reminders).

The information available allows us to further investigate if the impact varies according to basic youths' socioeconomic characteristics, our fourth research question. Similarly, given that we have transactional information for eight months after all three treatments ended we can evaluate how long the effects (if any) last beyond the treatment period. To do so, as noted earlier, we estimate the system of equations (1) by SUR on transactional data for post treatment months (month 13 through 20 after initial account opening).

To understand the extent to which treated youth recall receiving the SMS messages—informative about the effect of treatment assignment on treatment usage or take-up—and if the SMS treatments had any effect on savings displacement, educational expectations or simple financial knowledge of youths we use data from our phone survey administered nine months after treated youth received the last SMS. Because these are cross-sectional data we analyze survey responses using ordinary least squares regressions in which each outcome is regressed on three separate treatment group assignment indicators, controlling for baseline youth characteristics.

Financial Behavior Impacts during the 12 Months of Exposure to Treatment

In this section, we present results on the impact of the different SMS treatments on financial outcomes during the 12 months of exposure to treatment: account closing, account dormancy, net account balance, deposits and withdrawals and heterogeneity by age and gender.

Impacts on account closing

Table 3 shows results of our SUR estimation strategy in which the dependent variable is an indicator that equals one if the account in month m was closed and zero otherwise. After 12 months only 3.5% of the youth in the control group had closed their account. Table 3 also reveals that none of the three treatments had a significant impact on this outcome. As the joint test statistics at the bottom of the table show, we cannot reject the joint hypothesis that the corresponding treatment effect on account closing probability is zero in all months for all three treatments. Neither the content nor the intensity of SMS has an impact on account closure.

Table 3. BCS Bank's *Tuticuenta* Account Closure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semimonthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Closed Account After 1 Month	0.010	-0.002 (0.002)	0.001 (0.002)	-0.004* (0.002)	2.6 (0.10)	0.27 (0.60)	4.79 (0.03)
Closed Account After 2 Months	0.012	-0.002 (0.002)	0.001 (0.003)	-0.004 (0.003)	0.92 (0.34)	0.5 (0.48)	2.92 (0.09)
Closed Account After 3 Months	0.013	0.000 (0.003)	0.000 (0.003)	-0.004 (0.003)	0.02 (0.89)	1.63 (0.20)	2.11 (0.15)
Closed Account After 4 Months	0.017	0.000 (0.003)	-0.001 (0.003)	-0.004 (0.003)	0.05 (0.83)	1.58 (0.21)	1.17 (0.28)
Closed Account After 5 Months	0.018	0.000 (0.003)	-0.001 (0.003)	-0.004 (0.003)	0.11 (0.74)	1.28 (0.26)	0.68 (0.41)
Closed Account After 6 Months	0.021	0.001 (0.004)	-0.002 (0.004)	-0.003 (0.004)	0.76 (0.38)	1.59 (0.21)	0.17 (0.68)
Closed Account After 7 Months	0.023	0.002 (0.004)	0.000 (0.004)	-0.003 (0.004)	0.23 (0.63)	1.83 (0.18)	0.83 (0.36)
Closed Account After 8 Months	0.024	0.003 (0.004)	0.001 (0.004)	-0.002 (0.004)	0.2 (0.65)	1.77 (0.18)	0.84 (0.36)
Closed Account After 9 Months	0.027	0.003 (0.004)	0.002 (0.004)	-0.003 (0.004)	0.14 (0.71)	1.82 (0.18)	1.03 (0.31)
Closed Account After 10 Months	0.029	0.005 (0.004)	0.005 (0.004)	0.000 (0.004)	0.00 (0.96)	1.00 (0.32)	0.97 (0.32)
Closed Account After 11 Months	0.033	0.005 (0.005)	0.003 (0.005)	0.000 (0.005)	0.24 (0.62)	1.21 (0.27)	0.41 (0.52)
Closed Account After 12 Months	0.035	0.006 (0.005)	0.005 (0.004)	-0.001 (0.005)	0.07 (0.80)	1.62 (0.20)	1.11 (0.29)
F- Stat for each group		9.81	13.22	7.7			
P-Value		(0.63)	(0.35)	(0.81)			
Observations		10053					

Notes: Table shows the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Impacts on account dormancy

Dormancy is defined as an account with no deposits or withdrawals in six or more consecutive months. By definition, no account is dormant in months one through five of exposure to treatment. Six months after initial exposure to treatment, however, 46% of youths in the control group have a dormant account and the percentage increases to 60% after 12 months (Table 4).

Table 4. BCS Bank’s *Tuticuenta* Account Dormancy

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Dormant Account After 6 Months	0.466	-0.030** (0.013)	-0.019 (0.012)	-0.016 (0.012)	0.76 (0.38)	1.29 (0.26)	0.08 (0.78)
Dormant Account After 7 Months	0.514	-0.035*** (0.013)	-0.018 (0.012)	-0.022* (0.012)	1.79 (0.18)	1.05 (0.31)	0.09 (0.76)
Dormant Account After 8 Months	0.544	-0.036*** (0.013)	-0.011 (0.012)	-0.017 (0.012)	3.85 (0.05)	2.20 (0.14)	0.22 (0.64)
Dormant Account After 9 Months	0.567	-0.032*** (0.013)	-0.011 (0.012)	-0.013 (0.012)	2.62 (0.11)	2.10 (0.15)	0.02 (0.88)
Dormant Account After 10 Months	0.586	-0.027** (0.013)	-0.009 (0.012)	-0.013 (0.012)	1.88 (0.17)	1.17 (0.28)	0.08 (0.78)
Dormant Account After 11 Months	0.600	-0.026** (0.012)	-0.010 (0.012)	-0.012 (0.012)	1.63 (0.20)	1.39 (0.24)	0.01 (0.93)
Dormant Account After 12 Months	0.608	-0.018 (0.012)	-0.006 (0.012)	-0.010 (0.012)	0.83 (0.36)	0.36 (0.55)	0.10 (0.76)
F- Stat for each group		10.06	3.87	3.81			
P-Value		(0.18)	(0.79)	(0.80)			
Observations		10053					

Notes: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

SMS treatment status does not affect account dormancy. Estimates by month of the financial education treatment dummy are typically negative in sign and statistically insignificant. We cannot reject the null hypothesis that the impact of the financial education treatment on account dormancy

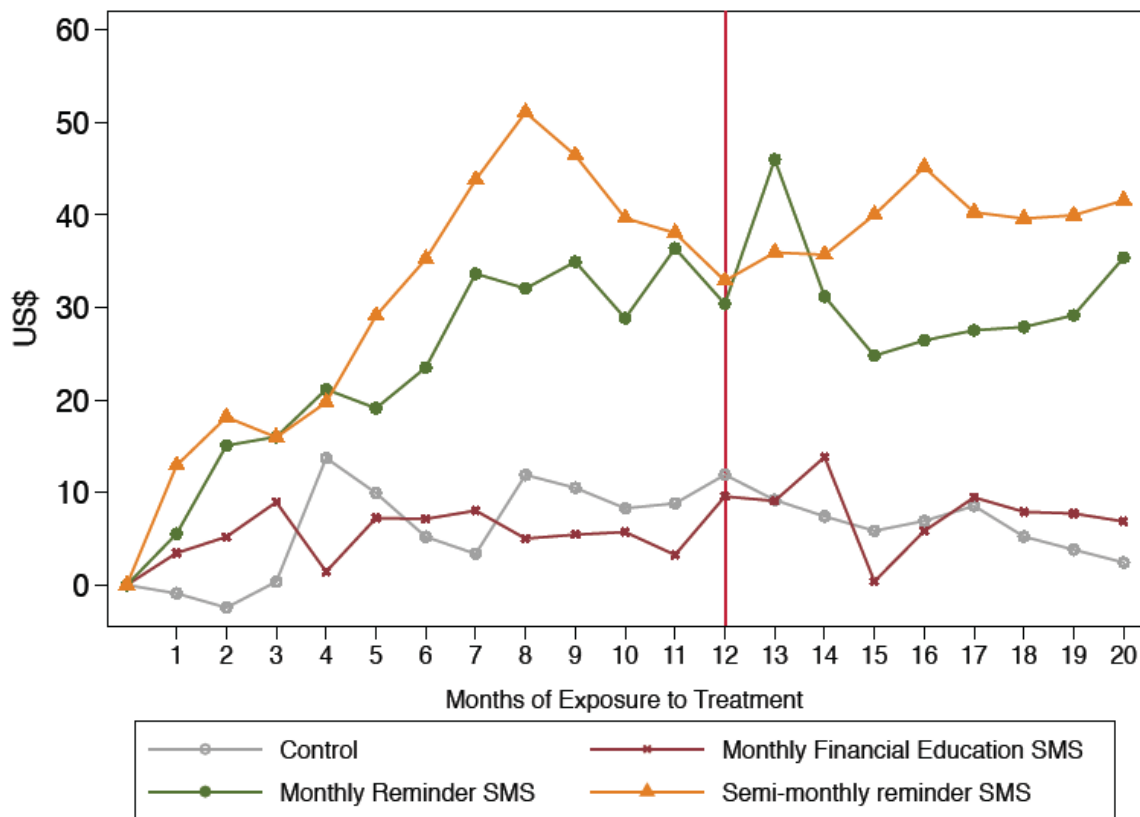
is equal to the impact of the monthly reminders treatment. Also, as the bottom panel of Table 4 indicates, we cannot reject the joint null hypothesis that six to 12 months after initial exposure to the SMS, the impacts of the financial education treatment, the monthly reminder treatment and the semimonthly reminder treatment are zero.

