Zap It to Me: The Short-Term Impacts of a Mobile Cash Transfer Program

Jenny C. Aker, Rachid Boumnijel, Amanda McClelland, and Niall Tierney

Abstract

Conditional and unconditional cash transfers have been effective in improving development outcomes in a variety of contexts, yet the costs of these programs to program recipients and implementing agencies are rarely discussed. The introduction of mobile money transfer systems in many developing countries offers new opportunities for a more cost-effective means of implementing cash transfer programs. This paper reports on the first randomized evaluation of a cash transfer program delivered via the mobile phone. In response to a devastating drought in Niger, households in targeted villages received monthly cash transfers as part of a social protection program. One-third of targeted villages received a monthly cash transfer via a mobile money transfer system (called zap), whereas one-third received manual cash transfers and the remaining one-third received manual cash transfers plus a mobile phone. We show that the zap delivery mechanism strongly reduced the variable distribution costs for the implementing agency, as well as program recipients' costs of obtaining the cash transfer. The zap approach also resulted in additional benefits: households in zap villages used their cash transfer to purchase a more diverse set of goods, had higher diet diversity, depleted fewer assets and grew more types of crops, especially marginal cash crops grown by women. We posit that the potential mechanisms underlying these results are the lower costs and greater privacy of the receiving the cash transfer via the zap mechanism, as well as changes in intra-household decision-making. This suggests that m-transfers could be a cost-effective means of providing cash transfers for remote rural populations, especially those with limited road and financial infrastructure. However, research on the broader welfare effects in the short- and long-term is still needed.

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1. Introduction

Conditional and unconditional cash transfers have been an important component of social protection policies in developing countries since the 1990s (World Bank 2006, World Bank 2009, DFID 2011). While there is widespread evidence of the effectiveness of such programs in improving development outcomes, the costs of such programs are rarely discussed. Yet many cash transfer programs present logistical, operational and security challenges, especially in countries with limited physical and financial infrastructure, as they require carrying cash in small denominations from urban centers to remote rural areas. These costs can affect the cost effectiveness of cash transfer programs as compared with other types of interventions.

The introduction of mobile-phone based money transfer systems (m-transfers) in many developing countries offers an alternative means of providing such cash transfers. By allowing the money to be transferred via a mobile phone, such programs could potentially reduce the costs to implementing agencies of providing cash transfers to remote populations, especially in areas with few financial institutions. Furthermore, m-transfer systems may also prove easier for cash transfer recipients to collect and use their transfers, provided they have ready access to m-transfer service providers.[1]

Beyond the cost savings, the m-transfer system itself may lead to additional benefits for program recipients. Research on the impact of m-transfer systems in Kenya and Rwanda suggests that households increased their access to financial services (Morawczynski and Pickens 2009, Mbiti and Weil 2011) and informal private transfers between individuals (Blumenstock, Eagle and Fafchamps 2011, Jack and Suri 2011), thereby allowing households to better manage shocks. Furthermore, the greater relative privacy of the m-transfer approach could reduce sharing among households within the village, thereby leaving more disposable income available for the household (Jakiela and Ozier 2011).

We report the results of a randomized cash transfer program in Niger, where some program recipients received a cash transfer via a m-transfer system (called Zap). Overall, our results suggest that the technology strongly reduced the variable

[1] Cost-saving measures may also cause a deterioration in program performance along other dimensions. For example, the switch from cash currency to m-transfers might increase costs for recipients who cannot "cash out" their m-transfer, access m-transfer agents or use the technology.

distribution costs to the implementing agency, as well as costs to the program recipients in accessing their cash transfer. The m-transfer approach also resulted in additional benefits for program recipients: households in *zap* villages spent the cash transfer on more types of items, sold fewer non-durable assets, consumed more diverse foods and cultivated more diverse crops as compared to those receiving a manual cash transfer. These effects do not appear to be driven by baseline differences in household characteristics, differential attrition or take-up, distribution of the mobile phone handset or different impacts of the cash transfer delivery mechanism on prices effects. Rather we posit that these effects are largely explained by the time savings for program recipients, greater privacy of the zap transfer mechanism and a shift in women's influence within the household.

This paper is broadly related to a body of research on the impact of information technology on a variety of development outcomes (Jensen 2007, Aker 2010) and m-money in particular (Jack and Suri 2011, Blumenstock, Eagle and Fafchamps 2011, Mbiti and Weil 2011). Yet unlike existing research in the field, this paper uses a unique experimental design to distinguish the impact of m-transfers from the impact of the mobile phone itself, and provides detailed cost information on each cash transfer mechanism.

The rest of the paper proceeds as follows. Section II describes the situation in Niger and m-transfer systems in general. Section III describes the research design. Section IV describes the different datasets and estimation strategy. Section V outlines a theoretical framework of the impact of mobile money on household well-being, whereas Section VI provides estimates of the impact of the program. Section VII addresses some of the potential mechanisms and Section VIII discusses alternative explanations. Section IX provides a cost-benefit analysis of the zap intervention, and Section X concludes.

2. Background

2.1. Drought and Food Crises in Niger

Niger, a landlocked country located in West Africa, is one of the poorest countries in the world. With a per capita GNP of US$230 and an estimated 85 percent of the population living on less than US$2 per day, Niger is one of the lowest-ranked countries on the United Nations' Human Development Index (UNDP 2010). As the country spans the Saharan, Sahelian and Sudano-Sahelian agro-ecological zones, rainfall ranges from 200 millimeters (mm) per year in the northern regions to 800 mm in the south between May and August. Precipitation varies substantially across the country both within and across years (Nicholson, Some and Kone, 2000). Niger experienced six droughts between 1980 and 2005 (Government of Niger 2007).

A majority of households in Niger depend upon rainfed agriculture, with staple food crops consisting of millet, sorghum and fonio, and cash crops including cowpeas, peanuts, cotton and sesame. Inter-annual deviations in rainfall are positively associated with fluctuations in agricultural output, as yields depend upon the timing and quantity of rainfall.

