Get Your Goat: Planning, Saving, and Ceremonial Spending

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Abstract. Providing "nudges" or simple reminders is increasingly seen as a way to help households overcome behavioral biases. We conducted a randomized evaluation in Niger of interventions designed to assist households in planning for spending on religious ceremonies: a lockbox, SMS reminders about savings goals and a combination of the two. These interventions had no impact on household expenditures for religious festivals or other ceremonies, such as weddings, naming ceremonies or funerals. Nevertheless, they shifted the financial mechanisms that households used to pay for some of these events towards savings. The SMS interventions allowed households to increase their overall savings amounts, whereas the lockbox interventions allowed households to better meet certain savings goals, increase health expenditures and reduce food insecurity. These effects differ substantially between men and women, suggesting that the cooperative bargaining model may not hold.
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Introduction

In developed and developing countries alike, celebrating family ceremonies and religious festivals is an important expense. A majority of poor households spend on funerals, weddings or religious festivals every year, and the amounts spent represent a significant proportion of the household budget (Banerjee and Duflo 2007). In Niger, the subject of this study, households can spend as much as 20 percent of per capita income on the annual religious festivals of Eid al-Adha and Eid al-Fitir, yet report that they are unable to meet stated health or education goals. Why would households spend on ceremonies at the expense of other savings goals? If financial markets are performing optimally, households could save up for festivals expenditures or take out loans and pay them back (Dupas and Robinson 2013). Yet given the highly seasonal nature of incomes and imperfect credit markets, such strategies can be impossible to implement. Even without credit market imperfections, households' consumption may outpace their ability to perceive their declining marginal utility of consumption of those goods, especially after a period of deprivation (Kahneman 2011). This behavior may be exacerbated in cases where there is intense social pressure to participate in festivals, or when festivals are timed such that they occur immediately after a period of low consumption.

There has been great interest in addressing such behavior via nudging interventions, which typically send individuals or households reminders about their financial behavior. Numerous experimental studies have illustrated the power of simple behavioral design changes to increase savings rates in developed countries, as well as reduce debts (Benartzi and Thaler; Choi, Laibson, Madrian, Metrick 2004, Bracha and Meier 2010). There is also great interest in applying designs informed by behavioral economics to help households boost savings rates in developing countries, with efforts focused on reminders to save or pay back debts, as well as technologies that provide commitment devices.

Whether behavioral nudges are actually successful in changing individuals' financial behavior remains an open empirical question, especially in developing countries. Karlan et al (2012) find that reminders in the Philippines, Bolivia and Peru assist households in reaching a savings goal (Karlan et al 2012), but that these nudges are the most effective when combined with a specific goal or incentive. Evidence from experimental trials of products that offer some kind of commitment to overcome self-control have shown promising results (Ashraf, Karlan and Yin 2010, Dupas and Robinson 2013), but take-up of commitment varies significantly depending

on features of the savings product. These results suggest that the details of the setting, the type of savings goal and the timing and content of the reminders are crucial in predicting whether or not such interventions could work.

While previous literature has focused largely on saving in general, we designed an experiment that sought to assist households in managing their spending for two large religious festivals in Niger, as well as encourage savings for households' stated goals. Households in our survey area spent an average of $US 180 on ceremonial expenses during the baseline period, a substantial percentage of household income. Yet households also expressed that they were unable to meet other savings goals later in the year and felt regretful about certain festival expenditures.

To address these dual needs, we designed two interventions. The first intervention was a simple individual lockbox, which offered individuals a secure place to put their money, but without any commitment to make deposits or limit withdrawals. The second intervention sent out SMS reminders to households about their religious festival spending and other savings goals, focusing primarily on health and education savings goals. A subset of households were assigned to both treatments.

Overall, we find that households in the *SMS* interventions saved more overall, whereas the *lockbox* interventions allowed households to better meet certain savings goals, to contribute more to their own health expenses and to reduce household food insecurity. While the interventions did not affect households' expenditure patterns for religious festivals or other ceremonial expenses along the intensive or extensive margin, they had more subtle impacts on the mechanisms that households used to pay for such expenditures.

At the same time, our interventions must be placed into context. First, over the course of our study, a drought affected a large percentage of households in our study, and overall religious and ceremonial expenditures decreased, thereby affecting our power to detect an effect. Second, as Muslim festivals are based upon the lunar calendar, thus occurring at a different point in time every year, a subset of our sample made ceremonial expenditures before the harvest in the follow-up period – during a time of great liquidity constraints – making these even more difficult to detect. And finally, the average impacts of the intervention hide important differences by gender, thereby suggesting that the cooperative bargaining model may not hold.

Our results contribute to the small yet growing literature on ceremonial spending. Banerjee and Duflo (2007) find that spending on festivals is common in poor households all over the world. Participation in ceremonies can also improve household status, strengthen trust and generate social capital (Rao 2000, Rao 2001, Shukla 2010). While access to savings accounts has been shown to increase ceremonial spending in some contexts (Prina 2015), this does not appear to be the case in our contexts, perhaps because the savings technology only allowed for small savings amounts. We also speak to a substantial literature on intra-household decision-making and consumption expenditures (e.g., Deaton 1989, Dunbar et al 2010, Duflo and Udry 2004, Doss 2006).

The rest of this paper proceeds as follows. Section I provides background on financial access and ceremonial spending in Niger. Section II presents the experimental design and data, and Section III presents the estimation strategy. Section IV discusses the main empirical results. Section V discusses threats to identification and potential mechanisms. Section VI concludes.

I. Research Setting and Design

Niger, a landlocked country located in West Africa, is one of the poorest countries in the world. With an estimated 85 percent of the population living on less than USD$2 per day, Niger is one of the lowest-ranked countries on the United Nations' Human Development Index (UNDP 2010). Access to formal financial services is extremely limited. Less than 2% of adults countrywide and less than 1% of rural adults have an account in a formal financial institution (Demirguc-Kunt and Klapper 2012).

Ceremonial spending is an important part of Nigerien culture and households contribute generously to weddings, *sunas* (naming ceremonies), funerals, and religious festivals, such as Ramadan and Tabaski. The magnitude of ceremonial spending is significant; the average expense for Tabaski in our survey sample was 53,957 CFA (approximately US$90) before the intervention, equivalent to more than 20% of average GDP per capita in Niger. Despite the fact that Tabaski is a predictable annual event, purchases for the holiday (which often include a goat or sheep, other food, children's clothing, and adults' clothing) represent one of Nigerien households' greatest financial burdens.

Our baseline analysis finds that rural households demonstrate significant financial dexterity in managing Tabaski expenses through contributions across generations and by utilizing a variety of financing mechanisms including various forms of savings, loans, asset sales, and gifts. As saving is a key component of households' money management strategies, large ceremonial expense events are common savings goals for rural Nigeriens. Before our intervention, many people were saving for ceremonies like Tabaski or Ramadan (63%), a suna (85%) or a family member's wedding (83%). Saving for investing in the education of a child (75%) and for agricultural investment (76%) are also commonly mentioned savings goals. Additionally, saving for emergencies is nearly universal, with 95 percent saving for health emergencies and other 98 percent for other types of unpredictable shocks. The very high rates of saving for unexpected shocks is unsurprising given the high frequency with which households experience them; for example, 70 percent of households experienced drought in the previous year. However, many households (45%) had been unable to meet their savings goals, attributing the failure to not having enough money (89%), spending on an urgent need or emergency (47%), or buying something else (23%).

This accords with earlier studies on the financial lives of the poor, which demonstrate how the poorest households must use a range of inventive strategies to execute household financial management (Banerjee and Duflo 2007, Collins et al. 2009, Duflo et al. 2013). The poor work creatively and often together to successfully manage their money (Banerjee and Duflo 2007; Duflo et al. 2013). For example, in Sub-Saharan Africa, 48% of people who report having saved in the past year did so in a self-managed community-based savings method such as a savings group, rather than in a formal account (Demirguc-Kunt and Klapper, 2012). Households' success in finding viable financial strategies has important implications for their wellbeing. In Kenya, Dupas and Robinson found that those who had access to savings services, even informal savings services, were more likely to increase their investment in health and increase their productivity and income (Dupas and Robinson, 2009, 2011).