The fact that there are no differences across treatment groups in *Tuticuenta* account closing or account dormancy support attributing a causal interpretation to differences in *Tuticuenta* account balances across the various treatment groups.

Impacts on net account balances

Figure 1 displays the paper’s main results. The figure shows the evolution over time of average net *Tuticuenta* account balances for each treatment group. Balances are normalized to zero with respect to the first month’s average balance in each group. Similarly, months are normalized with respect to account opening month. The vertical line at month 12 depicts the end of the intervention period.

Figure 1. Net *Tuticuenta* Account Balances over Time by Treatment Assignment Status



Note: Figure shows the evolution over time of average net *Tuticuenta* account balances for each treatment group. Balances are normalized to zero with respect to the first month’s average balance in each group. Similarly, months are normalized with respect to account opening month. The vertical line at month twelve depicts the end of the intervention period. Balances converted to US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

During the 12 months of exposure to treatment, there are no differences in average net *Tuticuenta* account balances between youths assigned to the financial education SMS treatment and those assigned to control. By contrast, there are large differences over time in average net account balances between youths assigned to either of the two savings reminder groups and those assigned to control and financial education groups. These differences emerge early on and last for the duration of (and beyond) exposure to treatment. By month 12, average net account balances in both reminder treatments are about \$30 larger as those in either the financial education treatment or control (about \$10). Figure 1 also shows that during the twelve months of exposure to the SMS treatments, no differences in net account balances emerge between the monthly and semimonthly reminder treatment groups.¹⁰

SUR regression results of net *Tuticuenta* account balances are analogous to those in Figure 1 and allow formal testing of various hypotheses (Table 5). Relative to youths assigned to control conditions, the financial education SMS treatment does not increase average account balances; we cannot reject the null hypothesis that the financial education treatment effects during the 12 months of exposure are jointly zero (F-stat=11.54, p-value=0.48, Column 2).

Table 5. Accumulated Net *Tuticuenta* Account Balances

SUR Equation Outcome	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Net Savings After 1 Month	22.3	5.3 (7.2)	6.9 (7.0)	15.5** (7.1)	0.05 (0.82)	1.87 (0.17)	1.41 (0.24)
Net Savings After 2 Months	74.8	8.9 (9.2)	17.7** (8.9)	22.56** (9.1)	0.88 (0.35)	1.94 (0.16)	0.23 (0.639)
Net Savings After 3 Months	75.5	10.9 (9.2)	15.1* (8.9)	18.6** (9.1)	0.2 (0.65)	0.64 (0.42)	0.14 (0.71)
Net Savings After 4 Months	103.2	-9.5 (10.9)	7.8 (10.5)	9.5 (10.7)	2.46 (0.12)	2.88 (0.09)	0.02 (0.88)
Net Savings After 5 Months	108.8	-1.3 (10.7)	9.4 (10.3)	20.8** (10.5)	0.96 (0.33)	4.04 (0.04)	1.16 (0.28)
Net Savings After 6 Months	86.0	3.5 (11.1)	18.6* (10.7)	32.6*** (10.9)	1.80 (0.18)	6.49 (0.01)	1.60 (0.21)
Net Savings After 7 Months	67.8	6.2 (12.7)	30.8** (12.2)	43.1*** (12.4)	3.67 (0.06)	8.07 (0.00)	0.97 (0.21)
Net Savings After 8 Months	44.4	-4.6 (15.5)	20.2 (14.9)	43.1*** (15.2)	2.49 (0.11)	9.01 (0.00)	2.23 (0.21)
Net Savings After 9 Months	40.8	-0.2 (14.1)	27.5** (13.5)	41.9*** (13.8)	3.76 (0.05)	8.45 (0.00)	1.05 (0.30)
Net Savings After 10 Months	51.8	1.4 (13.2)	22.5* (12.6)	35.8*** (12.9)	2.51 (0.11)	6.51 (0.01)	1.05 (0.31)
Net Savings After 11 Months	53.8	-2.4 (13.4)	27.7** (12.8)	32.7** (13.2)	4.96 (0.03)	6.55 (0.01)	0.14 (0.71)
Net Savings After 12 Months	70.3	1.1 (13.1)	17.8 (12.5)	24.3* (12.8)	1.58 (0.21)	2.98 (0.08)	0.25 (0.62)

¹⁰ Throughout the paper we express monetary amounts in US dollars.

F- Stat for each group	11.54	22.59	24.07
P-Value	(0.48)	(0.03)	(0.02)
Observations	10053		

Notes: Table shows coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. The dependent variable is net account balance in BCS Bank's Tuticuenta accounts, the target accounts for the experiment. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015

Monthly reminders significantly increase net *Tuticuenta* account balances; we reject the null hypothesis that monthly reminder treatment effects during the 12 months of exposure are jointly zero (F-stat=22.59, p-value=0.031, Column 3 of Table 5). The positive impact of reminders on net account balances emerges as early as month two after account opening and persists for the remaining months of exposure to treatment. Relative to average net account balances in the control group, the monthly reminder effect estimates increase net balances by between 7% and 67% on any given month. The average estimate of the effect of monthly reminders on net account balances over the 12 months of exposure is \$18.5, a 28% increase relative to the average net account balance in the control group over the period of \$66.6.

Semimonthly reminders significantly increase net *Tuticuenta* account balances; we reject the null hypothesis that semimonthly reminder treatment effects during the 12 months of exposure are jointly zero (F-stat=24.07, p-value=0.020, Column 4 of Table 5). The positive impact of semimonthly reminders on net account balances emerges after the first month of exposure to the SMS and persists for remaining months of exposure to treatment. Relative to average net account balances in the control group, the semimonthly reminder effect estimates increase net balances by between 9% and 103% on any given month. The average estimate of the effect of semimonthly reminders on net account balances over the 12 months of exposure is \$28, a 43% increase relative to the average net account balance in the control group over the period.

When we formally test hypotheses of equality of treatment effects month by month, in three out of the 12 months of exposure to treatment we are able to reject the null hypothesis that monthly reminder treatment effects are equal to financial education treatment effects at increasing net account balances (Table 5, Column 5). For all months of exposure to treatment after the fourth month we reject the null hypothesis of equality of the financial education and the semimonthly reminder treatment effects on net account balances (Table 5, Column 6). In no month during exposure to treatment, we can reject the null hypothesis of equality of the monthly and semimonthly reminder treatment effects (Table 5, Column 7). Therefore, while it appears that semimonthly savings reminders are the most effective treatment to increase net account balances, we cannot reject the null hypothesis that monthly reminders are equally effective.

Impacts on withdrawals and deposits

The increase in net account balances in the monthly and semimonthly reminder treatments documented earlier could result from an increase in the number and amount of deposits or/and a decrease in the number and amount of withdrawals. The evidence from transactional data over the 12 months of exposure to treatment suggests that the increase in net account balances in both reminder treatments is chiefly the result of a significant decrease in the amount of money youths in both reminder treatment groups choose to withdraw from their *Tuticuenta* accounts (Table 6). Most

of the coefficients associated with any of these two treatments are significantly different from zero and their economic magnitude is important. On average, youth in any of the reminders group withdrew \$38 less than youths in the control group per month, a reduction of 17% of the accumulated total sum of withdrawals. None of the SMS treatments have a significant effect on the number of withdrawals or on the number and amount of deposits (Appendix Tables A4–A6).

These effects of SMS messages on reduced account withdrawals stand in contrast to earlier findings of messages on savings outcomes in adults. Among adults, reminders appear to increase the number and amount of deposits and have no effects on withdrawals (Karlan et al., forthcoming; Kast, Meir, & Pomeranz, 2012).