Because of the correlation between rainfall and grain output, drought is positively correlated with food crises and famine. An estimated one-third of the country's population died during the "great famine" of 1931, with approximately 250,000 drought-related human fatalities occurring in the Sahelian region between 1968-1974 and 1983-84. In 2005, an estimated 2.4 million Nigeriens were affected by severe food shortages, with more than 800,000 of these classified as critically food insecure (FEWS NET 2005). Niger also suffered from both drought and harvest failures in 2009/2010, with 2.7 million people classified as vulnerable to extreme food insecurity (FEWS NET 2010). Rural households in Niger typically deal with such shocks by reduced consumption, asset depletion, tree-cutting for firewood and charcoal sales and seasonal migration.

2.2. Mobile Money

Mobile phone technology has reduced the costs of communicating information over long distances in many parts of the developing world. This transformation has been particularly dramatic in sub-Saharan Africa, where investments in other infrastructures such as power, roads and landlines are limited. In Niger, there were 13 mobile phone subscribers per 100 people in 2010, as compared to fewer than .2 landline for every 100 people. The road network is equally poor: Despite the fact that Niger is one of the largest countries in Africa, the total road network was estimated to be 15,000 km as of 2005, of which only 8 percent were paved. There is less than 1 bank for every 100,000, making it one of the most "unbanked" countries in sub-Saharan Africa (CGAP 2010).

Since 2005, a variety of m-transfer systems have emerged in 80 developing countries in Africa, Asia and Latin America. These systems typically involve a set of applications that facilitate a variety of financial transactions via mobile phone, including transmitting airtime, paying bills and transferring money between individuals. Most m-transfer systems allow the user to store value in an account accessible by the handset, convert cash in and out of the stored value account, and transfer value between users by using a set of text messages, menu commands, and personal identification numbers (PINs) (Aker and Mbiti 2010). A "pseudo account" can be established by purchasing "electronic money" (e-money) from an agent, usually a third party or someone who works for the mobile phone operator or bank. The user can then send e-money to another recipient with a phone, who then withdraws the e-money from their local transfer agent. Fees are generally charged for each transaction.

The first m-transfer system in Niger was introduced in January 2010. Known as Zap, the product was developed by the primary mobile phone service provider (Zain, now Bhartia Airtel) in multiple countries. Initial coverage, usage and growth of Zap was limited in 2010 and geographically focused in the capital city (Niamey) and regional capitals. The cost of making a $USD45 transfer using Zap cost $1.50 during this period.[2]

3. Research Design

In 2010, an international non-governmental organization, Concern Worldwide, developed a humanitarian program in response to the 2009/2010 Niger drought and food crisis. In an attempt to prevent asset depletion and reduce malnutrition among drought-affected households, the program provided unconditional cash transfers to approximately 10,000 households during the "hungry season", the five-month period before the harvest and typically the time of increased malnutrition. Program recipients were to receive an average of 22,000 CFA ($USD 45) per month for five months, for a total of $USD 215. In an effort to facilitate the disbursement of cash in remote areas, Concern decided to implement a pilot study across 116 villages in 6 communes of the Tahoua region.

3.1. Cash Transfer Interventions

Three interventions were ultimately chosen for the pilot program. The reference was the standard *manual cash* intervention, whereby beneficiary households received unconditional cash transfers of 22,000 CFA per month (approximately $US45).[3] The total value of the transfer over the five-month period was approximately 2/3 of the total annual GDP per capita. Payments were made on a monthly basis, whereby cash was counted into envelopes and transported via armored vehicles to individual recipients. Rather than distributing the cash in each village, a central village location was chosen for groups of 4-5 villages. Program recipients had to travel to their designated location on a given day to receive the cash transfer.[4]

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[2]To make a transfer between $20-$40 cost $1.50; to transfer more than $USD40 cost $3 per transfer.

[3]While the program encouraged program recipients to attend health centers, this was not a condition for receiving the actual transfer. Thus, the program was a de facto unconditional cash transfer program.

[4]Program recipients in cash and placebo villages were informed of the date and location of their cash transfer via a phone call a few days' prior to the transfer. While Concern tried to ensure that the cash distribution points were as close as possible to each village, it was not possible to have a distribution point in every village.

The two additional interventions were variants of the basic intervention, one of which was aimed at reducing the costs of distributing cash to remote, sparsely-populated and in some cases insecure rural areas. Program recipients in the second group (*zap*) received their cash transfer via the mobile phone. After receiving the electronic transfer, recipients had to take the mobile phone to an m-transfer agent located in their village, a nearby village or a nearby market to obtain their physical cash. As less than 30 percent of households in the region owned mobile phones prior to the program, Concern also provided program recipients with mobile phones, as well as the Zap account, and paid for the transfer charges. The second intervention thereby differs from the manual cash intervention with respect to the transfer delivery *mechanism*, as well as the provision of the handset and the m-transfer technology.[5]

In an effort to disentangle the impact of the change in delivery mechanism from that of receiving a mobile phone, the third group (*placebo*) mirrored the manual cash intervention, but also provided a mobile phone. Like the manual cash group, program recipients received $US45 in physical cash on a monthly basis and had to travel to a meeting point to receive their cash. However, like the zap group, program recipients also received a mobile phone (which was "Zap" enabled), yet did not receive their transfer via the mobile phone.

Comparing the *placebo* and cash groups should allow us to disentangle the additional effect of having a mobile phone. Comparing the *zap* and *placebo* groups should allow us to detect the additional effect of m-transfer delivery mechanism (as compared with the manual cash delivery), since both groups were provided with mobile phones. However, these comparisons rely upon the assumption that the treatment effects are additive, which not be valid in this context.

3.2. Experimental Design

Prior to the introduction of the program, Concern Worldwide identified 116 "food deficit" villages in the Tahoua region, those classified by the Government of Niger as

[5] While Zap was introduced into Niger in January 2010, there were a limited number of zap agents in rural areas. Consequently, Concern Worldwide worked with Zain (now Bhartia Airtel) to ensure that Zap agents were registered within the program area. Agents were either registered in the village, in neighboring villages or in nearby markets. On the day of the cash transfer, program recipients would receive a special "beep" on their mobile phone, informing them that the transfer had arrived. The program recipient could then travel to a local agent (at her discretion) and show the value on the phone. The m-transfer agent would then remove the value of the cash transfer and "cash out", paying the value of the cash transfer to the program recipient

having produced less than 50 percent of their consumption needs during the 2009 harvest. Of these, some villages were prioritized for the *zap* intervention based upon their population size and proximity to skirmishes near the Niger-Mali border, thereby reducing the sample size to 96 villages. The remaining eligible villages were randomly assigned between the basic (manual cash), placebo and zap interventions. In all, 32 villages were assigned to the cash group, 32 to the placebo group and 32 to the zap group. A map of the project areas is provided in Figure 1.