However, lacking a safe place to save may only partially explain the challenge of saving for expected and unexpected expense events. Limited attention can also play a key role in suppressing savings. Given time-inconsistent preferences and limited attention, people may exhibit a present bias towards consumption (Karlan et al 2012). Reminder messages could make saving "top of mind", i.e. a more salient activity, leading to changes in saving and spending

behavior (Karlan et al 2012). Specifically, the reminders in our study focus on future likely expenditures that it may be easy for households to fail to attend to during periods of other more immediate and salient expenditures, such as religious ceremonies. Nudges to save in the face of lumpy expenditures have proved effective in other contexts; Atkinson et al. (2013) find that urging borrowers of microfinance institutions in Guatemala to save at the time they make a loan payment increases the probability to save and the amount saved.

A. Interventions

Starting in August 2013, Sahel Group, a local non-governmental organization (NGO), implemented a savings intervention in Niger. The first intervention, a lockbox, involved providing households in targeted villages with a lockbox and key. The lockbox was a small metal blue box, approximately 8" x 8" x 4", with a coin slot in the top and a keyed lock. The lockbox was delivered without any instructions or labeling approximately one month after the baseline survey.

The second intervention was the provision of SMS reminders prior to the Muslim festivals of Ramadan (June 2014) and Tabaski (October 2013 and September 2014). Three types of messages (five messages total) were sent to all households in the SMS treatment in the two weeks prior to each religious festival, namely: 1) a reminder that the holiday was approaching, but cautioning against spending too much; 2) a reminder that the holiday was approaching, and a reminder to save for health or school fees; and 3) a simple holiday greeting.[1] Thus, a household assigned to the SMS treatment would have received 15 messages over the course of 2013 and 2014, five messages for each of the three holidays.

What are the features of these interventions, and how might they affect savings behavior and expenditure patterns? The *lockbox* intervention provides individuals with a secure place to save as compared to other informal mechanisms commonly used. This secure place to save, in turn, provides some physical distance from the cash, which can facilitate mental accounting for particular savings goals (Dupas and Robinson 2009). The SMS, at the same time, focus attention on individuals' overspending and to other savings goals, with some "earmarking" for

[1] For example, messages included "Tabaski is coming! Enjoy the celebrations, but don't forget to save for your health and your family's health!" and "Tabaski is coming! Enjoy the celebrations but don't spend too much!"

health expenses. Thus, we posit that the *lockbox* intervention should help individuals to resist "temptations" or unplanned expenditures (including transfers to others), such as expenses related to health shocks, funerals and droughts, whereas the SMS intervention could help individuals to plan better for planned expenditures, such as religious festivals and weddings (Berman et al. 2016).

B. Experimental Design

Prior to the introduction of the interventions, Tufts and Sahel identified 70 intervention villages in one region of Niger, Dosso. These villages had previously participated in an adult education (ABC) program with Catholic Relief Services between 2009 and 2011, and hence had achieved some levels of literacy and were familiar with mobile phone messaging. Among these 70 villages, we first stratified by sub-administrative division and ABC status before assigning villages to the *lockbox* or control condition. Thus, there were 35 villages that received lockboxes and 35 that did not.

Within each village, we identified the 50 literacy participants (25 men and 25 women) that had previously participated in the adult education program. Surprisingly, there was very little attrition due to migration or death. Within each village, we stratified the literacy participants by gender and randomly assigned participants to receive a SMS reminder or none. Eight individuals per village received a reminder message. Thus, the SMS randomization was a cross-cutting randomization at the individual level, stratified by gender.

II. Data and Estimation Strategy

The data we use in this paper come from three primary datasets. First, we conducted two rounds of household survey data to measure the impact of the interventions on household expenditures and savings goals, prior to and after the intervention. Second, we conducted frequent telephone surveys for a subset of households in order to measure the impact of the interventions on time-sensitive expenditures for religious festivals and food security measures. And finally, we use the administrative data from the SMS aggregator to note whether a mobile phone received a message, as a measure of compliance.

A. Household Survey Data

Household surveys were administered to 16 households (8 men and 8 women) within each village prior to the start of the intervention in August and September 2013, for a total of 1,120 respondents across 70 villages. We also conducted a follow-up survey in October and November 2014, immediately following the Tabaski festival for that year.[2]

Each survey collected detailed information on socio-demographic characteristics, income and expenditure patterns, savings behavior and savings goals, time and risk preferences, shocks and coping strategies and asset ownership. In particular, we had detailed modules on households' spending amounts and patterns for large expense events, including celebrations such as weddings, *sunas* (naming ceremonies), religious festivals (Ramadan and Tabaski), as well as negative shocks like illnesses and funerals.

While attrition is typically a concern in most household surveys, our rates of attrition were relatively low (9.8%) and there was not differential attrition between the *lockbox* and *non-lockbox* villages, nor between *SMS* and *non-SMS* respondents. In addition, as mentioned previously, we observed little attrition between the end of the previous study (2012) and the beginning of this study.

B. Telephone Survey Data

The second primary dataset is a telephone survey with 300 randomly selected respondents (stratified by the lockbox and SMS treatments). The phone surveys were conducted in December 2013 (after Tabaski), May 2014 and August 2014 (after Ramadan), and collected information about recent expenditures on religious ceremonies (Tabaski and Ramadan), shocks, savings behavior and food security, which have high intra-annual variation.

C. Clickatell User Data

The final dataset is the user report data from Clickatell, the software that was used to send out the SMS messages to respondents. Clickatell provides detailed information on whether the message was sent, if not, why not and the type of error message received. We use these data to provide insights on non-compliance (ie, non-receipt of messages) at the individual level.

[2]Tabaski occurred around or immediately prior to the harvest for most households in our sample during the baseline and first follow-up phone survey, and before the harvest for approximately half of the households in our survey during the endline period.

D. Pre-Program Balance of Household Characteristics

Table 1 shows the results of pre-program balance tests by treatment status, and suggests that the randomization created balanced groups along observable dimensions. We test for differences in the means of a variety of characteristics, including socio-demographic characteristics, religious and other ceremonial expenditures, health expenses and savings goals. Overall, our groups are balanced and most differences in pre-program household characteristics are small and not statistically significant.

Respondents were, on average, 41 years old. Nearly all respondents (88%) were married, and the majority (76%) were from the Hausa ethnic group (Panel A). Nearly all households engage in agriculture and own their own land. Mobile phone ownership and usage in this area was ubiquitous, with 90 percent of households owning a mobile phone and 89 percent of respondents having used a mobile phone since the last harvest.

Savings behavior was practiced universal. Nearly everyone in our sample reported that they were saving, with less than 1% using a formal savings account. Rather, individuals primarily used informal savings mechanisms, such as livestock (75%), foodstuffs (70%), savings groups (40%), and at home "under the mattress" (40%). On average, respondents used three of these informal saving mechanisms.

Festivals and ceremonial expenditures were common savings goals. Households reported saving for Tabaski or Ramadan (63%), a naming ceremony (suna) (85%) or a wedding (83%). The high prevalence of these goals accords with the high cost of festivals and ceremonies for households. Indeed, religious festivals are the largest expenditure category in our sample, as all households celebrate these annually.[3] Every Muslim household (99.5 percent of our sample) spent money to celebrate Tabaski, with expenses averaging US$90, more than 20% of average GDP per capita. Respondents themselves contributed US$36 towards Tabaski expenses. The primary expense categories were food, clothing and livestock (sheep, goats, and poultry); children's clothing was the most expensive item for most households (36%), followed by the sheep or goat (25%) and adult clothing (20%).

In addition to religious festivals, households also spent a significant amount on other ceremonies, such as weddings. While the unconditional expenses for these ceremonies were

[3] This represents only spending on Tabaski, as our baseline survey did not ask about Ramadan expenses.

lower as compared with religious festivals, conditional on having a wedding, weddings were a significantly larger expense (US$304).[4]

Nearly every household experienced at least one shock prior to the baseline, most commonly drought (70%), illnesses (48%) and livestock illness (49%). 55 percent of respondents had an illness themselves and spent approximately US$30 to receive treatment for their most recent illness. 64 percent of households reported that a child had been ill, and spent US$7 per recent illness on treatment. In addition to serious illness, 15% of households experienced a death and nearly all households incurred funeral expenses, approximately US$25.[5]

All of these characteristics demonstrate that households must work creatively, with informal financial mechanisms, to manage their agricultural income to cover significant expected and unexpected expenses throughout the year.