Table 6. Accumulated Amount of Withdrawals

SUR Equation Outcome	Control Mean	(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Financial Education	Monthly Reminder	Semi-monthly Reminder		F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Value of withdrawals After 1 Month		-24.8	-9.5 (7.0)	-14.9** (6.8)	-5.1 (6.9)	0.56 (0.45)	0.38 (0.54)	1.95 (0.16)
Value of withdrawals After 2 Months		27.3	-6.7 (10.7)	-24.9** (10.3)	-9.8 (10.5)	2.81 (0.09)	0.08 (0.78)	2.02 (0.15)
Value of withdrawals After 3 Months		29.5	-6.1 (13.7)	-26.5** (13.2)	-9.9 (13.4)	2.18 (0.14)	0.07 (0.79)	1.5 (0.22)
Value of withdrawals After 4 Months		77.9	-4.4 (16.9)	-32.8** (16.2)	-18.3 (16.6)	2.74 (0.10)	0.63 (0.43)	0.75 (0.38)
Value of withdrawals After 5 Months		136.3	-14.5 (19.8)	-41.0** (19.0)	-37.1* (19.4)	1.74 (0.19)	1.23 (0.27)	0.04 (0.84)
Value of withdrawals After 6 Months		156.9	-13.6 (22.0)	-49.5** (21.1)	-40.4* (21.6)	2.59 (0.11)	1.14 (0.23)	0.17 (0.68)
Value of withdrawals After 7 Months		181.4	-19.0 (24.5)	-61.8*** (23.5)	-51.3** (24.0)	2.98 (0.08)	1.65 (0.20)	0.19 (0.66)
Value of withdrawals After 8 Months		213.5	-21.7 (27.8)	-53.3** (26.6)	-50.8* (27.2)	1.27 (0.26)	1.04 (0.31)	0.01 (0.92)
Value of withdrawals After 9 Months		226.0	-29.7 (30.3)	-63.2** (29.1)	-50.2* (29.7)	1.2 (0.27)	0.44 (0.51)	0.19 (0.66)
Value of withdrawals After 10 Months		258.4	-32.0 (33.1)	-61.0* (31.7)	-41.1 (32.4)	0.75 (0.38)	0.07 (0.79)	0.37 (0.54)
Value of withdrawals After 11 Months		253.6	-30.3 (35.1)	-58.9* (33.7)	-34.4 (34.4)	0.65 (0.42)	0.01 (0.91)	0.5 (0.48)
Value of withdrawals After 12 Months		263.6	-30.6 (37.4)	-51.9 (35.9)	-32.1 (36.6)	0.32 (0.57)	0.00 (0.97)	0.29 (0.59)
F- Stat for each group			8.36	25.05	20.17			
P-Value			(0.76)	(0.015)	0.0639			
Observations			10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level dummies as in Table 2, gender and migrant status of accountholder. Dependent variable is value of withdrawals from *Tuticuenta* Account. Asymptotic standard errors correlated within accountholders across equations in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

The evidence on withdrawals and deposits during the exposure period further supports the hypothesis that SMS reminders may also help youths overcome attention restrictions with regards to saving (Karlán et al., forthcoming). Over 90% of youth in developing countries obtain savings money from other family members (Johnson et al., 2015). These resources usually correspond to allowances or birthday gifts. This implies that youth typically have little control over the supply of saving money and therefore, increasing either the number or amount of deposits may be difficult. Youth probably have a greater control on how and when to spend the money, which could explain why reminders work through a reduction in the amount of money withdrawn rather than through deposits.

Heterogeneity

Our fourth research question relates to the extent to which impacts may be heterogeneous by youth characteristics. We explore two dimensions of heterogeneity: age and gender. We modify equation (1) to include interactions of each of the treatment variables with either a male dummy or (in a separate estimation) a dummy indicating if the youth was 12 years old or older for all outcomes of interest were estimated. We do not reject the null hypotheses that, for all months and for all treatments, the coefficients associated to the interactions were equal to zero. That is, the impacts of the SMS reminders do not vary according to gender or age of the youth who receive it (results not shown, available upon request).

Financial Behavior Effects after Completion of the SMS Treatment Period

Transactional data enable us to investigate whether SMS messages affect financial outcomes up to eight months after youth stop receiving them. To do so, we estimate the SUR system of equations (1) using information from months 13 through 20 for all financial outcomes of interest.

There are no effects of financial education SMS treatment assignment on *Tuticuenta* account balances in any of the eight months after the last SMS message was sent. Point estimates are small in magnitude, sometimes negative and always statistically insignificant (Table 7, Column 2).

Youth accountholders assigned to the reminder SMS messages continue to have higher account balances in their *Tuticuenta* accounts after they stop receiving messages. Impact estimates on *Tuticuenta* account balances for the monthly reminder are statistically significant in months 13 and 14 (only at the 10% level in month 14) and then again in months 19 and 20. The average increase in account balances for account holders in the monthly reminder treatment is about \$24—23% relative to the average balance of \$102 in the control group during the period (Table 7, Column 3). We cannot reject that treatment effect estimates on monthly account balances in the monthly reminder treatment are jointly equal to zero (Table 7, Column 3) or equal to those in the financial education SMS treatment, except in month 13 (Table 7, Column 5).

Impact estimates on *Tuticuenta* account balances for the semimonthly reminder are statistically significant in all of months 13 through 20 and correspond to an average increase in account balances of about \$37 or 36% relative to the average balance of \$102 in the control group during the period (Table 7, Column 4). We reject the null hypothesis that for all months 13 through 20 the effects of the semimonthly reminder on account balances are jointly zero. Moreover, for all months 15 through 20 (3 to 8 months after the last message was sent) we reject the null hypotheses that semimonthly reminder impact estimates on *Tuticuenta* account balances are the same as those in the financial education treatment (Table 7, Column 6). We cannot reject the hypotheses that on any given month they are equal to those in the semimonthly reminder treatment (Table 7, Column 7).

Table 7. Accumulated Net Tuticuenta Account Balances - Medium term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Net Savings After 13 Months	70.2	5.1 (16.2)	36.1** (15.5)	32.1** (15.9)	3.58 (0.06)	2.64 (0.10)	0.06 (0.80)
Net Savings After 14 Months	76.6	10.5 (14.3)	22.9* (13.7)	32.2** (14.0)	0.73 (0.39)	2.19 (0.14)	0.43 (0.51)
Net Savings After 15 Months	113.3	-2.1 (13.4)	18.0 (12.9)	37.6*** (13.1)	2.21 (0.14)	8.38 (0.00)	2.18 (0.14)
Net Savings After 16 Months	135.9	2.8 (14.1)	18.5 (13.5)	41.9*** (13.8)	1.21 (0.27)	7.31 (0.01)	2.8 (0.09)
Net Savings After 17 Months	128.8	4.8 (14.2)	17.8 (13.6)	34.59** (13.9)	0.82 (0.36)	4.19 (0.04)	1.42 (0.23)
Net Savings After 18 Months	88.0	6.1 (14.4)	21.7 (13.8)	37.3*** (14.1)	1.13 (0.29)	4.44 (0.03)	1.19 (0.27)
Net Savings After 19 Months	73.2	7.4 (14.9)	24.3* (14.3)	38.9*** (14.6)	1.25 (0.26)	4.26 (0.04)	0.98 (0.32)
Net Savings After 20 Months	24.7	7.5 (16.1)	31.6** (15.4)	41.4*** (15.78)	2.19 (0.14)	4.22 (0.04)	0.38 (0.54)
F- Stat for each group		5.29	7.11	13.15			
P-Value		(0.51)	(0.31)	(0.04)			
Observations		10053					

Notes: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Impact estimates for all treatments in months 13 through 20 after initial SMS delivery are small and statistically insignificant on the remaining *Tuticuenta* account outcomes of account closure, account

dormancy, number and amount of deposits and number and amounts of withdrawals (Appendix Tables A7–A12).

The impacts on financial outcomes after youth stop receiving messages suggest that savings reminders—particularly semimonthly reminders—have sizeable and lasting impacts on savings in the accounts directly linked to the messages. The fact that we do not observe effects of the treatments on deposits or withdrawals after youth stop receiving messages suggests that reminders may only lead to potential changes in behavior during the period in which youth are exposed to them. The fact, however, that we observe lasting impacts of reminders on balances in *Tuticuenta* accounts highlights the role that initial actions and inertia have on savings outcomes (e.g., Madrian & Shea, 2001).

Impacts on Other Outcomes: Savings Substitution, Control over Expenses, Financial Knowledge, and Expectations

To this point, we have documented Intent-to-Treat estimates of the various SMS treatments on transactional outcomes from BCS bank’s *Tuticuenta* account. One potential drawback of these analyses is that they do not shed light on actual treatment receipt—the extent to which treated youth acknowledge having received the SMS messages—or other outcomes such as savings substitution, control over expenses, financial knowledge or expectations. To address this potential drawback, we designed a brief survey that BCS bank administered via phone among a random subsample of the experimental sample.¹¹ We randomly selected 1,620 of the 10,053 accountholders in the experimental sample to participate in the phone survey follow-up, stratifying by treatment assignment status. BCS bank administered the phone survey nine months after the last SMS was sent out or about 21 months after the first SMS was sent. BCS bank successfully completed 491 phone surveys for an average response rate of about 30%, comparable to the response rate of other recent phone surveys carried out by the bank.