An ideal evaluation would have also included a pure comparison (non-cash) group, plus a group with access to mobile phones and m-money (but no cash). Due to the humanitarian nature of the intervention and the political situation at the time of the crisis, there was no pure comparison (non-cash) group. Hence, while we can estimate the causal effect of the *zap* and *placebo* interventions as compared to the manual *cash* intervention, we cannot estimate the causal impact of the *cash* transfer program in this context. Yet a substantial body of empirical evidence documents the impact of conditional and unconditional cash transfer programs in a variety of emergency and development contexts (World Bank 2009, Baird, McIntosh and Ozler 2011, DFID 2011).

Within each food deficit village, household-level eligibility was determined by two primary criteria: 1) the level of household poverty (determined during a village-level vulnerability exercise); and 2) whether the household had at least one child under five. The number of recipient households per village ranged from 20 to 75 percent of the village population. In all villages, the cash transfer was provided to the woman. The study timeline is presented in Figure 2.

4. Data and Estimation Strategy

4.1. Data

The data come from two primary sources. First, a comprehensive household survey of more than 1,200 program recipients was conducted in all 96 villages. The baseline survey was conducted in April 2010, with a follow-up survey in December 2010. The research team located over 98 percent of households for the follow-up survey. Both the attrition rates and the distribution of attriting households' characteristics were similar across the treatment groups (Table A1).

The household survey collected detailed information on household food security, demographics, asset ownership, agricultural production and sales, mobile phone ownership and usage, uses of the cash transfer and village and household-level shocks. As the surveys were conducted during a humanitarian crisis and over a short time frame, the research team was mindful of the time burden on respondents. As a result, the household surveys did not include a detailed income and expenditure module. We

use the household-level data to measure the impact of the cash delivery mechanism on a subset of development outcomes and behaviors, using proxy income measures.

The second dataset includes is weekly agricultural price information from over forty-five markets for a variety of goods between May 2010 and January 2011, as well as the date of each cash transfer in each village. We use these data to test for different effects of the cash transfer delivery mechanism (zap or manual cash) on local market prices, as these price effects could directly and indirectly affect household welfare.

4.2. Pre-Program Balance of Program Recipients

Table 1 suggests that the randomization was successful in creating comparable groups along observable dimensions. Differences in pre-program household characteristics are small and insignificant. Average household size was nine, and a majority of respondents were members of the Hausa ethnic group. Less than 15 percent of households had any form of education, and 72 percent of households were in monogamous marriages. Less than thirty percent of households owned a mobile phone prior to the start of the program, yet 63 percent of respondents had used a mobile phone in the few months prior to the baseline.

Table 2 provides further evidence of the comparability of the different interventions for key outcomes, namely food security, agricultural production, migration and coping strategies. Over 90 percent of households relied upon agriculture as a primary income source, and approximately 50 percent had at least one seasonal migrant in the past year. A strong majority (97 percent) of households had experienced drought, and household diet diversity was 3 (out of 12 categories of foods).[6]

4.3. Estimation Strategy

To estimate the impact of the *zap* program on a variety of outcomes, we first use a simple reduced form regression specification comparing outcomes in the post period. This takes the following form:

$$(1) \qquad Y_{iv} = \beta_0 + \beta_1 zap_v + \beta_2 placebo_v + X'_{iv0}\gamma + \theta_R + \varepsilon_{iv}$$

[6]Overall, we made over 75 comparisons and find 10 variables that are statistically significant at the 10 percent level, 4 that are statistically significant at the 5 percent level and 1 at the 1 percent level. These results are in-line with what we would expect from random assignment (Barrera-Osorio, Bertrand, Linden, and Perez-Calle, 2011).

The variable Y_{iv} represents the outcome of interest (food security, coping strategy, assets, agricultural production and sales) of individual or household *i* in village *v*. zap_v is an indicator variable for whether the village participated in the m-transfer program, whereas $placebo_v$ is an indicator variable for whether the village was in the placebo group. θ_R are geographic fixed effects at the commune level. To improve precision, we include a vector of household baseline covariates, $X'_{iv0,}$ such as ethnicity, marital status and household size. The error term consists of ε_{iv}, which captures unobserved individual or household characteristics or idiosyncratic shocks. We cluster the error term at the village level. The coefficients of interest are β_1 and β_2, which capture the average impact of the two treatments as compared to the basic cash intervention. We also test whether these coefficients are equal.[7]

While a simple differences specification will tell us the magnitude of the difference among the three interventions in the post period, we also use a difference-in-differences approach as a robustness check.

5. Theoretical Framework

The m-transfer system, as compared with the manual cash transfer, could potentially impact household outcomes through six primary mechanisms. First, by altering the costs involved in obtaining the transfer, the zap program could affect the time use of program recipients. If the m-transfer mechanism reduced program recipients' transport and opportunity costs involved in obtaining the transfer, then this would reduce lost income to zap program recipients. If, however, the new technology made it more difficult for program recipients to access their cash – either due to the limited number of m-transfer agents or difficulty in using the technology – this could have increased costs for the zap households and reduced participants' ability to access the cash transfer.

Second, as households in *zap* villages did not have to travel to a pre-arranged location – but could "cash out" from any m-transfer agent – households could have changed the location and timing of their cash transfer expenditures. For example, *zap* households could have been more likely to make purchases within the village rather than in an

[7]Two villages that were originally assigned to one intervention received a different intervention, due to management oversight. Nevertheless, villages were classified by their initial intervention, so the estimated program effect is the impact of being offered the treatment (intention to treat) not the impact of the treatment itself. Most results are robust to measuring the impact of the treatment itself.

external market, thereby allowing women greater freedom to spend the cash transfer themselves.