III. Estimation strategy

To estimate the impact of *lockbox* and *SMS* interventions on our outcomes of interest, we estimate the following regression:

$$Y_{iv} = \beta_0 + \beta_1 lockbox_v + \beta_2 anysms_i + \beta_3 lockbox_v * sms_i + \beta_4 female + \gamma X'_{i0} + \theta_R + u_{iv}$$

Where Y_{iv} is the outcome of individual i in village v, $lockbox_v$ is an indicator variable equal to 1 if the village was assigned to the lockbox intervention (*lockbox*=1), 0 otherwise. $anysms_i$ is an indicator variable for whether individual i was assigned to the SMS reminder intervention (anysms=1), 0 otherwise. $lockbox_v * sms_i$ is the interaction between being in a village assigned to the lockbox intervention and a household assigned to the SMS intervention. θ_R are geographic fixed effects at either the sub-regional or the village level, and female controls for the respondent's gender. X'_{i0} is a vector of individual level baseline covariates. The error term u_{iy} captures individual shocks or ability. We cluster standard errors at the village level. While equation (1) is our primary specification, we also use an ANCOVA specification, controlling for the baseline value of the outcome variable. ANCOVA results are reported in Appendix 1.

The coefficient on lockbox (β_1) is the average effect on the outcome of interest of being assigned to the *lockbox*, without receiving a SMS, as compared with the control. The coefficient on SMS (β_2) is the average effect of being assigned to receive a SMS for those individuals in

[4] Conditional on a household celebrating a suna, sunas cost US$84. The unconditional mean of wedding expenditures is US$32, and the unconditional mean of suna expenditures was US$22.
[5] The unconditional mean of funeral expenses is US$3.

non-lockbox villages, whereas β_3 captures the joint effect of the lockbox and SMS interventions. All of the treatment coefficients measure the intention to treat (ITT), capturing the effect of treatment assignment. In the tables, we also report the joint effects of the SMS intervention and the lockbox intervention. Our key identification assumption is that the treatment assignment is exogenous, conditional on the other covariates.

IV. Results

A. Compliance

Table 2 presents the "first stage" of the interventions on take-up, broadly defined as receiving the specific intervention. In the *lockbox* treatment, take-up and usage rates were high; 96.4 percent of those assigned to the *lockbox* treatment reported receiving a lockbox and almost all individuals had the lockbox during the follow-up survey. Yet only 41 percent reported having money in the box at the time of the follow-up survey, potentially since savings had been recently liquidated. Among those in the *lockbox* treatment, the average savings amount was only approximately US$3. For those who currently had money in the box, the average savings amount was approximately US$9.

Identifying compliance in the *SMS* treatment is more nuanced, as it requires verifying that the message was sent, as well as the fact that the individual received it and read it. To address the issue of SMS compliance, we use several different data sources: Clickatell, which report whether the message was delivered to the respondent's telephone number; data on household and individual phone number churn rates; and self-reported measures of having received and read a message related to the intervention.

Overall, the Clickatell data show that 53 percent of *SMS* respondents received any messages for each of the three holidays, whereas an additional 39 percent received messages for some but not all of the three holidays. This coincides with the data on phone number churn rates: in the year between the baseline and follow-up surveys, only 44 percent of households in our sample maintained the same phone number. Overall, these two figures suggest that approximately half of our intended recipients received the SMS intervention, a challenge for SMS-based interventions more broadly.

Even if SMS reminders were received, the self-reported data suggest that only 18 percent of those assigned to the *SMS* treatment recalled receiving an SMS for the previous holiday.

Despite individuals' previous participation in an adult education program, low literacy levels compounded this issue; only 39 percent of those respondents who said they had received a message were able to read the message themselves. Overall, these results suggest that the SMS intervention may have been more salient for those respondents who kept the same mobile phone and were able to read the SMS, as opposed to the broader SMS sample.

B. Expenditure Patterns for Religious Ceremonies

As the primary focus of this research was on ceremonial spending, Table 3 reports the impacts of the program on religious festival expenditures (Tabaski and Ramadan). Overall, the pure control households spent a total of US$190 on religious festivals for 2014, with slightly more spent on Tabaski than Ramadan. The majority of control households purchased clothing, followed by poultry (68%), sheep (27%) or goat (20%) and wood (11%).[6] All households bought food for the festivals.

Overall, the interventions did not appear to have strong individual or joint effects on households' or respondents' total festival expenditures or on the types of items purchased, whether investment (clothing) or consumption goods (food and livestock). While individuals in the *SMS* intervention reported spending approximately US$7.75 more on the festival and were 7 percentage points more likely to purchase poultry, there was no reduction in other spending categories (Panel A). Yet these average effects mask strong differences by gender (Table 8): Women who received the SMS alone contributed approximately US$20 less to religious expenditures as compared with men, but women in the *lockbox*SMS* group contributed *more* as compared with their male counterparts.

C. Expenditures for Family Ceremonies

Table 4 presents the results for family ceremonial expenditures, namely weddings and sunas. While saving for family ceremonies was not a specific focus of the *lockbox* or *SMS* interventions, in light of importance of these festivals in households' expenditure basket, as well as their stated importance as a savings goal for many households, we report these results.

[6] While traditionally sheep are slaughtered for Tabaski, given the high cost of sheep, households may slaughter goats or poultry for the festival, which are relatively cheaper. Yet households in Niger report that slaughtering poultry gives them a feeling of shame, as they are not following normal customs.

Overall, 1/3 of control households had a birth in the year prior to the survey and all households held a *suna* for the child if she or he lived. Control households spent approximately US$25 on naming ceremonies and 90 percent of respondents in households that had a birth contributed to the *suna* expenses. None of the interventions affected households' expenditure patterns for *sunas*, either the overall amount or the types of items purchased. When looking at these expenditures by gender, however, a different pattern emerges (Table 8). Whereas men in the control group spent approximately 15,000 CFA on sunas ($US30), women's spent about 5,000 CFA less, suggesting that women traditionally contribute less to sunas. The interventions further affected women's spending: women in both the *lockbox* and *SMS* groups spent less on suna expenditures than their male counterparts, with a statistically significant effect at the 5 percent level for the *lockbox* intervention. The joint *SMS*lockbox* intervention somewhat mitigated this effect, although overall, women in the treatment group spent significantly less on sunas than their male counterparts.

For weddings, 21% of households celebrated a wedding in the past year, a majority of which were for the child. While average unconditional wedding expenditures among control households were US$25, conditional on celebrating a wedding, control households spent approximately US$215. Similar to the suna expenses, none of the treatments had individual or joint effects on households' likelihood of holding a wedding – which is a conscious choice for the household -- or expenditure patterns. Yet similarly, the results by gender are striking: Whereas 23% of control households with male respondents held a wedding over the previous year, with no effect on the likelihood of holding a wedding in male respondents' households, the interventions had strong effects on the likelihood of a marriage by gender and whether the dowry was an expense, in part related to the gender of the individual being married.

D. Expenditures on Health Shocks

Table 5 presents the results of the impacts on health and funeral expenses. The *SMS* intervention included specific reminders for health expenses, as health was an important stated savings goal for households.

Table 5 suggests that health shocks remained an important issue: 65 percent of respondents were ill since the previous harvest, with 69 percent of households having a sick child. The rates of seeking treatment were high: 90 percent of adults and 95 percent of children

sought treatment for their illnesses, either at health centers, hospitals or within the village. The average cost of treatment among control households was US$18. In addition to illness, a subset of households (18 percent) experienced a death since the last harvest. Funeral expenditures were modest, averaging just a few dollars per household.