Relative to the response rate of 36% among controls, response rates among youth accountholders in the financial education or the monthly reminders are four percentage points lower, although the differences are not statistically significant. The response rate among youth assigned to the semimonthly reminder treatment is 17% lower and the difference is statistically significant. However, we cannot reject the null hypotheses that the composition of the respondent pool is equal to the composition of the nonrespondent pool across all socioeconomic characteristics (Appendix Table A13, Columns 2 and 3). Among survey respondents, baseline characteristics are balanced across the four different experimental groups (Appendix Table A13, Columns 4–8).

Table 8 shows the phone survey results. About 40% of respondents assigned to any of the three SMS treatments report having received either the financial education or the savings reminders messages. There are no statistically significant differences across treatments in reported message receipt. This “first stage” result implies that Treatment-on-the-Treated estimates of SMS receipt on *Tuticuenta* account balances are about 2.5 times larger than the Intent-to-Treat estimates reported in Table 5 and Table 7 above.¹² For instance, the Treatment-on-the-Treated effect on *Tuticuenta* account

¹¹ BCS bank directly contacted and obtained the parents’ consent for the survey to be administered to the youth.

¹² The internal validity of this scale-up calculation relies on the assumption that the only channel by which message delivery impacts outcomes is through message receipt. We believe that this assumption holds for the experimental sample because messages were sent directly to eligible youth and there was no control group contamination.

balances over the 12 months during which eligible youth received monthly reminder messages is about \$46, a 70% increase relative to the control mean. Similarly, the Treatment-on-the-Treated effect on *Tuticuenta* account balances over the 12 months during which eligible youth received semimonthly reminders is \$70, a 103% increase relative to the control mean.

There is no evidence suggesting savings substitution from other bank accounts into BCS bank's *Tuticuenta* account. Three percent of respondents in the control group report saving in another bank account. The difference in the probability of reporting saving in other bank accounts is small and not statistically significant separately for each of the treatments (Table 8, Columns 2–4) and remains so even when we pool all the treatments (Table 8, Column 5).

The survey evidence suggests, however, that observed impacts of the SMS messages on *Tuticuenta* account balances may be partially explained by a substitution away from savings at home in a piggybank. About 35% of youth in the control report saving in a piggybank at home, in addition to whatever they save in the *Tuticuenta* account (Table 8, Column 1). Youth in the financial education SMS treatment are about 10% (29% relative to the control mean) less likely to report saving in a piggybank at home (Table 8, Column 2). This difference is only statistically significant at the 10% level. Youth in the monthly reminder SMS treatment are 15% (43% relative to the control mean) significantly less likely to report saving in a piggybank at home (Table 8, Column 3). Youth in the semimonthly reminder SMS treatment are 11% (31% relative to the control mean) less likely to report saving in a piggybank at home, a difference that is statistically significant at the 10% level (Table 8, Column 4). When we pool all treatments together, we find that youth receiving any message are 12% (34% relative to the control mean) significantly less likely to report saving in a piggybank at home (Table 8, Column 5).

With two additional assumptions these results enable us to calculate an upper bound on savings substitution. Specifically, if one is willing to assume that (a) only those that save at home in the absence of the SMS messages save at all, and (b) the increase in *Tuticuenta* account balances among those that reduce their home savings as a consequence of being eligible to receive SMS messages is dollar for dollar a consequence of transfers from home savings, then at most 34% of the reported increase in *Tuticuenta* account balances for youth in the monthly and semimonthly SMS reminder treatments is the result of substitution away from home savings.

This level of substitution from home savings is considerably lower than the one reported from a school-level financial education intervention in Ghana (Berry, Karlan, & Pradhan, 2015). Moreover, the substitution away from home savings into *Tuticuenta* account savings may be welfare enhancing to the extent that it represents a no-cost reduction in risk. For instance, many low-income individuals choose to take up and to use formal savings products even when the costs of doing so are high enough that they effectively yield negative interest rates (Dupas & Robinson 2013; Karlan et al., 2014).

Therefore, no less than two-thirds of the average increase in *Tuticuenta* account balances likely represents a net increase in savings. For instance, the net increase in savings after 20 months (eight months after the last message was sent) among youth assigned to receive the semimonthly reminder is about \$24, which represents a 27% increase relative to the average account balance in the control group.

Table 8. Phone Survey Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OLS Outcome	Control Mean	Financial Education	Monthly Reminder	Semi- monthly Reminder	Any Treatment	F-test Financial Education= Monthly Reminder	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder = Semimonthly Reminder
Proportion of respondents who received SMS ¹	0.000	0.376* **	0.391* **	0.435* **	0.402* **	0.06 (0.81)	0.89 (0.35)	0.45 (0.50)
Saves elsewhere ²	0.374	-0.112*	0.149* *	-0.088	0.114* *	0.39 (0.53)	0.15 (0.69)	1.04 (0.31)
Saves in another bank account ³	0.027	-0.015	0.005	0.017	0.002	0.77 (0.38)	2.10 (0.15)	0.18 (0.67)
Saves at home ⁴	0.347	-0.096*	0.154* **	-0.105*	0.123* *	1.03 (0.31)	0.03 (0.87)	0.76 (0.38)
Someone else also has control over Tuticuenta account ⁵	0.381	-0.082	-0.045	-0.012	-0.046	0.38 (0.54)	1.50 (0.22)	0.29 (0.59)
Always or very often controls monthly spending ⁶	0.327	0.031	0.017	0.000	0.016	0.04 (0.84)	0.24 (0.62)	0.07 (0.79)
Has graduate school education level aspirations ⁷	0.367	-0.065	0.043	0.007	-0.007	2.81 (0.09)	1.46 (0.23)	0.31 (0.58)
Understands interest concept ⁸	0.327	-0.097*	-0.056	-0.05	-0.068	0.50 (0.48)	0.73 (0.39)	0.01 (0.92)
Observations	491							

Note: Results present the coefficient of interest of OLS models using information from those youths who answered the phone survey. Control variables include age, stratum, education level dummies as in Table 2, gender and migrant status of accountholder. Robust standard errors in parenthesis, *p<0.10, **p<0.05, ***p<0.01.

For each outcome variable, the following criteria were considered:

¹Dummy variable equal to one if accountholder says that she received SMS messages sent by BCS and zero otherwise.

²Dummy variable equal to one if accountholder answered that she saves in other place different from Tuticuenta and zero otherwise.

³Dummy variable equal to one if accountholder answered that she saves in another bank account different from Tuticuenta and zero otherwise.

⁴Dummy variable equal to one if accountholder answered that she saves in a piggy bank in their house and zero otherwise.

⁵Dummy variable equal to one if accountholder answered other adults have control over her Tuticuenta account and zero otherwise.

⁶Dummy variable equal to one if account holder answers she always or very often reviews her spending on a monthly basis and zero otherwise.

⁷Dummy variable equal to one if accountholder's education level aspirations is to attain graduate education and zero otherwise.

⁸Dummy variable equal to one if accountholder answered correctly a simple compound interest question and zero otherwise.

We also asked youth respondents to rate how frequently they exercised control over their expenditures with possible responses being never, not often, often, very often and always. Seventeen% of youths in the control group report that they always control expenditures and 16% of them report that they control expenditures very often. SMS treatment assignment does not influence the probability of controlling expenditures very often or always (Table 8, Columns 2–5).

Finally, we also attempted to measure impacts of the different treatments on financial knowledge and educational aspirations. We measured financial knowledge with one simple question on interest compounding (see Appendix Table A3). Thirty three% of youth in the control group correctly understand interest compounding. The sign of the point estimates suggests that the SMS treatments may reduce financial knowledge although estimates are fairly imprecisely estimated and only statistically significant at the 10% level for youth in the financial education treatment. Thirty seven% of youth in the control group report aspiring to reach post-graduate education. None of the treatments separately or pooled increase educational aspirations (Table 8, Columns 2–5).

Conclusions

Under a novel randomized control trial design this study contributes to the knowledge on how technology may increase savings among low-income youth in developing countries. We find that simple financial information delivered through SMS improves savings outcomes among youth and that message content matters. Consistent with the limited attention hypothesis, youth accountholders who receive reminders increase account balances in more than 30% relative to control accountholders during the 12-month period in which they receive SMS. We calculate that no less than two-thirds of the increase in account balances among the monthly and semimonthly reminder treatment groups represents a net increase in savings and that no more than the remaining one third represents substitution away from savings at home.

We find that financial education nudges delivered through SMS do not increase savings. This finding contrasts with recent evidence from other field experiments in Brazil and Ghana indicating that school-level financial education may promote savings outcomes among youth (Berry, Karlan, & Pradhan, 2015; Bruhn et al, 2013). One possible conjecture to explain the discrepancy in these findings is that financial education requires a more structured curriculum and a more intensive mode of delivery. This conjecture, however, needs to be empirically validated in future work.