Third, since m-transfers reduce the observability of the amount and timing of the cash transfer, this could have affected inter-household sharing of the cash transfer, thereby leaving more income available for the household (Jakiela and Ozier 2011). This could have also implicitly and explicitly signaled that the transfer belonged to the woman within the household, thereby increasing women's bargaining power, changing intra-household decision-making and the allocation of resources (Doepke and Tertilt 2011).

Fourth, access to the m-transfer technology could have increased households' familiarity with financial transfer services and access to informal private transfers. This could have facilitated households' ability to send or receive transfers outside of the village, conditional on the availability of the m-transfer service for both parties. Improved access to such transfer mechanisms could thereby help households to better cope with risks and shocks, potentially affecting investment or consumption decisions (Blumenstock, Eagle and Fafchamps 2011, Jack and Suri 2011).

Finally, since the zap program was new and involved a training on how to use the technology, program recipients could have simply been better informed about the program, including the time, date and frequency of the cash transfers. This could have enabled households to more efficiently plan their use of the cash transfer throughout the duration of the program.

Whichever of these channels is most important, it is important to note that the impacts outlined in this paper are only for the short-term, ie, immediately after the program. Some of these effects imply behavioral changes that might only be observed several years after the program or are difficult to test using survey data. Nevertheless, we attempt to provide insights into the mechanisms at work in Section 7.

6. Results

6.1. Did the Zap Intervention Reduce Distribution and Recipients' Costs?

A key motivation for using the zap approach in Niger was to reduce the costs of the implementing agency in providing the cash transfer, as well as those of program recipients in obtaining the cash transfer. Figures 3 and 4 show the relative costs to each party.

Figure 3 shows the per-recipient cost of each transfer mechanism for Concern Worldwide, including fixed and variable costs. The primary initial investment costs of

the program included expenses for identifying program recipients, purchasing mobile phones and training recipients in using the mobile phones, the latter of which were only for the zap intervention. Variable costs for the manual cash distributions included transport and security costs, as well as costs associated with organizing the cash into individual envelopes. The average per recipient cost was US$12.76 in cash/placebo villages and US$13.65 in zap villages, or $.90USD more per recipient. Excluding the cost of the mobile phones, the per-recipient cost of the zap intervention falls to $8.80 per recipient. Thus, while the initial costs of the zap program were significantly higher, variable costs were 30 percent higher in the manual cash distribution villages. [8]

Figure 4 shows the recipients' transport and opportunity costs related to obtaining the cash transfer. As both the placebo and manual cash groups received the cash transfer via the same mechanism, we pool the two groups and compare means between the *zap* and *cash/placebo* villages. Overall, program participants in zap villages incurred significantly fewer costs for obtaining the cash transfer. Whereas cash and placebo program recipients travelled an average of 4.04 km roundtrip to obtain the transfer, zap program recipients only travelled .9 km to "cash out" at the nearest agent, with a statistically significant difference at the 1 percent level. This is equivalent to an opportunity cost savings of 30 minutes for each cash transfer, or 2.5 hours over the entire program. Based upon an average daily agricultural wage of USD $3.60, this time savings would translate into USD $.92 over the cash transfer period. This is equivalent to 2.5-3 kilograms of millet, enough to feed a family of five for one day.

6.2. How did Program Recipients Use the Cash Transfer?

The uses of the cash transfer that the cash transfer recipients reported might be instructive about the kinds of effects of different cash transfer delivery mechanisms that we might expect. As Concern Worldwide did not stipulate that the cash transfer be used for a specific purpose, nor was it conditional on a particular behavior, recipients were free to spend the cash transfer how they wished. Overall households in the manual cash villages used their transfer to purchase 4.12 different categories of goods, including staple grains (99%), cowpeas (42%), meat (40%), oil (70%), condiments (70%), health expenses (28%), seeds (20%), school fees (7%), reimbursing debts (7.4%) and labor costs (2%). (Respondents could list more than one use of the cash transfer, so the total can exceed 100%.) This suggests that cash transfer recipients primarily used the transfer to ensure immediate consumption needs, but also to make limited agricultural

[8] This includes amortized fixed costs for the mobile phones over the program period. If the program had been extended to 12 months, the per-recipient costs would be relatively equal.

investments and avoid longer-taking children out of school and becoming further indebted.

Table 3 shows the different uses of the cash transfer by intervention group. Overall, the results paint a picture of more diverse uses of the cash transfer by zap households. Households in zap villages purchased .86 more types of food and non-food items as compared with both the cash and placebo groups, with a statistically significant difference between each pair. Program participants in the zap group were 20 percentage points more likely to purchase non-staple grains (such as rice and corn), 9 percentage points more likely to purchase cowpea and 13-16 percentage points more likely to purchase meat, condiments and oil as compared with those in the cash and placebo groups (Panel A).

Table 3 (Panel B) shows that the uses of the cash transfer for non-food items, namely school fees, health expenses and clothing. While relatively fewer households used the transfer for these uses, there was no difference between the zap, placebo and cash groups in using the cash transfer for these purposes. Thus, while the zap program led to more diverse food purchases, especially those associated with a more diverse diet, it did not lead to different health or education expenditures in changes.

6.3. Did the Zap Intervention Affect Household Coping Strategies and Food Security?

Table 4 presents the results from a regression of Equation (1) for a variety of food security indicators and commonly-used coping strategies in Niger, including asset decapitalization. The household diet diversity score and asset data were collected in December 2010, three months after the end of the program, whereas the coping strategy data were recall data from the hungry period. Therefore, these results point to a (short-term) persistent impact of the program.

The results in Table 4 are broadly correlated with the different uses of the cash transfer by intervention group observed in Table 3. Household diet diversity is .16 points higher in the zap villages as compared with the cash and placebo villages, although there is only a statistically significant difference between the zap and placebo groups (Panel A). When assessing the impact on specific food groups, there was no impact of the program on the consumption of staple foods, namely grains and cowpeas. However, households in zap villages were 4-5 percentage points more likely to consume fruits -- and 6-12 percentage points more likely to consume fats than households in cash and placebo villages, a 28-percent increase. While the impact on fat consumption is primarily driven by differences between the zap and placebo groups, there is a marginal (statistical) difference between the zap and cash groups.