Similar to the above tables, there are few individual or joint effects of the treatments on households' health and funeral expenditures, despite the specific focus of the *SMS* interventions on health savings goals. Yet the joint effect of the *lockbox* treatment – with and without SMS – increased spending on treatment by approximately US$5, with a statistically significant effect at the 10 percent level. When looking at this by gender, on average, women in control households spent slightly more than men in control households on health expenses, approximately US$5 more (Table 8). While none of the treatments had strong effects on males' health-seeking behavior, the *lockbox* and *SMS* treatments (alone) reduced females' health expenditures as compared with their male counterparts, with spending similar to women control households. The joint intervention seemed to mitigate this effect, suggesting that perhaps women needed both liquidity *and* reminders in order to change their health-seeking behavior. There were few effects of the intervention, either on average or by gender, on children's health expenses.

E. Financing Mechanisms

While the *lockbox* and *SMS* interventions did not have strong impacts on households' average ceremonial or health expenditure patterns, they might have affected the way in which households managed their money to pay for such expenses, either overall or by gender. Table 6 reports the results of the impact of the different treatments on households' financing mechanisms, namely savings (cash, livestock, foodstuffs and savings groups) and loans. As the *lockbox* interventions sought to encourage savings, there was a subtle increase in households' use of savings (of different forms) to cover expenditures, especially for Tabaski, sunas and health expenditures. While a majority of people in the control group use savings to pay for these expenses, informal loans are also a very common financing mechanism.

After the interventions, informal loan use persists. We find no shift away from loan usage in the individual or joint effects of the *SMS* or *lockbox* interventions. However, those in both the *SMS* and *lockbox* treatments were more likely to use savings to pay for Tabaski, and those in the *lockbox only* treatment were more likely to use savings to pay for a suna and to sell assets (a

form of in-kind savings) to pay for sunas. Additionally, we find that for health shocks and funerals, households were less dependent upon contributions from people outside the household. All of these measures are the extensive margin – rather than the intensive margin – so we are unable to determine whether savings (as compared with loans) accounted for a larger percentage of expenditures for each of these items.

F. Savings and Food Security

While Table 6 suggests that households were more likely to use savings to pay for some of their ceremonial and health expenditures, we are also interested in household welfare. Table 7 reports the impacts of the interventions on households' savings, food security and education. In the control group, savings (from all sources) was approximately $US25, and most individuals stated that they were unable to meet their savings goals.

Overall savings amounts increased for the joint *SMS* group by approximately US$3.60, with a statistically significant effect at the 10 percent level. Perhaps surprisingly, the joint effects of the *lockbox* intervention suggest that households had lower overall savings, although these results are not statistically significant at conventional levels. This seems to be primarily driven by the large negative coefficient on the *lockbox* only group; households in this treatment saved approximately US$15 less than those in the control group. This suggests that perhaps the SMS reminder was a necessary nudge to encourage savings.

While it is seemingly contradictory that the introduction of a savings technology might result in lower savings amounts, this could be because the *lockbox* group either shifted their types of savings mechanisms or were using their savings to accomplish certain savings goals. In fact, Panels B and C suggest this may be the case; lockbox households were more likely to meet their food and livestock savings goals, and were less likely to experience food insecurity for 5 of the past 12 months, all with statistically significant results.

V. Threats to identification and potential mechanisms

There are several threats to the identification of the above findings. We briefly discuss two here: attrition and multiple hypothesis-testing. Our rate of attrition is relatively low at 9.8%, and we find no significant differences in the rates of attrition between the *lockbox*, *SMS* or joint treatments.

In Tables 3-7, we examined the impact of the treatments on over 40 different outcomes. While our results are modest, this raises concerns that any observed effects cannot be attributed to the joint *lockbox* or *SMS* intervention, but are rather simply observed by chance among all of the different outcomes. Following Sankoh et al (1997), we use a Bonferroni correction that adjusts for the mean correlation among outcomes, focusing on the key outcomes of interest, namely, the savings amounts, food security and use of different financial mechanisms. Using the Bonferonni-adjusted p-values, only the results on the increased likelihood to use savings and food security remain statistically significant.

VI. Conclusion

Participation in ceremonies and holidays is an important expense for all households, including poor households. In Niger, the location of this field experiment, households spend to celebrate the holiday of Tabaski but are often unable to meet savings goals for education, health or agriculture expenses. Given the highly seasonal nature of agricultural incomes and extremely limited access to formal financial services, Nigerien households cannot easily save up for holidays or take out loans and pay then back. Additionally, households' consumption of temptation goods may outpace their ability to perceive their declining marginal utility of consumption of those goods. This behavior may be exacerbated when festival participation is critical for increasing or maintaining social status.

We use a field experiment in which we randomly varied access to a simple savings technology, combined with SMS message reminders, in order to better understand ceremonial spending behavior and the roles played by inattention and lack of access to savings products. To address the lack of a safe place to save, we provide an informal savings technology, a simple lockbox, which offered individuals a secure place to put their money. To address inattention, we send SMS savings reminders about households' savings goals, in particular religious festivals (Ramadan and Tabaski), health and education, and general savings. We also provide a subset of households with access to both treatments. We analyze a combination of pre- and post-household survey data, telephone survey data, and Clickatell user data to estimate the effects of the interventions on our outcomes of interest.

Overall, we find that the *SMS* interventions allowed households to save more overall, whereas the *lockbox* interventions allowed households to better meet important savings goals, in particular food and livestock-raising, contribute more to their own health expenses, and reduce household food insecurity. While the interventions did not affect households' expenditure patterns for religious festivals or other ceremonial expenses along the intensive or extensive margin, they had more subtle impacts on the mechanisms that households used to pay for such expenditures.

Our study contributes to the small yet growing literature on ceremonial spending, and underscores the priority of ceremonial spending in poor households. We shed light on the dynamics of spending and saving behavior, and on some of the challenges to using savings reminders and simple savings mechanisms to help households better prepare for expected ceremonial spending.

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Table 1: Baseline Household Characteristics

	Control Group Mean	Lockbox	SMS	Lockbox*SMS
	(1)	(2)	(3)	(4)
Panel A: Socio-demographic characteristics				
Age of Respondent	41.13	1.22	-1.28	0.679
		(1.73)	(1.14)	(1.49)
Gender of Respondent, 1=Woman	0.49	0.00	0.01	0.00
		(0.01)	(0.01)	(0.01)
Respondent is married	0.88	0.06	0.05	-0.08
		(0.02)	(0.02)	(0.03)
Respondent is Hausa	0.76	0.02	0.00	-0.01
		(0.01)	(0.02)	(0.02)
Household has at least one cement house	0.90	-0.04	0.00	0.01
		(0.03)	(0.02)	(0.03)
Household has at least one straw/mud house	0.46	0.02	0.02	0.00
		(0.05)	(0.04)	(0.05)
Number of asset categories owned by hh	6.17	0.05	0.13	0.05
		(0.18)	(0.11)	(0.19)
Number of crop categories produced by hh	6.45	-0.02	-0.19	0.26
		(0.18)	(0.11)	(0.16)
Household has experienced drought since last harvest	0.71	-0.03	-0.01	0.09
		(0.04)	(0.04)	(0.05)
Household owns a cellphone	0.90	-0.01	-0.03	0.00
		(0.03)	(0.03)	(0.04)
Respondent has used a cellphone since last harvest	0.89	0.02	0.01	-0.04
		(0.02)	(0.02)	(0.03)
Panel B: Tabaski expenditures				
Household's total spending for Tabaski	53404.91	1616.64	-1036.24	1496.37
		(4,863.90)	(5,102.75)	(6,315.63)
Respondent's total spending for Tabaski	22323.47	4315.18	190.83	-1392.48
		(2,343.47)	(1,892.49)	(2,621.94)
Household purchased clothing for Tabaski	0.95	0.00	-0.01	0.03
		(0.02)	(0.02)	(0.03)
Household purchased sheep for Tabaski	0.31	-0.02	-0.01	0.03
		(0.04)	(0.03)	(0.05)
Household purchased goat for Tabaski	0.27	-0.06	-0.08	0.08
		(0.03)	(0.03)	(0.04)
Household purchased poultry for Tabaski	0.68	-0.08	0.03	0.04
		(0.05)	(0.03)	(0.05)
Household purchased wood for Tabaski	0.17	-0.05	-0.06	0.09
		(0.04)	(0.02)	(0.04)
Household spending on sheep for Tabaski	18313.00	-1402.24	-2295.02	2704.74
		(2,607.30)	(1,896.94)	(2,564.45)