We find that none of the treatments had measurable effects on self-control over expenses, financial knowledge as measured by a question on understanding the concept of interest compounding, or educational aspirations. These findings contrast with those in Bruhn and colleagues (2013) who find that a school-level intervention in Brazil increases financial knowledge and financial planning.

Our findings on the channels by which SMS reminders affect savings also contrast with earlier work on the effects of SMS reminders among adults. Unlike prior studies on adult populations (Karlan et al., forthcoming; Kast, Meier, & Pomeranz, 2012), lower account withdrawals and not higher deposits drive the higher account balances among youth assigned to either of the two reminder treatments.

The savings effects of reminders are long-lasting: Eight months after youth stopped receiving messages, those initially assigned to savings reminders still maintained significantly higher balances in

their bank account relative to the financial education treatment or control groups. The lasting impacts on savings among youth accountholders assigned to the reminder groups are not, however, the result of continued behavior changes (i.e., reduced withdrawals) but rather the lasting effect of those initial behavioral changes induced by the reminders.

Taken together, the results highlight the difficulty of changing long-term behavior among youth but how reminders in particular may be very effective at changing short-term savings behavior and how those initial changes in behavior have lasting impacts on savings. Given how inexpensive SMS and mobile technologies in general are, understanding how the use of technology among youth interacts with financial decision-making is a promising area for future research.

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APPENDIX

Table A1. Financial Education SMS designed by MFO and used in Treatment 1.

No.	Financial Education SMS Message	Rationale
1	Every peso counts. Even if you save a small amount each day, it adds up at the end of the month. You can save more than you think! Banco Caja Social	The first message about saving should be encouraging to everyone, including those who can only save a small amount. The message also conveys that the regularity of saving is also crucial.
2	List your expenses as needs or wants. Food is a need, but candy is a want. Cut some of the wants to reach your goal. Banco Caja Social	Kids can reduce spending on unnecessary expenses or “wants”, e.g. jewelry, fashionable clothing, internet, alcohol, activities with friends.
3	Resist pressure to spend. Your friends may buy things now, but you’re saving for more later! When tempted, picture your savings goal in your mind. Banco Caja Social	Kids may feel pressure to spend to maintain their image among their peers, e.g. spend on beauty accessories and the latest fashionable clothes. Kids may also feel pressure to spend while out with their friends.
4	Start a savings trend. Your friends need to save too, even if they don’t admit it! Think of free activities you can do together so you all can save money. Banco Caja Social	Saving is easier when your friends are doing it too. Kids spend money when doing activities with their friends.
5	Find out where your money goes. Track how much you spend on everything for 1 week by writing it down each day. See where you can cut your spending. Banco Caja Social	It is easy to lose track of where we spend all our money. By suggesting to youth to track all their expenses for one week, they can better identify how they are spending their money and decide where they can reduce or eliminate unnecessary expenditures.
6	Spend less than you receive. Calculate how much money you receive in 1 week. If you spend more than you take in, cut your spending and save instead. Banco Caja Social	Identifying the amount of their income can help ensure youth do not spend more than they take in, which is another component of budgeting.
7	Stay one step ahead. Plan how much you’ll spend this week and stick to your limit. You can do it! Banco Caja Social	Encourage youth to be pro-active in managing their money by planning ahead and setting limits to spending before they start spending.
8	You are first. When you receive money, deposit some in your account for your goal first before you start spending. That way it’s easy to save. Banco Caja Social	Encourage a savings habit among youth by making saving the first step before starting to spend on other things.
9	Be street-smart. Keeping all your money at home is like putting all your eggs in 1 basket. Protect your savings by moving the money for your savings goal into the bank. Banco Caja Social	One of the benefits of saving that youth identified in the market research was safety. Encourage youth to move the money they are saving at home for their savings goals into the bank.
10	You are the boss. By opening your account and following a savings plan, you’re in control of your money. Keep saving and you’ll achieve your goal! Banco Caja Social	Leverage the positive feelings of independence and pride youth are likely to feel with having their own savings account and being control of their own money in order to encourage them to continue saving.
11	Think ahead. What things can help or hurt as you try to meet your savings goal? Make the right choices to achieve your goal safely and responsibly. Banco Caja Social	Sometimes low-income youth may resort to risky behaviors or illegal means to obtain money to save, as the market research indicates. This message echoes a similar message from Save the Children’s financial education curriculum.
12	Make savings a habit. Don’t stop saving after you reach one goal. Achieving one goal will help lead you to new goals. Our dreams are endless. Good luck! Banco Caja Social	Kids tend to save only when they have a specific short term goal that they want to achieve. After that specific goal is reached, they stop saving. Encourage youth to continue to save as a habit, not as a short-term measure.

Table A2. Average characteristics of youths included and excluded from the experimental sample

Youth Characteristic	In final experimental sample	Not in final experimental sample	P-value of joint test of equality of means across four treatment groups
Age	12.32 (2.94)	11.91 2.50	0.000
Male	0.48 (0.50)	0.50 (0.50)	0.043
Strata 1 or 2	0.28 (0.45)	0.29 (0.46)	0.046
Strata 3 or 4	0.37 (0.48)	0.45 (0.50)	0.000
Strata 5 or 6	0.02 (0.70)	0.03 (0.70)	0.553
Strata missing	0.32 (0.47)	0.23 (0.42)	0.000
Unmarried	0.99 (0.06)	0.99 (0.01)	0.000
Not in school	0.97 (0.10)	0.01 (0.12)	0.030
Attending primary school	0.49 (0.50)	0.59 (0.49)	0.000
Attending secondary school	0.48 (0.50)	0.39 (0.49)	0.000
Attending vocational college	0.01 (0.10)	0.00 (0.03)	0.000
Attending university	0.01 (0.10)	0.00 (0.05)	0.000
Migrant	0.25 (0.43)	0.25 (0.43)	0.415
Has E-Mail	0.15 (0.35)	0.05 (0.22)	0.000
Number of observations	10053	4736	

Note: Table reports means and standard deviations for characteristics of BCS bank's Tuticuenta account holders included and not included in the experimental sample. Youth who opened a *Tuticuenta* account in February, March or April of 2012 in any of the 263 bank branches nationwide are initially eligible to participate in the experiment. A total of 14,788 youth are part of this initial selection. We impose two additional restrictions on final experimental sample: having a registered a personal cellphone number in the account application form and among youths with a cellphone, we only included youths who opened a *Tuticuenta* account in a branch were at least three other youths opened *Tuticuenta* accounts. See notes to Table 2 for variable definitions.

Table A3. Telephone survey questions

1. Do you save in some other place other than in Tuticuenta?
YES (move to # 2) NO (move to # 3)
2. Where else do you save? For instance: Another bank account, moneybox, or in a hidden place.
3.

Besides you. Does someone else manage your Tuticuenta?
YES (Who? _____)
4. In a scale from 1 to 5, where 1 is never and 5 is always. How often do you take control over your spending?
NEVER 1 2 3 4 5 ALWAYS
5. What is the maximum level of education that you aspire to complete? (READ OPTIONS)
 - i. Less than secondary.
 - ii. Secondary.
 - iii. Technical college.
 - iv. Technological college.
 - v. University.
 - vi. Graduate (Master or PhD).
6. In a scale from 1 to 5, where 1 means “it is not important” and 5 means “it is very important”. How important it is to save for your future?
IT IS NOT IMPORTANT 1 2 3 4 5 IT IS VERY IMPORTANT
7. Imagine that you have \$100 in your Tuticuenta and you receive an annual interest rate of 2%. After 5 years, how much money do you think you will have if you keep all in the account? (READ OPTIONS)
 - a. More than \$102
 - b. Exactly \$102
 - c. Less than \$102
 - d. You do not know.
8. What is the maximum level of education that your mother completed? (READ OPTIONS)
 - a. Less than secondary.
 - b. Completed Secondary.
 - c. Vocational College
 - d. University degree or more.
9. Did you receive the SMS about savings that BCS sent to your cellphone?
YES NO
10. Do you want to continue receiving this kind of messages that BCS sent?
YES NO