Panel B assesses the impact of the zap program on the use of particular coping strategies, particularly those longer-term impacts. The dependent variables in these regressions include a variety of common coping strategies in the Sahel, such as selling seeds and land, cutting trees, searching for anthills and reducing the number of meals per day. Neither selling seeds nor land were commonly used coping strategies among households in these villages. While households in zap villages used these coping strategies less frequently than those in the cash and placebo groups, these differences are not statistically significant at conventional levels. Therefore, it does not appear as if the m-transfer program affected the use of these coping strategies.

Panel C assesses the impact of the program on asset decapitalization, as asset accumulation would not have been expected during the program. Overall, households in zap villages had .45-.66 more asset categories as compared with those in the cash and placebo groups, 25 percent higher than those in the cash group. These differences are primarily due to increased mobile phone ownership in the zap and placebo groups. Excluding the mobile phone, the program did not have an impact upon durable asset ownership (carts, plows, bikes and mopeds), as there is no statistically significant difference between the zap, placebo and manual cash groups. However, there was an impact upon non-durable assets: Excluding mobile phone ownership, households in *zap* villages had .15-.24 more non-durable assets (lamps and flashlights) as compared with the placebo or cash groups. This represents an eleven percent increase, suggesting that zap households were selling non-durable assets less frequently than those in placebo or cash villages.

6.4. Did the Zap Intervention affect Agricultural Investment and Production?

Table 5 presents the results of regressions of Equation (1) for a variety of agricultural outcomes. Unsurprisingly, the zap program did not have an impact upon the likelihood of cultivating or land ownership. However, the program did affect crop choices: Households in zap villages grew .36-.49 more types of crops than those in the placebo and manual cash villages, a 12-16 percent increase as compared with the cash intervention (Panel A). These differences are statistically significant at the 5 and 10 percent levels, respectively. These effects are not driven by changes in the likelihood of growing traditional staple food and cash crops, such as millet, sorghum, cowpeas and peanuts. Rather, they were due to the cultivation of marginal cash crops: zap households were 13 percentage points more likely to grow *vouandzou* and *okra*, two cash crops that are primarily grown by women on marginal lands in Niger.[9] These

[9]In fact, vouandzou in Hausa is known as "*gojiya mata*", literally translated as the "women's peanut".

effects appear to be primarily driven by the zap program, as the differences are statistically significant as compared with manual cash and placebo groups. As detailed plot-level data are not available, we do not know whether these crops were grown on new or existing land.

The changes in crop choice did not translate into different production levels or marketing strategies across the three groups (Panel B) . There were no differences across the different interventions in the quantity of grains or cash crops produced, or the likelihood of selling those crops after the harvest or the quantity sold immediately after the harvest.

7. Potential Mechanisms

7.1. Did the Zap Intervention Change Awareness, Location and Timing of Expenditures?

Table 6 provides some evidence of the location, timing and uses of the cash transfer. For example, the lower costs related to accessing cash via the zap distribution mechanism could have changed the purchase patterns of program recipients, allowing them to purchase goods closer to home. Or, the anonymity of the cash transfer via the m-transfer system could have enabled recipient households to better spread their expenses over multiple periods. Alternatively, the "innovation" of the m-transfer technology could have increased program recipients' awareness of the cash transfer program, thereby reducing uncertainty about the cash transfer and allowing households to more optimally allocate expenses across different months. Finally, as transfers via the m-transfer system were more difficult for outsiders to observe, this could have allowed program recipients to spend the cash transfers themselves, rather than providing it to their spouses. This last mechanism is less likely, however, as socio-cultural norms make it difficult for women between the ages of 20-45 to travel to markets individually or in groups.

Overall, the data do not allow us to conclude that the program impact is driven by one of these mechanisms. Forty-three percent of recipients in the cash villages spent their transfer at a kiosk within the village, whereas sixty-one percent spent the cash transfer at a market outside of the village. While this percentage was higher in zap villages, there is not a statistically significant difference (Panel A). Only 25 percent of cash and placebo program participants could correctly cite the total amount or duration of the cash transfer prior to the program, with no statistically significant difference between the zap and cash/placebo treatments (Panel B). Over 50 percent of manual cash households spent their transfer all at once, without a statistically significant difference between zap, placebo and cash villages (Panel C). In addition, there were no effects of the zap program on sharing norms across the three treatment groups. Overall, this suggests

that the zap intervention did not change where or when program recipients' spent the cash transfer, whether they shared the cash transfer or their overall awareness of the program.

7.2. Did the Zap System Increase Households' Access to Private Transfers?

By having access to the m-transfer (zap) technology, program recipients in zap villages could have received informal private transfers from migrants and other family members more easily, thereby augmenting the income increase derived from the transfer. Table 7 shows the results of regressions for a variety of indicators related to private money transfers (person-to-person). While households in both zap and placebo villages were more likely to receive remittances (due to higher rates of migration), this did not affect the frequency or amount of remittances transferred to the household during this period. Moreover, households in all villages primarily received remittances via Western Union (34 percent) or friends (53 percent), with less than 5 percent of households receiving remittances via the m-transfer technology. This is supported by data on the percentage of program recipients who used zap to make money transfers – very few used the m-transfer technology, and there were no statistically significant differences between the three groups. This provides evidence that the results are not driven, at least in the short-term, by the impact of the m-transfer technology on private transfers.

7.3. Did the Zap Intervention Change Intra-Household Decision-Making?

Table 8 provides suggestive evidence of intra-household decision-making with respect to the cash transfer.[10] The program was implemented an area of Niger where socio-cultural norms do not permit younger, married women belonging to the Hausa ethnic group to travel to markets, either individually or in groups. This is in contrast to cultural norms in the Fulani and Toureg groups, where women often travel to markets to sell dairy products and purchase food items. For this reason, we would not expect to find strong average effects of the program on women's control over the cash transfer, but might find heterogeneous effects across different ethnic groups.