Table 1 continued: Baseline Household Characteristics

	Control Group Mean	Lockbox	SMS	Lockbox*SMS
	(1)	(2)	(3)	(4)
Panel C: Other ceremonial expenditures				
Household had a birth since the last harvest	0.33	-0.05	-0.02	0.08
		(0.04)	(0.04)	(0.06)
Of those with a birth, household celebrated suna	0.93	-0.03	0.00	0.04
		(0.04)	(0.03)	(0.05)
Household spending on suna (unconditional)	13368.00	-3695.12	-2111.41	3493.57
		(2,212.42)	(2,845.01)	(3,471.91)
Household celebrated a marriage since last harvest	0.16	-0.01	-0.01	-0.01
		(0.04)	(0.03)	(0.04)
Household spending on wedding (unconditional)	19236.00	5725.19	2215.54	-7831.20
		(6,678.91)	(5,950.64)	(9,960.24)
Panel D: Health and Funeral expenditures				
Respondent was sick since the last harvest	0.55	0.03	0.00	-0.02
		(0.04)	(0.03)	(0.05)
Household spending on respondent's last illness	19264.00	-1808.27	-3857.99	-3038.20
		(5,698.00)	(5,050.62)	(6,734.99)
Child in household was sick since the last harvest	0.64	0.03	-0.05	0.08
		(0.05)	(0.04)	(0.06)
Household spending on child's last illness	4153.80	993.11	-13.53	-1043.06
		(1,435.97)	(1,078.07)	(1,714.11)
Household experienced a death since the last harvest	0.15	0.05	0.04	-0.09
		(0.03)	(0.03)	(0.04)
Household spending on funeral expenses	1830.22	113.83	1138.10	-2066.19
		(673.04)	(935.33)	(1,098.07)

Notes: Column 1 presents the mean for the control group; Columns 2-4 report the coefficient from a regression of the dependent variable on an indicator variable for treatment assignment and village level fixed effects to account for randomization. Robust standard errors in parentheses.

Table 2. Take-up of the interventions

	Obs.	Mean	Std. dev.
Panel A: Take-up and usage of lockbox			
Received lockbox	556	0.96	0.19
Still has lockbox	512	0.98	0.12
Will show lockbox	505	0.99	0.09
Uses the lockbox to save money	505	0.41	0.49
Amount of money currently in lockbox (CFA)	556	1742.12	4985.15
Panel B: Take-up of SMS message			
Self-reported take-up:			
Received an SMS reminder for Tabaski 2014	556	0.18	0.38
Read the message themselves	71	0.39	0.49
Someone read the message for them	45	0.82	0.39
Clickatell delivery rates:			
Received SMS for all three holidays	556	0.53	0.50
Received SMS for some of three holidays	556	0.39	0.49
Did not receive SMS for any of three holidays	556	0.08	0.27
Phone number churn rates:			
Household maintained same phone number	1123	0.44	0.50

Table 3: Tabaski and Ramadan Expenditures

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Tabaski and Ramadan expenditure amounts						
Total Tabaski spending for the household (CFA)	61,351	-4,369.15	-53.25	6,600.85	6547	2231
	(76,912)	(6,352.65)	(7,532.62)	(8,546.42)	*0.12*	*0.73*
Total Tabaski spending for the respondent (CFA)	26,192.00	163.70	1,705.86	3,004.32	4710	3168
	(28,368)	(2,365.96)	(2,311.65)	(3,245.07)	*0.05***	0.22
Amount spent on the largest expense category for Tabaski (CFA)	32,392.00	-1,911.34	-795.51	5,243.84	4448	3332
		(2,556.85)	(2,254.52)	(3,490.83)	*0.1*	*0.25*
Total Ramadan spending for the household (CFA)	53,904.57	4,551.86	38.44	-3,289.62	-3251	1262
		(5,124.11)	(3,844.96)	(5,672.19)	*0.43*	*0.77*
Total Ramadan spending for the respondent (CFA)	26,806.41	2,330.66	940.87	-1,015.85	-74	1314
		(3,748.99)	(2,224.47)	(4,063.72)	*0.98*	*0.54*
Panel B: Investment expenditures for Tabaski and Ramadan						
Household purchased clothing for Tabaski	0.95	0.01	-0.00	0.01	0	0.02
		(0.02)	(0.02)	(0.03)	*0.84*	*0.35*
Household purchased clothing for Ramadan	0.86	-0.02	-0.04	0.05	0.01	0.04
		(0.03)	(0.04)	(0.05)	*0.72*	*0.32*
Panel C: Consumption expenditures for Tabaski and Ramadan						
Household purchased poultry for Tabaski	0.68	-0.06	-0.03	0.10*	0.07	0.04
		(0.04)	(0.04)	(0.05)	*0.05***	*0.37*
Household purchased sheep for Tabaski	0.27	0.01	0.02	0.02	0.04	0.03
		(0.04)	(0.03)	(0.05)	*0.19*	*0.53*
Household purchased goat for Tabaski	0.20	-0.02	-0.02	0.04	0.02	0.02
		(0.04)	(0.03)	(0.05)	*0.66*	*0.53*
Household purchased wood for Tabaski	0.12	-0.01	0.01	0.03	0.04	0.02
		(0.03)	(0.03)	(0.04)	*0.24*	*0.64*
Amount spent on sheep for Tabaski (CFA)	17,436.44	-827.36	2,123.59	1,203.89	3327	376
		(2,836.27)	(2,101.80)	(3,043.81)	*0.14*	*0.9*
Household purchased goat and/or sheep for Ramadan	0.13	-0.00	0.02	-0.01	0.01	-0.01
		(0.03)	(0.04)	(0.04)	*0.72*	*0.67*
Household purchased wood for Ramadan	0.10	-0.01	-0.00	0.03	0.03	0.03
		(0.03)	(0.03)	(0.04)	*0.23*	*0.43*

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from a regression in the form of Equation 1, presented in Section III. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in italics. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 4: Other Ceremonial Expenditures

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Sunas						
Household had a birth since the last harvest	0.36	0.07	0.01	-0.06	-0.05	0.01
		(0.05)	(0.04)	(0.07)	*0.32*	*0.81*
Total suna spending for the household (CFA)	12,103.73	3,008.83	-110.15	-1,770.45	-1,880	1,238
		(2,366.44)	(2,414.16)	(3,432.29)	*0.45*	*0.59*
The respondent contributed to the suna expenses	0.89	0.07	0.01	-0.06	-0.05	0.01
		(0.05)	(0.04)	(0.06)	*0.34*	*0.79*
Panel B: Weddings						
The household celebrated a marriage since the last harvest	0.21	0.02	0.00	0.01	0.01	0.03
		-0.04	-0.04	-0.05	*0.88*	*0.46*
Son was married	0.50	-0.01	-0.02	0.01	-0.01	-0.01
		(0.03)	(0.02)	(0.04)	*0.71*	*0.93*
Daughter was married	0.40	0.05*	0.02	-0.01	0.01	0.03
		(0.03)	(0.02)	(0.04)	*0.71*	*0.30*
Total wedding expenditures for the household for the household (CFA)	24878.54	-843.86	-2,948.18	9,743.36	6,795	8,899
		(6,296.88)	(6,587.81)	(9,505.11)	*0.33*	*0.23*
Dowry was a wedding expense	0.647	-0.03	-0.03	0.04	0.01	0.11
		(0.03)	(0.03)	(0.04)	*0.79*	*0.65*
Bed was a wedding expense	0.411	0.05**	0.03	-0.03	0.00	0.02
		(0.03)	(0.03)	(0.04)	*0.98*	*0.53*

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from a regression in the form of Equation 1, presented in Section III. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in italics. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 5: Health and Funeral Expenditures