Table A4. Accumulated Number of Withdrawals from Tuticuenta Account

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Number of withdrawals After 1 Month	2	-0.073 (0.045)	-0.086** (0.044)	-0.116*** (0.045)	0.08 (0.78)	0.83 (0.36)	0.43 (0.51)
Number of withdrawals After 2 Months	0.925	-0.083 (0.071)	-0.120* (0.068)	-0.132* (0.069)	0.25 (0.62)	0.44 (0.50)	0.03 (0.86)
Number of withdrawals After 3 Months	1.310	-0.086 (0.099)	-0.123 (0.096)	-0.153 (0.098)	0.14 (0.71)	0.44 (0.51)	0.09 (0.76)
Number of withdrawals After 4 Months	1.655	-0.065 (0.128)	-0.065 (0.123)	-0.158 (0.126)	0.00 (0.99)	0.54 (0.46)	0.5 (0.48)
Number of withdrawals After 5 Months	2.012	-0.082 (0.152)	-0.095 (0.146)	-0.204 (0.149)	0.01 (0.93)	0.61 (0.43)	0.52 (0.47)
Number of withdrawals After 6 Months	2.418	-0.139 (0.178)	-0.180 (0.171)	-0.292* (0.174)	0.05 (0.82)	0.71 (0.40)	0.41 (0.52)
Number of withdrawals After 7 Months	2.756	-0.159 (0.200)	-0.212 (0.192)	-0.349* (0.196)	0.07 (0.79)	0.86 (0.35)	0.48 (0.49)
Number of withdrawals After 8 Months	3.092	-0.225 (0.220)	-0.237 (0.211)	-0.365* (0.216)	0 (0.96)	0.39 (0.53)	0.35 (0.56)
Number of withdrawals After 9 Months	3.387	-0.213 (0.238)	-0.275 (0.229)	-0.351 (0.233)	0.07 (0.79)	0.32 (0.57)	0.1 (0.75)
Number of withdrawals After 10 Months	3.645	-0.183 (0.256)	-0.267 (0.246)	-0.348 (0.251)	0.11 (0.74)	0.4 (0.53)	0.1 (0.75)
Number of withdrawals After 11 Months	3.944	-0.195 (0.275)	-0.279 (0.264)	-0.333 (0.269)	0.09 (0.76)	0.24 (0.62)	0.04 (0.84)
Number of withdrawals After 12 Months	4.420	-0.198 (0.292)	-0.260 (0.280)	-0.318 (0.286)	0.04 (0.83)	0.16 (0.69)	0.04 (0.84)
F- Stat for each group		18.3	19.86	19.02			
P-Value		(0.11)	(0.07)	(0.09)			
Observations		10053					

Note: Table shows coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Table A5. Accumulated Number of Deposits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Number of deposits After 1 Month	0.288	0.006 <i>(0.021)</i>	-0.015 <i>(0.020)</i>	-0.009 <i>(0.021)</i>	0.95 <i>(0.33)</i>	0.53 <i>(0.46)</i>	0.06 <i>(0.81)</i>
Number of deposits After 2 Months	0.584	0.015 <i>(0.037)</i>	-0.025 <i>(0.035)</i>	0.024 <i>(0.036)</i>	1.18 <i>(0.28)</i>	0.05 <i>(0.82)</i>	1.81 <i>(0.18)</i>
Number of deposits After 3 Months	0.882	0.035 <i>(0.049)</i>	-0.020 <i>(0.048)</i>	0.038 <i>(0.049)</i>	1.28 <i>(0.26)</i>	0.01 <i>(0.93)</i>	1.53 <i>(0.22)</i>
Number of deposits After 4 Months	1.092	0.043 <i>(0.061)</i>	-0.015 <i>(0.059)</i>	0.049 <i>(0.060)</i>	0.89 <i>(0.34)</i>	0.01 <i>(0.92)</i>	1.13 <i>(0.29)</i>
Number of deposits After 5 Months	1.383	0.033 <i>(0.074)</i>	-0.054 <i>(0.071)</i>	0.047 <i>(0.072)</i>	1.37 <i>(0.24)</i>	0.03 <i>(0.85)</i>	1.92 <i>(0.16)</i>
Number of deposits After 6 Months	1.555	0.055 <i>(0.086)</i>	-0.070 <i>(0.083)</i>	0.050 <i>(0.085)</i>	2.06 <i>(0.15)</i>	0.00 <i>(0.96)</i>	2.01 <i>(0.16)</i>
Number of deposits After 7 Months	1.710	0.047 <i>(0.099)</i>	-0.078 <i>(0.095)</i>	0.053 <i>(0.098)</i>	1.53 <i>(0.22)</i>	0.00 <i>(0.95)</i>	1.76 <i>(0.18)</i>
Number of deposits After 8 Months	1.819	0.032 <i>(0.112)</i>	-0.082 <i>(0.107)</i>	0.047 <i>(0.110)</i>	1.00 <i>(0.32)</i>	0.02 <i>(0.89)</i>	1.34 <i>(0.25)</i>
Number of deposits After 9 Months	2.019	0.036 <i>(0.123)</i>	-0.088 <i>(0.118)</i>	0.075 <i>(0.121)</i>	1.01 <i>(0.32)</i>	0.09 <i>(0.76)</i>	1.8 <i>(0.18)</i>
Number of deposits After 10 Months	2.194	0.025 <i>(0.133)</i>	-0.099 <i>(0.128)</i>	0.085 <i>(0.131)</i>	0.85 <i>(0.36)</i>	0.19 <i>(0.66)</i>	1.95 <i>(0.16)</i>
Number of deposits After 11 Months	2.409	0.036 <i>(0.145)</i>	-0.089 <i>(0.139)</i>	0.111 <i>(0.142)</i>	0.73 <i>(0.39)</i>	0.25 <i>(0.62)</i>	1.93 <i>(0.16)</i>
Number of deposits After 12 Months	2.548	0.036 <i>(0.158)</i>	-0.107 <i>(0.152)</i>	0.103 <i>(0.155)</i>	0.8 <i>(0.37)</i>	0.17 <i>(0.68)</i>	1.79 <i>(0.18)</i>
F- Stat for each group		10.12	12.09	15.62			
P-Value		<i>(0.61)</i>	<i>(0.44)</i>	<i>(0.21)</i>			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies, gender and migrant status of account holder. Asymptotic standard errors correlated within account holders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Table A6. Accumulated Amount of Deposits

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Value of deposits After 1 Month	-2.8	-4.3 (9.0)	-8.1 (8.7)	10.1 (8.9)	0.16 (0.69)	2.45 (0.12)	4.12 (0.02)
Value of deposits After 2 Months	101.8	2.1 (11.5)	-7.3 (11.1)	12.1 (11.3)	0.64 (0.42)	0.7 (0.39)	2.88 (0.09)
Value of deposits After 3 Months	104.3	4.7 (13.4)	-11.5 (12.9)	8.3 (13.1)	1.43 (0.23)	0.07 (0.79)	2.24 (0.13)
Value of deposits After 4 Months	179.9	-14.2 (17.7)	-25.1 (16.9)	-8.8 (17.3)	0.37 (0.54)	0.09 (0.76)	0.86 (0.35)
Value of deposits After 5 Months	243.6	-16.1 (20.3)	-31.8 (19.5)	-16.3 (19.9)	0.58 (0.44)	0.00 (0.99)	0.59 (0.44)
Value of deposits After 6 Months	251.7	-11.0 (22.7)	-31.9 (21.7)	-8.8 (22.2)	0.83 (0.36)	0.01 (0.30)	1.06 (0.30)
Value of deposits After 7 Months	264.9	-13.3 (26.2)	-32.9 (25.1)	-9.9 (25.6)	0.55 (0.46)	0.02 (0.89)	0.79 (0.37)
Value of deposits After 8 Months	273.4	-26.8 (30.7)	-35.1 (29.4)	-9.2 (30.0)	0.07 (0.79)	0.31 (0.58)	0.72 (0.39)
Value of deposits After 9 Months	282.2	-30.4 (32.4)	-37.7 (31.1)	-9.9 (31.8)	0.05 (0.82)	0.38 (0.54)	0.75 (0.39)
Value of deposits After 10 Months	325.8	-31.2 (34.1)	-40.6 8(32.7)	-6.9 (33.4)	0.07 (0.79)	0.48 (0.49)	0.99 (0.32)
Value of deposits After 11 Months	323.0	-33.3 (35.8)	-33.2 (34.3)	-3.3 (35.0)	0.00 (0.99)	0.67 (0.41)	0.71 (0.40)
Value of deposits After 12 Months	349.6	-30.1 (38.0)	-36.2 (36.4)	-9.4 (37.2)	0.03 (0.87)	0.28 (0.60)	0.5 (0.48)
F- Stat for each group		10.95	8.15	15.38			
P-Value		(0.53)	(0.77)	(0.22)			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Table A7. Account Closure - Medium Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Closed Account After 13 Months	0.039	0.006 <i>(0.005)</i>	0.003 <i>(0.005)</i>	-0.001 <i>(0.005)</i>	0.42 <i>(0.51)</i>	1.87 <i>(0.17)</i>	0.57 <i>(0.45)</i>
Closed Account After 14 Months	0.045	0.002 <i>(0.005)</i>	0.001 <i>(0.005)</i>	-0.004 <i>(0.005)</i>	0.03 <i>(0.85)</i>	1.15 <i>(0.28)</i>	0.85 <i>(0.36)</i>
Closed Account After 15 Months	0.471	0.003 <i>(0.005)</i>	0.002 <i>(0.005)</i>	-0.002 <i>(0.005)</i>	0.01 <i>(0.93)</i>	0.6 <i>(0.44)</i>	0.51 <i>(0.47)</i>
Closed Account After 16 Months	0.050	0.002 <i>(0.006)</i>	0.003 <i>(0.005)</i>	-0.001 <i>(0.006)</i>	0.02 <i>(0.89)</i>	0.16 <i>(0.69)</i>	0.31 <i>(0.58)</i>
Closed Account After 17 Months	0.052	0.004 <i>(0.006)</i>	0.004 <i>(0.006)</i>	0.001 <i>(0.006)</i>	0.00 <i>(0.98)</i>	0.22 <i>(0.64)</i>	0.21 <i>(0.65)</i>
Closed Account After 18 Months	0.055	0.004 <i>(0.006)</i>	0.003 <i>(0.006)</i>	0.003 <i>(0.006)</i>	0.08 <i>(0.78)</i>	0.09 <i>(0.77)</i>	0.00 <i>(0.99)</i>
Closed Account After 19 Months	0.058	0.003 <i>(0.006)</i>	0.003 <i>(0.006)</i>	0.004 <i>(0.006)</i>	0.00 <i>(0.99)</i>	0.01 <i>(0.92)</i>	0.01 <i>(0.93)</i>
Closed Account After 20 Months	0.060	0.003 <i>(0.006)</i>	0.003 <i>(0.006)</i>	0.003 <i>(0.006)</i>	0.00 <i>(0.99)</i>	0.00 <i>(0.96)</i>	0.00 <i>(0.97)</i>
F- Stat for each group		10.58	3.54	7.51			
P-Value		<i>(0.10)</i>	<i>(0.74)</i>	<i>(0.28)</i>			
Observations		10053					