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[10] In order to formally test for differences in intra-household bargaining, we would ideally want to test outcomes across each of the three interventions between households with male and female program recipients. As all program recipients were women, we are unable to do this, and thus can only compare proxy indicators for intra-household decision-making across the three interventions, conditional on the program recipient being a woman.

Program recipients (women) reported that they were responsible for spending the cash transfer in over 53 percent of household. Among the remaining households, the cash transfer was primarily spent by the program recipients' husband or son (Panel A). Yet almost all recipients (99 percent) stated that they were consulted on the use of the cash transfer. A slightly higher percentage stated that they were involved in the zap and placebo groups, with a statistically significant difference between the zap and placebo group. However, the magnitude of this impact is small.

In light of the difficulty in observing intra-household bargaining, Panels B and C attempt to separate out these effects by ethnic group, which have different intra-household roles and responsibilities. Panel B shows the results for the Fulani and Toureg ethnic groups (17 percent of recipients), whereas Panel C shows the results for the Hausa ethnic group (83 percent of recipients).

Zap program recipients in Fulani and Toureg households were 10 percentage points more likely to be responsible for spending the cash transfer as compared with the manual cash group, and 4 percentage points more likely than households in the placebo groups. Given the small sample size, it is difficult o detect a statistically significant effect, although the magnitude of the coefficient is larger than the coefficients for the Hausa ethnic group. When looking at the uses of the cash transfer for education and health expenses, Fulani and Touareg zap recipients were 17 percentage points more likely to use the transfer to pay for health fees, as compared with 1 percentage in Hausa zap recipients. There are no strong differences for school fees or spending in markets outside of the village, although on average a higher percentage of Fulani and Touareg households spent the transfer outside of the village.

These results, taken together with more diverse uses of the cash transfer, greater diet diversity and increased cultivation of women's cash crops, provide some suggestive evidence that the zap mechanism could have changed intra-household decision-making, thereby allowing women to have greater control over the spending of the cash transfer and engage in consumption and production decisions. Nevertheless, these results are suggestive at best, and more research is needed.

7.4. Did the Zap Program Change Mobile Phone Usage?

Beyond the mechanisms identified above, it is possible that the zap program could have changed zap households' access to information via the mobile phone, thereby affecting agricultural practices and diet diversity. Furthermore, even if the zap program did not affect households' likelihood of sending or receiving private transfers via the mobile phone, the handset could have facilitated communications with migrants and their ability to request remittances via other channels.

Table 9 shows the impact of the program on mobile phone ownership and usage for each type of intervention. Unsurprisingly, the zap program increased mobile phone ownership and the frequency of usage since the last harvest, with a statistically significant difference between the zap and cash villages, as well as between the zap and placebo villages. While respondents in zap villages were more likely to make calls or send and receive beeps as compared to placebo and cash villages, there was not a statistically significant difference in their probability of receiving a call, writing or receiving SMS or transferring money via the m-transfer system (Panel A). Overall, households in zap villages were more likely to communicate with friends and family members within Niger and to communicate a shock, but there is not a statistically significant difference between the *zap* and *placebo* groups. Taken together, these results suggest that households in zap villages used the phone in more active ways as compared to those in the placebo and cash groups. Nevertheless, there were no differences in the reasons for communicating via mobile phone. This seemingly contradictory result suggests that recipients in zap households viewed the mobile phone as their personal property (as evidenced by greater usage), rather than a household resource.

8. Alternative Explanations

There are several threats to the validity of the above findings. First, the zap intervention could have resulted in differential uptake of the program, thereby affecting the intention to treat estimates. For example, if zap households had more difficulty in finding m-transfer agents or using the technology, they might have been less likely to access the cash transfer. Or, if households in zap villages were more motivated to stay in the program because of the presence of the new technology, then there could have been differential attrition across the three groups. A means comparison of the three groups for each of these outcomes shows that there are no differential effects in attrition, the probability of receiving the cash transfer or shocks across groups (Table A1).

The previous results thus far have tested for the impact of the zap intervention on specific development outcomes. In Figure 4 and Tables 3-5, we examine the impact of the zap program on 35 different outcomes, both with and without controls. This raises concerns that the observed effects cannot be attributed to the zap intervention, but are rather simply observed by chance among all of the different outcomes. Following Gibson, McKenzie and Stillman (2010), we use the Bonferroni correction for multiple testing. Using a family-wise error rate of 10 percent, and assuming that all 35 outcomes are one family, the Bonferroni p-value would therefore be .0029. The outcomes that are significant at this level are the cost of obtaining the cash transfer, the different uses of the cash transfer (number of food and non-food items, other grains, condiments and

oil), the impact on non-durable assets and likelihood of growing vouandzou and okra. Thus, we are confident that the zap intervention affected recipients' cost in obtaining the cash transfer, as well as their recipients' use of the transfer and sales of non-durable assets. Perhaps more surprisingly, we find that the likelihood of producing marginal cash crop remains. Yet none of the food security or crop diversity outcomes are significant when correcting for multiple testing.

A final alternative explanation to the interpretation of the above findings is the potential differential effects of the cash transfer mechanism on prices. For example, if the manual cash transfer mechanism put greater inflationary pressure on local markets as compared with the zap transfer mechanism, this could reduce the value of the cash transfer in those villages and decrease the number of goods purchased or consumed. Or, if the zap transfer increased prices more quickly and producers were price elastic, this could have increased incentives for households to cultivate certain crops.[11]

Since the intervention occurred at the village level, village-level price data would be optimal for investigating these impacts (Cunha, Di Giorgi and Jayachandran 2010). Yet a majority of purchases in rural Niger and among program recipients take place in weekly markets – many of which are located 5-10 km from the village – weekly market price data were collected. The randomized nature of the program implies that some markets were linked to both manual cash and zap villages, thereby making it difficult to differentiate the impact of each and necessarily ensuring that the stable unit treatment value assumption is violated.