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Adult Health Expenditures						
Respondent was sick since the last harvest	0.65	-0.00	-0.01	-0.04	-0.05	-0.04
		(0.05)	(0.05)	(0.06)	*0.18*	*0.42*
Respondent sought treatment for illness	0.90	0.01	0.01	-0.05	-0.03	-0.04
		(0.05)	(0.05)	(0.07)	*0.37*	*0.50*
Household spent money on respondent's illness	0.43	0.04	-0.00	-0.01	-0.02	0.02
		(0.05)	(0.05)	(0.06)	*0.65*	*0.59*
Amount respondent spent on illness (CFA)	10,699.13	-515.45	-1,635.07	3,663.96	2,028	3,148
		(2,146.35)	(1,779.94)	(2,772.11)	*0.34*	*0.08**
Respondent contributed to health expenses						
Health expenses could not be paid during last illness	0.06	-0.01	-0.01	0.00	-0.01	-0.01
		(0.02)	(0.01)	(0.02)	*0.81*	*0.52*
Panel B: Child Health Expenditures						
A child in the household was sick since the last harvest	0.69	-0.01	-0.04	0.03	-0.01	0.02
		(0.04)	(0.04)	(0.07)	*0.81*	*0.71*
Child received treatment for illness	0.95	0.01	-0.04	0.03	0.00	0.03
		(0.04)	(0.04)	(0.06)	*0.85*	*0.48*
Spent money on child's treatment	0.90	0.02	-0.03	-0.00	-0.04	-0.02
		(0.05)	(0.04)	(0.07)	*0.47*	*0.84*
Amount spent on child's health expenses (CFA)	2705.60	777	965	-1285	-319	-507
		647.01	(873.46)	(1,279.78)	*0.63*	*0.46*
Respondent contributed to health expenses					-0.01	0.08
					0.77	*.10**
Health expenses could not be paid during child's illness	0.01	-0.00	0.00	-0.00	0.00	-0.01
		(0.00)	(0.01)	(0.01)	*0.59*	*0.15*

Table 5 continued: Health and Funeral Expenditures

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Funeral Expenditures						
Death in the household since the last harvest	0.18	-0.00	-0.05	0.01	-0.03	0.01
		(0.04)	(0.04)	(0.05)	*0.28*	*0.71*
Household spent money on the funeral		-0.00	-0.03	0.01	-0.03	0.00
		(0.03)	(0.03)	(0.04)	*0.49*	*0.80*
Amount spent on funeral expenses (CFA)	685.02	931.18	-70.58	-1,008.86	-1,079.44	-77.68
		(585.87)	(242.47)	(690.53)	*0.10**	*0.82*

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from a regression in the form of Equation 1, presented in Section III. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in italics. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 6: Financing Mechanisms

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Financing mechanisms for Tabaski and Ramadan						
Household used savings to pay for Tabaski	0.5483	0.03	0.01	0.05	0.06	0.08
		(0.04)	(0.04)	(0.05)	*0.08**	*0.02***
Household used livestock to pay for Tabaski	0.1854	-0.08**	-0.01	0.05	0.03	-0.03
		(0.03)	(0.04)	(0.05)	*0.27*	*0.40*
Household sold assets to pay for Tabaski	0.504	0.11**	0.04	-0.11*	-0.07	0.00
		(0.04)	(0.04)	(0.06)	*0.1**	*0.93*
Household used a loan to pay for Tabaski	0.27	0.00	0.02	0.03	0.05	0.03
		(0.04)	(0.04)	(0.05)	*0.13*	*0.41*
Household sold assets to pay for Ramadan		0.02	0.02	-0.04		
		(0.03)	(0.03)	(0.04)	*0.58*	*0.54*
Household used savings to pay for Ramadan		-0.00	-0.02	-0.00		
		(0.04)	(0.03)	(0.04)	*0.42*	*0.87*
Panel B: Financing mechanisms for other ceremonial expenses						
Sunas						
Household used savings to pay for suna	0.5714	0.13***	0.05	-0.12**	-0.07	0.01
		(0.04)	(0.03)	(0.05)	*0.06**	*0.91*
Household used livestock to pay for suna	0.1309	-0.00	0.04	-0.00	0.03	-0.01
		(0.02)	(0.03)	(0.03)	*0.05***	*0.91*
Household sold food goods to pay for suna	0.5238	0.10**	0.02	-0.10**	-0.09	-0.01
		(0.04)	(0.03)	(0.05)	*0.03***	*0.89*
Household used a loan to pay for suna	0.33	0.01	0.02	-0.00	0.01	0.00
		(0.03)	(0.03)	(0.04)	*0.60*	*0.98*
Weddings						
Household used savings to pay for wedding	0.65	0.04	0.01	-0.02	-0.01	0.03
					0.73	*0.44*
		(0.03)	(0.03)	(0.04)		
Household used livestock to pay for wedding	0.65	-0.00	-0.03	0.03	0.01	0.03
		(0.03)	(0.03)	(0.04)	*0.79*	*0.33*
Household sold food goods to pay for wedding	0.67	0.01	0.01	-0.01	0.00	0.00
		(0.03)	(0.03)	(0.04)	*1.00*	*0.91*
Household used a loan to pay for wedding	0.31	-0.01	-0.03	0.05	0.03	0.04
		(0.02)	(0.02)	(0.03)	*0.31*	*0.07**

Table 6 continued: Financing Mechanisms

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Financing mechanisms for health expenses						
Adult Health Expenditures						
Household used savings to pay for health expense	0.50	0.00	0.00	0.01	0.01	0.01
		(0.05)	(0.04)	(0.06)	*0.67*	*0.75*
Household used savings group to pay for health expenses					*0.03*	*-0.01*
					*0.05**	*0.49*
Household used livestock to pay for health expense	0.15	-0.05**	-0.03	0.04	0.01	-0.01
		(0.02)	(0.02)	(0.03)	*0.59*	*0.71*
Household sold foodstocks to pay for health expense	0.34	0.03	-0.01	-0.03	-0.04	0.03
		(0.04)	(0.03)	(0.05)	*0.30*	*0.96*
Household used a loan to pay for health expense	0.24	-0.02	0.02	-0.01	0.00	-0.04
		(0.03)	(0.03)	(0.05)	*0.80*	*0.27*
Someone outside household contributed to health expense	0.17	-0.02	-0.03	-0.01	-0.03	-0.03
		(0.02)	(0.03)	(0.03)	*.09**	*0.24*
Child Health Expenditures						
Household used savings for child health expense	0.51	-0.02	-0.05	0.11	0.06	0.08
		(0.05)	(0.05)	(0.07)	*0.24*	*0.10**
Household used savings group to pay for child health expense					*0.00*	*0.03*
					0.89	*0.15*
Household sold livestock to pay for child health expense	0.08	-0.01	-0.01	0.02	0.01	0.01
		(0.02)	(0.02)	(0.02)	*0.57*	*0.55*
Household sold foodstocks to pay child health expense	0.36	0.08*	0.05	-0.07	-0.02	0.00
		(0.04)	(0.04)	(0.06)	*0.65*	*0.93*
Household used loan for child health expense	0.18	-0.01	-0.03	-0.01	-0.04	-0.02
		(0.03)	(0.03)	(0.04)	*0.25*	*0.51*
Someone outside household contributed to child health expense	0.03	-0.00	0.00	-0.02	-0.02	-0.03
		(0.01)	(0.01)	(0.02)	*0.06**	*0.03***
Panel D: Financing Mechanisms for Funerals						
Household used savings to pay for funeral	0.44	0.00	-0.01	0.01	0.03	-0.04
		(0.02)	(0.02)	(0.03)	*0.79*	*0.74*
Household used savings group to pay for funeral					0.00	0.00
					0.67	*0.98*
Household used livestock to pay for funeral	0.05	-0.00	-0.00	0.00	0.01	0.01
		(0.01)	(0.01)	(0.01)	*0.96*	*0.56*
Household sold foodstocks to pay for funeral	0.23	0.02	-0.00	-0.00	0.00	0.02
		(0.03)	(0.02)	(0.03)	*0.76*	*0.35*
Household used loan to pay for funeral	0.12	0.00	0.00	-0.00	0.00	0.00
		(0.01)	(0.01)	(0.02)	*0.97*	*0.99*
Someone outside household contributed to funeral	0.47	0.00	0.01	-0.05	-0.04	-0.04
		(0.03)	(0.03)	(0.04)	*0.08**	*0.09**