Note: Table shows coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, strata dummies, education level dummies as in Table 2, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Table A8. Account Dormancy - Medium Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semimonthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Dormant Account After 13 Months	0.624	-0.022* (0.012)	-0.0101 (0.012)	-0.0140 (0.012)	0.91 (0.34)	0.40 (0.53)	0.10 (0.75)
Dormant Account After 14 Months	0.640	-0.019 (0.012)	-0.018 (0.012)	-0.011 (0.012)	0.01 (0.94)	0.37 (0.54)	0.30 (0.58)
Dormant Account After 15 Months	0.656	-0.014 (0.012)	-0.019* (0.012)	-0.009 (0.012)	0.21 (0.64)	0.11 (0.73)	0.67 (0.41)
Dormant Account After 16 Months	0.672	-0.016 (0.012)	-0.020* (0.012)	-0.015 (0.012)	0.12 (0.73)	0.00 (0.95)	0.17 (0.68)
Dormant Account After 17 Months	0.680	-0.012 (0.012)	-0.016 (0.012)	-0.007 (0.012)	0.10 (0.75)	0.17 (0.68)	0.56 (0.45)
Dormant Account After 18 Months	0.682	-0.008 (0.012)	-0.009 (0.011)	-0.003 (0.012)	0.01 (0.93)	0.17 (0.68)	0.27 (0.60)
Dormant Account After 19 Months	0.690	-0.004 (0.012)	0.001 (0.011)	0.001 (0.012)	0.18 (0.67)	0.18 (0.67)	0.00 (0.99)
Dormant Account After 20 Months	0.698	-0.005 (0.012)	0.001 (0.011)	0.000 (0.012)	0.28 (0.59)	0.20 (0.65)	0.01 (0.94)
F- Stat for each group		4.66	6.8	5.62			
P-Value		(0.59)	(0.34)	(0.47)			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01.

Table A9. Accumulated Number of Deposits – Medium Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Number of deposits After 13 Months	3.188	0.034 <i>(0.171)</i>	-0.123 <i>(0.164)</i>	0.124 <i>(0.167)</i>	0.83 <i>(0.36)</i>	0.26 <i>(0.61)</i>	2.14 <i>(0.14)</i>
Number of deposits After 14 Months	3.345	0.043 <i>(0.182)</i>	-0.13 <i>(0.175)</i>	0.149 <i>(0.178)</i>	0.88 <i>(0.35)</i>	0.33 <i>(0.57)</i>	2.4 <i>(0.12)</i>
Number of deposits After 15 Months	3.506	0.052 <i>(0.193)</i>	-0.129 <i>(0.185)</i>	0.153 <i>(0.189)</i>	0.86 <i>(0.35)</i>	0.27 <i>(0.61)</i>	2.19 <i>(0.14)</i>
Number of deposits After 16 Months	3.650	0.063 <i>(0.203)</i>	-0.118 <i>(0.195)</i>	0.178 <i>(0.199)</i>	0.78 <i>(0.38)</i>	0.31 <i>(0.58)</i>	2.16 <i>(0.14)</i>
Number of deposits After 17 Months	3.806	0.051 <i>(0.214)</i>	-0.121 <i>(0.206)</i>	0.177 <i>(0.210)</i>	0.63 <i>(0.43)</i>	0.33 <i>(0.56)</i>	1.96 <i>(0.16)</i>
Number of deposits After 18 Months	3.953	0.061 <i>(0.226)</i>	-0.124 <i>(0.217)</i>	0.201 <i>(0.222)</i>	0.65 <i>(0.42)</i>	0.37 <i>(0.54)</i>	2.09 <i>(0.15)</i>
Number of deposits After 19 Months	4.059	0.074 <i>(0.239)</i>	-0.125 <i>(0.229)</i>	0.225 <i>(0.234)</i>	0.68 <i>(0.41)</i>	0.38 <i>(0.54)</i>	2.19 <i>(0.14)</i>
Number of deposits After 20 Months	4.202	0.087 <i>(0.250)</i>	-0.120 <i>(0.240)</i>	0.257 <i>(0.245)</i>	0.67 <i>(0.41)</i>	0.44 <i>(0.51)</i>	2.31 <i>(0.13)</i>
F- Stat for each group		4.26	2.86	8.19			
P-Value		<i>(0.64)</i>	<i>(0.83)</i>	<i>(0.22)</i>			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Table A10. Accumulated Number of Withdrawals – Medium Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Number of withdrawals After 13 Months	4.751	-0.210 <i>(0.313)</i>	-0.302 <i>(0.300)</i>	-0.349 <i>(0.306)</i>	0.09 <i>(0.77)</i>	0.19 <i>(0.66)</i>	0.02 <i>(0.88)</i>
Number of withdrawals After 14 Months	5.047	-0.216 <i>(0.332)</i>	-0.312 <i>(0.319)</i>	-0.307 <i>(0.325)</i>	0.08 <i>(0.78)</i>	0.07 <i>(0.79)</i>	0.00 <i>(0.99)</i>
Number of withdrawals After 15 Months	5.326	-0.214 <i>(0.351)</i>	-0.313 <i>(0.337)</i>	-0.288 <i>(0.344)</i>	0.08 <i>(0.78)</i>	0.04 <i>(0.84)</i>	0.00 <i>(0.94)</i>
Number of withdrawals After 16 Months	5.586	-0.208 <i>(0.370)</i>	-0.334 <i>(0.355)</i>	-0.273 <i>(0.362)</i>	0.11 <i>(0.74)</i>	0.03 <i>(0.86)</i>	0.03 <i>(0.87)</i>
Number of withdrawals After 17 Months	5.830	-0.227 <i>(0.389)</i>	-0.347 <i>(0.373)</i>	-0.240 <i>(0.381)</i>	0.09 <i>(0.76)</i>	0.00 <i>(0.97)</i>	0.08 <i>(0.78)</i>
Number of withdrawals After 18 Months	6.065	-0.232 <i>(0.406)</i>	-0.358 <i>(0.389)</i>	-0.204 <i>(0.398)</i>	0.1 <i>(0.76)</i>	0.00 <i>(0.95)</i>	0.15 <i>(0.70)</i>
Number of withdrawals After 19 Months	5.895	-0.254 <i>(0.419)</i>	-0.371 <i>(0.402)</i>	-0.191 <i>(0.411)</i>	0.08 <i>(0.78)</i>	0.02 <i>(0.88)</i>	0.19 <i>(0.67)</i>
Number of withdrawals After 20 Months	6.118	-0.271 <i>(0.432)</i>	-0.382 <i>(0.415)</i>	-0.179 <i>(0.424)</i>	0.06 <i>(0.80)</i>	0.04 <i>(0.83)</i>	0.23 <i>(0.63)</i>
F- Stat for each group		1.66	1.62	9.39			
P-Value		<i>(0.95)</i>	<i>(0.95)</i>	<i>(0.15)</i>			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level, gender and migrant status of accountholder. Asymptotic standard errors correlated within accountholders across equations in parenthesis. *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Table A11. Accumulated Amount of Deposits – Medium Term