Despite the data limitations, our analysis treats each market as a local economy and examines food prices as the outcome. Using weekly price data between May and December 2010 from over 45 markets in the region, we estimate the impact of the cash transfer delivery mechanism on weekly prices by using the following regression:

$$(2) \qquad \ln(p_{ij,t}) = \alpha + \beta_1 zap_{j,t} + \beta_2 cash_{j,t} + \varphi \ln(p_{ij,t-1}) + \theta_t + \theta_j + \varepsilon_{ij,t}$$

where $ln(p_{ij,t})$ is the log price of agricultural good *i* in market *j* at week *t*, $zap_{j,t}$ is an indicator variable equal to one if a village within a 10 km-radius of the market received a transfer via zap during week *t*, 0 otherwise; $cash_{j,t}$ is an indicator variable equal to one if a village within a 10-km radius of the market received a manual cash transfer during week *t*, 0 otherwise; $ln(p_{ij,t-1})$ is the lagged price of agricultural commodity i; θ_t is a time trend, either monthly or weekly, and θ_j are market-level fixed effects, which will capture

[11] For a discussion of the potential impact of mobile money on the velocity of money and inflation, see Jack, Suri and Townsend (2010).

characteristics such as market size, road quality and infrastructure. Ideally, the specification should also include the percentage of households in the village receiving the cash transfer, as we would expect larger income effects in villages with a higher density of cash transfers. As the market-level fixed effects are correlated with the lagged dependent variable, we use the Arellano-Bond estimator to derive consistent estimates.

Table 10 presents the results of these regressions, first pooling for any cash transfer and then by the type of cash transfer delivery mechanism (zap or manual cash). Overall, the presence of a cash transfer in a particular market area during the week did not have a statistically significant impact upon food prices (Column 2). Thus, we fail to reject that the cash transfer increased prices as compared with normal trends.

Columns (3) and (4) disentangle the impact of the program by the cash transfer delivery mechanism. While the results are qualitatively similar to those in Column 1, this suggests that the zap mechanism had a stronger impact upon millet and rice prices as compared to the manual cash transfer mechanism. A zap transfer in a neighboring village during a particular week increased millet prices (per 100-kg bags) by 1 percent and rice prices (per kg) by 2-3 percent as compared with no cash transfer for the week. The impact on certain quantities of grains is unsurprising, as households would traditionally use the transfer to purchase bags of millet and smaller quantities of rice. Alternatively, the manual cash transfer mechanism increased cowpea prices by 7 percent as compared with no cash transfer. Nevertheless, there is only a statistically significant difference between the two types of cash transfer mechanisms for cowpeas.

These effects have ambiguous welfare implications. As all households were net consumers of grains during this period, an increase in millet and rice prices would have reduced consumer welfare for households living near those markets affected by the zap transfer. While this could potentially increase incentives to produce rice and millet, this is extremely unlikely, as rice is not produced in this zone, producers are highly price inelastic and there was no evidence of an increase in the cultivation or sale of millet.

Similarly, while the increase in cowpea prices in cash villages could have *decreased* welfare in villages near those markets, this represents a small percentage of the consumption basket as compared with staple grains. The price effect could have induced producers to grow and sell more cowpea during the following agricultural season. There is some evidence of this, as producers in placebo villages grew more cowpea, were more likely to sell cowpeas and increased the quantity sold. However, these price increases would have increased welfare for program recipients in manual cash and placebo villages.

Taken together, the price effects suggest that the previous results are a lower bound for the impacts of the zap intervention on recipient households. At the same time, these

larger price effects could have had adverse effects on consumption of non-recipients living in the village and region, as it increased millet prices by 200 CFA per 100-kg bag during this time period, equivalent to 1 kg of millet. This highlights the importance of conducting full welfare analyses in any impact evaluation, and suggests that price effects should be monitored closely in future manual cash and m-transfer programs.

9. Cost-Benefit Analysis of the Zap Intervention

A natural question related to the use of a new approach is whether the expected benefits outweigh the additional costs. This is especially the case in a country such as Niger, where, despite widespread growth in mobile phone coverage over the past decade, m-transfer systems are still relatively new. Thus, using an m-transfer system to distribute cash transfers can require significant up-front investments for governmental and non-governmental organizations, including ensuring access to the mobile phone handset and m-transfer technology. It also implies that a network of m-transfer agents already exists in the distribution areas, thereby requiring partnerships with mobile phone operators. In this section, we explore whether a m-transfer program should be a priority for governmental and non-governmental institutions for cash transfer programs.

A full cost-benefit analysis of the zap program would require estimates of both the social and private returns to the cash transfer program. As we do not have information on household income and expenditure patterns, we instead focus on the monetary value of a narrow range of benefits. In addition, a proper cost-benefit analysis would use a causal estimate of the impact of the cash transfer program. As we do not have a pure comparison group, we are unable to do this, but we can still calculate whether the additional gains due to the zap intervention are worth the additional costs.[12]

As outlined in the Figure 3, the average per recipient cost over the life of the project was US$12.76 in cash/placebo villages and US$13.65 in zap villages, or $.90USD more. While there was a range of benefits from the zap intervention, we focus on two for the cost-

[12]Dhaliwal, Duflo, Glennerster and Tulloch (2011) outline the relative advantages and disadvantages of cost benefit and cost effectiveness analyses. While the cost effectiveness analysis (showing the program effect on one outcome measure) is preferred in many contexts, we use a cost benefit analysis for several reasons. First, as the program was an unconditional cash transfer, it had effects on multiple outcomes, which are difficult to capture in one indicator. Second, as m-transfers were new in Niger and in the program region, the program required significant initial investments (including purchase mobile phones), which would not be required in contexts where m-transfer services have been in existence for several years.

benefit analysis: the monetary value of the reduced opportunity costs of program recipients' time (a value of $USD .91) and the increased cultivation of cash crops. Using average household okra production and the market price for okra during the program period, the average value of this okra production in zap households would have been $USD5. This suggests that the cost-benefit ratio is greater than one, meaning that the additional costs of the zap intervention yielded an equivalent or higher monetary benefit for zap program recipients. If the program yields benefits in the longer-term, perhaps by allowing households to send and receive more informal transfers or access formal financial services, this could potentially yield a higher rate of return.