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from a regression in the form of Equation 1, presented in Section III. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in italics. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 7: Savings, Food Security and Education

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Savings						
Total amount saved using all mechanisms	12,318.00	-7,226.57***	-2,152.62	4,360.95	2208.32	-2865.62
		(1,917.95)	(2,996.59)	(3,226.55)	*0.07**	*0.26*
Panel B: Savings Goals						
Met food savings goal	0.64	0.05	-0.02	0.02	0	0.07
		(0.04)	(0.03)	(0.05)	*0.95*	*0.06**
Met goal to save for livestock purchase	0.39	0.04	-0.00	0.03	0.03	0.07
		(0.04)	(0.05)	(0.06)	*0.5*	*.06**
Met wedding savings goal	0.38	0.05	0.04	-0.02	0.02	0.03
		(0.04)	(0.04)	(0.06)	*0.55*	*0.52*
Met Tabaski and/or Ramadan savings goal	0.44	0.02	-0.01	-0.00	-0.02	0.01
		(0.04)	(0.04)	(0.06)	*0.74*	*0.73*
Met health savings goal	0.25	0.03	0.04	0.02	0.06	0.05
		(0.04)	(0.03)	(0.05)	*0.16*	*0.25*
Met education savings goal	0.28	0.02	-0.02	0.01	-0.009	0.04
		(0.04)	(0.04)	(0.06)	*0.83*	*0.34*
Panel C: Food Insecurity						
Months of Adequate Household Food Provisioning (MAHFP)	8.81	0.11	-0.02	0.01	-0.01	0.12
	(2.37)	(0.22)	(0.16)	(0.24)	*0.95*	*0.57*
Household did not have adequate food in:						
October 2013	0.01	0.02*	0.02	-0.05**	-0.03	-0.02
		(0.01)	(0.01)	(0.02)	*0.05***	*0.08**
November 2013	0.01	0.00	0.01	-0.02**	0	-0.01
		(0.01)	(0.01)	(0.01)	*0.15*	*0.07**
December 2013	0.01	0.01	0.01	-0.02	0	-0.02
		(0.01)	(0.01)	(0.02)	*0.31*	*0.13*
January 2014	0.02	0.02	0.04*	-0.07***	-0.03	-0.05
		(0.02)	(0.02)	(0.03)	*0.04***	*0.03***
February 2014	0.06	0.00	0.03	-0.05	-0.02	-0.05
		(0.02)	(0.03)	(0.03)	*0.34*	*0.10**
March 2014	0.15	-0.00	0.04	-0.08	-0.03	-0.08
		(0.03)	(0.04)	(0.05)	*0.19*	*0.07**
April 2014	0.32	-0.03	-0.00	-0.01	-0.01	-0.04
		(0.05)	(0.04)	(0.05)	*0.7*	*0.38*
May 2014	0.49	-0.01	-0.02	-0.02	-0.04	-0.04
		(0.06)	(0.04)	(0.06)	*0.37*	*0.44*
June 2014	0.75	-0.00	0.00	-0.04	-0.04	-0.04
		(0.05)	(0.04)	(0.06)	*0.31*	*0.34*
July 2014	0.87	0.01	-0.02	0.04	0.01	0.04
		(0.04)	(0.04)	(0.05)	*0.61*	*0.2*
August 2014	0.84	-0.02	-0.02	0.03	0.01	0.01
		(0.04)	(0.03)	(0.05)	*0.76*	*0.71*

Table 7 continued: Savings, Food Security and Education

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel C: Education						
Number of children in household attending school	2.48	0.29	-0.18	0.10	-0.08	0.39
		(0.18)	(0.16)	(0.23)	*0.63*	*0.04***
Percentage of children in household attending school	0.77	0.02	-0.01	-0.02	-0.03	0.01
		(0.03)	(0.03)	(0.04)	*0.25*	*0.83*
Any child in the household attends school	0.87	0.02	-0.02	0.02	0.00	0.03
		(0.03)	(0.03)	(0.04)	*0.93*	*0.19*
Household removed a child from school to cope with shock	0.01	-0.01	-0.01	0.01	0.00	0.00
		(0.01)	(0.01)	(0.01)	*0.32*	*0.85*

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from a regression in the form of Equation 1, presented in Section III. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in italics. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Table 8: Heterogeneous Effects by Gender

	Religious ceremonies		*Other ceremonies*						*Health expenditures*
	Respondent Tabaski expenditure	HH bought clothes for Tabaski	HH suna expenditure	Respondent contributed to suna costs	HH had a marriage	Son was married	Daughter was married	Dowry was a wedding expense	Respondent's last health treatment cost
Men, Control Group Mean	39,864.24	0.93	15,418.50	0.38	0.23	0.14	0.1	0.2	5,405.45
Women, Control Group Mean	18,118.84	0.95	10,718.59	0.39	0.18	0.12	0.09	0.14	8,289.57
Lockbox*Female	-979.58	-0.02	-13,553.20***	-0.18***	0.13*	0.10*	0.03	0.11*	-8,341.88*
	(5,035.30)	(0.03)	(4,328.05)	(0.07)	(0.07)	(0.05)	(0.05)	(0.06)	(4,394.66)
SMS*Female	-11,290.49**	-0.06*	-3,868.49	-0.05	0.14*	0.08	0.03	0.13*	-4,972.45
	(4,644.17)	(0.03)	(3,592.19)	(0.07)	(0.07)	(0.06)	(0.05)	(0.07)	(4,016.64)
Lockbox*SMS*Female	12,621.51*	0.04	8,790.68*	0.21**	-0.19*	-0.20**	0.02	-0.22**	11,901.69**
	(6,690.63)	(0.04)	(5,252.19)	(0.09)	(0.10)	(0.08)	(0.08)	(0.08)	(5,809.72)
Observations	978	1,111	968	972	995	995	995	993	910
R-squared	0.18	0.01	0.06	0.02	0.01	0.01	0.01	0.01	0.01

Notes: Standard errors clustered at the village level are reported in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Appendix 1: ANCOVA Specification Results

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Tabaski expenditures						
Total Tabaski spending for the household (CFA)	61,351	-10,027.82	-3,737.06	13,274.52	9537	3246
	(76,912)	(7,203.61)	(8,756.77)	(10,050.76)	*0.05***	*0.62*
Total Tabaski spending for the respondent (CFA)	26,192.00	-1,686.32	1,104.95	3,924.73	5029	2238
	(28,368)	(2,225.93)	(2,223.68)	(3,038.98)	*0.02***	*0.31*
Household purchased clothing for Tabaski	0.95	0.01	-0.00	0.00	0	0.01
		(0.02)	(0.02)	(0.03)	*0.99*	*0.49*
Household purchased sheep for Tabaski	0.27	0.01	0.03	0.01	0.04	0.02
		(0.04)	(0.03)	(0.05)	*0.26*	*0.56*
Household purchased goat for Tabaski	0.20	-0.00	-0.01	0.02	0.02	0.02
		(0.04)	(0.03)	(0.04)	*0.62*	*0.51*
Household purchased wood for Tabaski	0.12	-0.00	0.02	0.02	0.03	0.01
		(0.03)	(0.03)	(0.04)	*0.3*	*0.74*
Amount spent on sheep for Tabaski (CFA)	17,436.44	-1,434.27	2,597.30	1,153.25	3750	-281
		(2,571.10)	(2,059.30)	(2,982.69)	*.09**	*0.9*
Panel B: Sunas and Weddings						
Household had a birth since the last harvest	0.36	0.07	0.01	-0.06	-0.05	0.01
		(0.05)	(0.04)	(0.07)	*0.31*	*0.81*
Total suna spending for the household (CFA)	12,103.73	3,113.56	-206.48	-1,590.99	-1,797	1,522
		(2,469.81)	(2,501.91)	(3,491.63)	*0.47*	*0.51*
The respondent contributed to the suna expenses	0.89	0.11*	0.04	-0.12	-0.08	-0.02
		(0.06)	(0.07)	(0.09)	*.09**	*0.77*
The household celebrated a marriage since the last harvest	0.21	0.02	0.00	0.01	0.01	0.03
		(0.04)	(0.04)	(0.05)	*0.85*	*0.43*
Total wedding expenditures for the household for the household (CF/	24878.54	-962.52	-3,200.36	9,994.12	6,793	9,031
		(6,291.13)	(6,660.19)	(9,490.34)	*0.32*	*0.22*
Panel C: Adult Health Expenditures						
Respondent was sick since the last harvest	0.65	0.00	-0.00	-0.04	-0.04	-0.04
		(0.05)	(0.05)	(0.06)	*0.21*	*0.44*
Respondent sought treatment for illness	0.90	0.05	0.08**	-0.06	0.02	-0.01
		(0.04)	(0.04)	(0.05)	*0.54*	*0.69*
Household spent money on respondent's illness	0.43	0.00	0.01	0.01	0.02	0.01
		(0.02)	(0.02)	(0.03)	*0.18*	*0.32*
Amount respondent spent on illness (CFA)	10,699.13	-6,433.31	-5,684.31	11,079.32	5,395	4,646
		(5,164.18)	(4,884.68)	(6,669.06)	*0.20*	*0.24*
Health expenses could not be paid during last illness	0.06	-0.04	-0.00	0.01	0.00	-0.03