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Value of deposits After 13 Months	355.9	-27.9 (42.9)	-15.1 (41.1)	-1.3 (42.0)	0.09 (0.77)	0.37 (0.55)	0.1 (0.75)
Value of deposits After 14 Months	355.7	-21.6 (45.8)	-16.4 (43.9)	-1.3 (44.9)	0.01 (0.91)	0.19 (0.66)	0.11 (0.74)
Value of deposits After 15 Months	394.5	-23.1 (47.6)	-18.1 (45.7)	6.9 (46.7)	0.01 (0.92)	0.38 (0.54)	0.28 (0.59)
Value of deposits After 16 Months	454.1	-18.6 (49.8)	-18.5 (47.8)	20.2 (48.8)	0.00 (0.99)	0.58 (0.45)	0.62 (0.43)
Value of deposits After 17 Months	456.2	-20.3 (51.2)	-20.7 (49.1)	20.4 (50.2)	0.00 (0.99)	0.6 (0.44)	0.65 (0.42)
Value of deposits After 18 Months	463.7	-18.6 (52.8)	-18.8 (50.7)	28.3 (51.8)	0.00 (0.99)	0.75 (0.38)	0.81 (0.37)
Value of deposits After 19 Months	469.2	-21.9 (54.12)	-17.4 (51.9)	30.4 (53.0)	0.01 (0.93)	0.80 (0.37)	0.89 (0.34)
Value of deposits After 20 Months	453.3	-29.0 (56.1)	-14.1 (53.8)	32.2 (55.0)	0.07 (0.79)	1.14 (0.29)	0.69 (0.40)
F- Stat for each group		2.9	0.92	9.95			
P-Value		(0.82)	(0.99)	(0.13)			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level, gender and migrant status of account holder. Standard errors are in parenthesis, *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Table A12. Accumulated Amount of Withdrawals – Medium Term

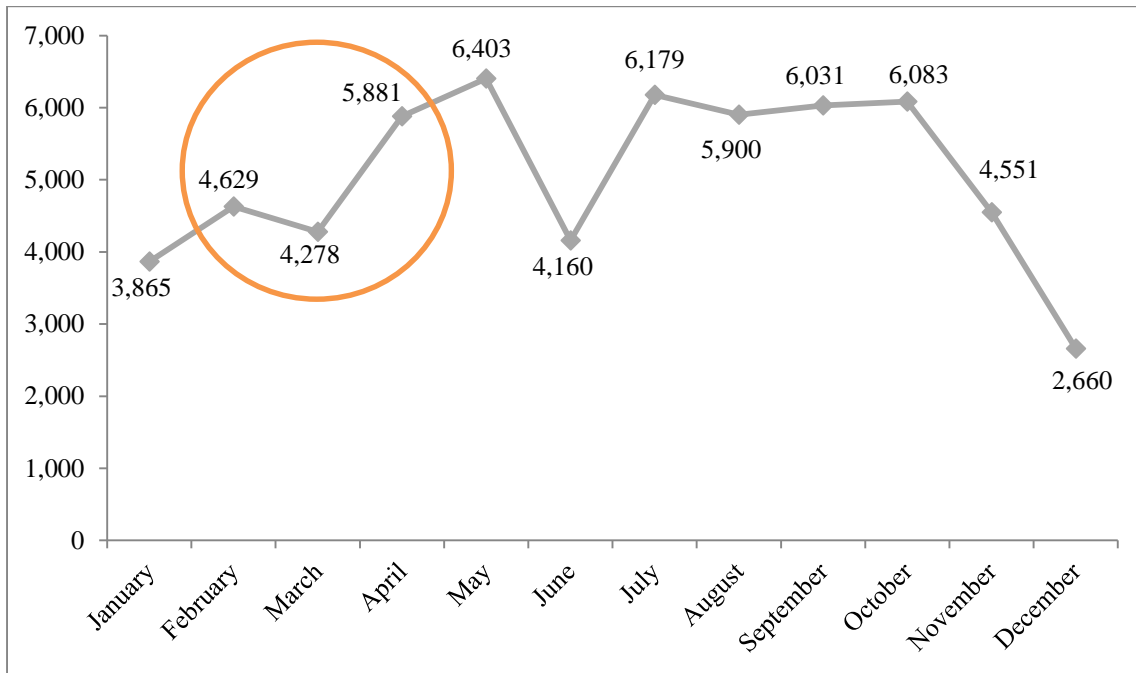
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
SUR Equation Outcome	Control Mean	Financial Education	Monthly Reminder	Semi-monthly Reminder	F-test Financial Education= Monthly Reminder (p-value)	F-test Financial Education= Semimonthly Reminder	F-test Monthly Reminder= Semimonthly Reminder
Value of withdrawals After 13 Months	270.4	-32.5 (39.7)	-49.3 (38.1)	-31.9 (38.9)	0.17 (0.68)	0.00 (0.99)	0.19 (0.66)
Value of withdrawals After 14 Months	264.0	-31.6 (44.1)	-37.4 (42.3)	-32.1 (43.2)	0.02 (0.89)	0.00 (0.99)	0.01 (0.90)
Value of withdrawals After 15 Months	266.1	-20.5 (47.3)	-34.3 (45.3)	-29.4 (46.3)	0.08 (0.77)	0.03 (0.85)	0.01 (0.92)
Value of withdrawals After 16 Months	307.4	-21.0 (48.9)	-35.2 (46.9)	-22.8 (47.9)	0.08 (0.77)	0.00 (0.97)	0.07 (0.80)
Value of withdrawals After 17 Months	317.0	-24.7 (50.2)	-36.8 (48.1)	-15.3 (49.2)	0.06 (0.81)	0.03 (0.85)	0.19 (0.67)
Value of withdrawals After 18 Months	365.0	-24.3 (51.4)	-38.8 (49.3)	-10.2 (50.4)	0.08 (0.78)	0.07 (0.79)	0.32 (0.57)
Value of withdrawals After 19 Months	385.6	-28.9 (52.5)	-40.1 (50.4)	-9.7 (51.5)	0.04 (0.83)	0.13 (0.72)	0.34 (0.56)
Value of withdrawals After 20 Months	418.2	-35.8	-43.9	-10.1	0.02	0.22	0.40
F- Stat for each group		4.64	4.43	6.47			
P-Value		(0.59)	(0.62)	(0.37)			
Observations		10053					

Note: Results present the coefficients of interest of SUR estimation models that include branch and opening month fixed effects to account for the stratified random assignment design. Additional control variables include age, stratum, education level, gender and migrant status of accountholder. Standard errors are in parenthesis, *p<0.10, **p<0.05, ***p<0.01. All monetary variables were calculated in US dollars using the market representative rate of 1USD for 2393.58 Colombian pesos, from the 4th of May 2015.

Table A13. Comparison of average characteristics of youths sampled and respondents of phone survey

Youth Characteristic	P-value of joint test of equality of means across two groups (into the survey and out of the survey)	P-value of joint test of equality of means across two groups (Answer and without answer)	P-value of joint test of equality of means across four treatment groups only for youths into the survey	P-value of joint test of equality of means across four treatment groups only for youths answered the survey successfully.
Age	0.2167	0.7809	0.3456	0.4230
Male	0.5477	0.7149	0.4558	0.5031
Stratum 0 (missing)	0.0478	0.6032	0.3596	0.8410
Stratum 1 - 2	0.5891	0.7087	0.7610	0.4029
Stratum 3-4	0.0215	0.7648	0.7567	0.5704
Stratum 5-6	0.7182	0.6776	0.1545	0.0533
Single	0.5862	0.3556	0.1724	0.4088
Primary	0.5611	0.8891	0.5748	0.7584
Secondary	0.7213	0.8687	0.6217	0.6001
Technical/Technological	0.5095	0.4681	0.0612	0.3090
University	0.4653	0.0638	0.9655	0.3579
Migrant	0.6446	0.3793	0.5403	0.7066
Number of observations by groups	Into the survey: 1620 Out the survey: 8433	Answer: 491 Without answer: 1129	Control: 444 Financial Education SMS: 373 Monthly Reminder: 406 Semi-monthly Reminder: 397	Control: 147 Financial Education SMS: 118 Monthly Reminder: 100 Semi-monthly Reminder: 126

Figure A1. Number of Tuticuenta accounts opened at BCS bank in 2012 and months chosen for inclusion into the randomization sample



Note: Youth who opened a *Tuticuenta* account in February, March or April of 2012 in any of the 263 bank branches nationwide were initially eligible to participate in the experiment. A total of 14,788 youth are part of this initial selection. Further restrictions are applied to obtain the final randomization sample. See text and notes to Table A2 for details.