Appendix 1: ANCOVA Specification Results, continued

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel D: Child Health Expenditures						
A child in the household was sick since the last harvest	0.69	-0.01	-0.03	0.02	-0.02	0.01
		(0.04)	(0.04)	(0.06)	*0.73*	*0.90*
Child received treatment for illness	0.95	0.02	0.02	-0.02	0.00	0.00
		(0.03)	(0.03)	(0.04)	*0.92*	*0.95*
Spent money on child's treatment	0.90	0.03	-0.00	-0.08	-0.08	-0.04
		(0.03)	(0.04)	(0.05)	*.02***	*0.27*
Amount spent on child's health expenses (CFA)	2705.60	1,402.31	591.51	-1,795.59	-1204	-393
		(1,628.97)	(1,396.72)	(1,971.43)	*0.41*	*0.78*
Health expenses could not be paid during child's illness	0.01	-0.00	0.01	-0.01	0.00	-0.01
		(0.00)	(0.01)	(0.01)	*0.65*	*0.31*
Panel E: Funeral Expenditures						
Death in the household since the last harvest	0.18	-0.00	-0.04	0.02	-0.03	0.01
		(0.04)	(0.04)	(0.05)	*0.32*	*0.69*
Amount spent on funeral expenses (CFA)	685.02	933.45	-77.96	-991.56	-1069	-58
		(610.77)	(247.31)	(723.44)	*0.12*	*0.87*
Panel F: Financing mechanisms for Tabaski and Ramadan						
Household used savings to pay for Tabaski	0.5483	0.03	0.01	0.05	0.06	0.09
		(0.04)	(0.04)	(0.05)	*0.08**	*0.02***
Household used livestock to pay for Tabaski	0.1854	-0.08**	-0.01	0.05	0.04	-0.03
		(0.03)	(0.04)	(0.05)	*0.25*	*0.41*
Household sold assets to pay for Tabaski	0.504	0.11**	0.05	-0.12*	-0.07	-0.01
		(0.04)	(0.04)	(0.06)	*0.08**	*0.89*
Household used a loan to pay for Tabaski	0.27	0.00	0.02	0.03	0.05	0.03
		(0.04)	(0.04)	(0.05)	*0.19*	*0.52*

Appendix 1: ANCOVA Specification Results, continued

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel G: Financing mechanisms for sunas and weddings						
Sunas						
Household used savings to pay for suna	0.5714	0.28**	0.22*	-0.45**	-0.23	-0.17
		(0.12)	(0.13)	(0.17)	*0.07**	*0.20*
Household used livestock to pay for suna	0.1309	-0.03	0.23**	-0.02	0.22	-0.05
		(0.04)	(0.10)	(0.13)	*0.01****	*0.67*
Household sold food goods to pay for suna	0.5238	0.22*	0.04	-0.28	-0.25	-0.07
		(0.13)	(0.12)	(0.19)	*.09**	*0.62*
Household used a loan to pay for suna	0.33	-0.11	-0.12	0.14	0.02	0.03
		(0.13)	(0.13)	(0.18)	*0.87*	*0.82*
Weddings						
Household used savings to pay for wedding	0.65	0.24	0.24	-0.07	0.17	0.18
		(0.19)	(0.25)	(0.31)	*0.35*	*0.46*
Household used livestock to pay for wedding	0.65	0.11	-0.22	0.19	-0.02	0.30
		(0.22)	(0.24)	(0.33)	*0.91*	*0.22*
Household sold food goods to pay for wedding	0.67	-0.38**	0.16	-0.21	-0.04	-0.59
		(0.17)	(0.14)	(0.24)	*0.84*	*0.01****
Household used a loan to pay for wedding	0.31	0.22	-0.04	0.30	0.26	0.52
		(0.20)	(0.20)	(0.30)	*0.27*	*.03***

Appendix 1: ANCOVA Specification Results, continued

	Control Group Mean (s.d.)	Lockbox	SMS	Lockbox*SMS	Total effect: SMS + Lockbox*SMS *p-value (SMS + Lockbox*SMS=0)*	Total effect: Lockbox + Lockbox*SMS *p-value (Lockbox + Lockbox*SMS=0)*
	(1)	(2)	(3)	(4)	(5)	(6)
Panel H: Financing mechanisms for health expenses						
Adult Health Expenditures						
Household used savings to pay for health expense	0.50	0.02	-0.02	0.05	0.03	0.06
		(0.08)	(0.09)	(0.11)	*0.65*	*0.33*
Household used livestock to pay for health expense	0.15	-0.06	-0.03	0.04	0.00	-0.02
		(0.06)	(0.05)	(0.08)	*0.99*	*0.62*
Household sold foodstocks to pay for health expense	0.34	-0.00	-0.03	0.00	-0.03	0.00
		(0.07)	(0.07)	(0.10)	*0.72*	*0.99*
Household used a loan to pay for health expense	0.24	-0.01	0.09*	-0.01	0.08	-0.02
		(0.06)	(0.05)	(0.09)	*0.24*	*0.77*
Child Health Expenditures						
Household used savings for child health expense	0.51	-0.03	-0.01	0.10	0.09	0.06
		(0.08)	(0.09)	(0.11)	*0.19*	*0.38*
Household sold livestock to pay for child health expen	0.08	-0.03	-0.05*	0.08	0.02	0.05
		(0.05)	(0.03)	(0.06)	*0.63*	*0.29*
Household sold foodstocks to pay child health expense	0.36	0.12*	0.07	-0.11	-0.04	0.02
		(0.07)	(0.08)	(0.11)	*0.65*	*0.83*
Household used loan for child health expense	0.18	-0.06	-0.10**	0.05	-0.05	0.00
		(0.06)	(0.05)	(0.08)	*0.40*	*0.93*
Panel I: Financing Mechanisms for Funerals						
Household used savings to pay for funeral	0.44	0.41	0.59*	-0.68*	-0.09	-0.27
		(0.26)	(0.33)	(0.37)	*0.59*	*0.27*
Household used livestock to pay for funeral	0.05	-0.17	-0.06	0.04	-0.02	-0.12
		(0.21)	(0.23)	(0.24)	*0.58*	*0.29*
Household sold foodstocks to pay for funeral	0.23	0.56**	0.27	-0.14	0.13	0.41
		(0.22)	(0.20)	(0.30)	*0.61*	*.02***
Household used loan to pay for funeral	0.12	-0.27	0.02	0.08	0.09	-0.19
		(0.19)	(0.21)	(0.21)	*0.31*	*0.32*

Notes: Column 1 presents the control group mean. Columns 2-4 present the coefficients from ANCOVA regression. Standard errors clustered at the village level are reported in parentheses. Columns 5 and 6 present coefficients from tests of joint significance. P-values are reported in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.