10. Conclusion

Cash transfer programs are an important part of the social protection policies in many developing countries. While there is significant evidence on the impact of such programs on improving specific outcomes, there is more limited evidence on their impact in humanitarian contexts, as well as their cost-effectiveness as compared with other types of interventions. This is particularly important in countries where distributing cash involves significant logistical, operational and security costs.

An intervention that provided a cash transfer via the mobile phone strongly reduced the costs of program recipients in obtaining the cash transfer, and reduced the implementing agency's variable costs associated with distributing cash. This suggests that mobile telephony could be a simple and low-cost way to deliver cash transfers. In addition, we observe that those in the m-transfer group bought more types of food and non-food items, increased their diet diversity, depleted their non-durable assets at a slower rate and produced a more diverse basket of agricultural goods. These differences are primarily due to the m-transfer intervention, and not to the presence of the mobile phone, suggesting that a program that simply distributes mobile phones might not yield the same impacts. This effects appear to be due to the reduced costs of the program and the greater privacy of the m-transfer mechanism, which are potentially linked with changes in intra-household decision-making.

The m-transfer approach may be limited in its application to all contexts. First, it will only be effective in cases where telecommunications infrastructure currently exists, which could limit its utility in remote areas. Second, in areas with high rates of illiteracy – as is the case in Niger – program recipients might not able use the m-transfer technology on their own, implying that they might need help from other family members, friends or m-transfer agents. This could potentially limit the use of the technology by program recipients for informal private transfers or in accessing other mobile financial services, but could be beneficial for the household as a whole. And finally, the short-term impacts of the program might not persist in the longer-term.

Despite these caveats, the widespread growth of mobile phone coverage, cheaper mobile phone handsets and m-money services in developing countries suggests that these constraints could be easily overcome. In addition, the benefits of the program in a context such as Niger -- a country with limited investment in power, roads and landlines, low literacy rates and one of the highest rates of financial exclusion in sub-Saharan Africa -- suggests that the approach could thrive in less marginalized contexts.

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Figure 1. Map of Villages in the Project Area

Figure 2. Timeline of Data Collection and Project Implementation

<table>
<tr><td>Year</td><td>January</td><td>March</td><td>April</td><td>May</td><td>June</td><td>July</td><td>August</td><td>September</td><td>October</td><td>November</td><td>December</td></tr>
<tr><td rowspan="2">2010</td><td rowspan="2">Village selection</td><td rowspan="2">Identification and selection of program recipients</td><td rowspan="2">Program preparation</td><td rowspan="2">Baseline household and village-level survey in 96 treatment villages</td><td colspan="4">Hungry season
Monthly cash transfers in 116 villages</td><td colspan="2">Harvest period</td><td>Midterm household and village-level survey</td></tr>
<tr><td colspan="7">Price data collected in 45 markets in all communes</td></tr>
<tr><td>2011</td><td></td><td></td><td></td><td>Final household and village-level survey in 96 treatment villages</td><td colspan="4">Hungry season</td><td colspan="2">Harvest period</td><td></td></tr>
</table>

Figure 3. Impact of the Cash Transfer Delivery Mechanism on Distribution Costs ($USD per program recipient)

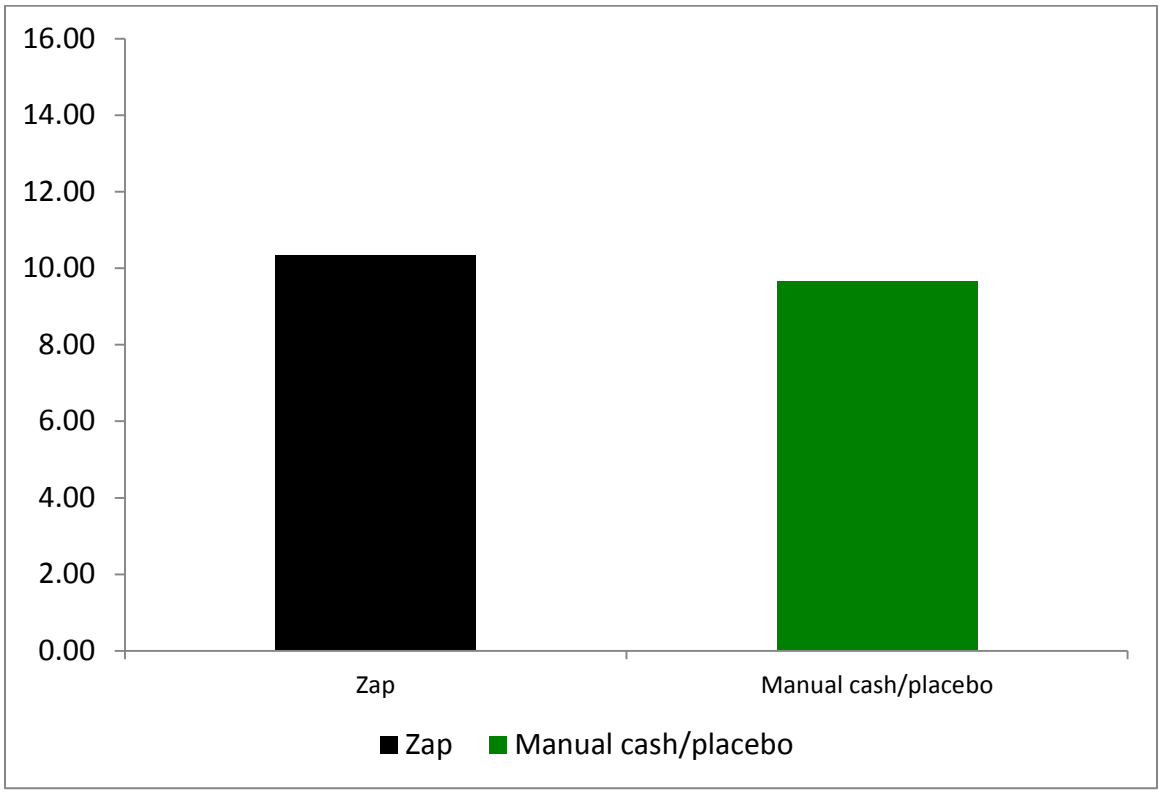

Figure 4. Impact of the M-Money Program on Program Recipients' Costs of Obtaining the Cash Transfer

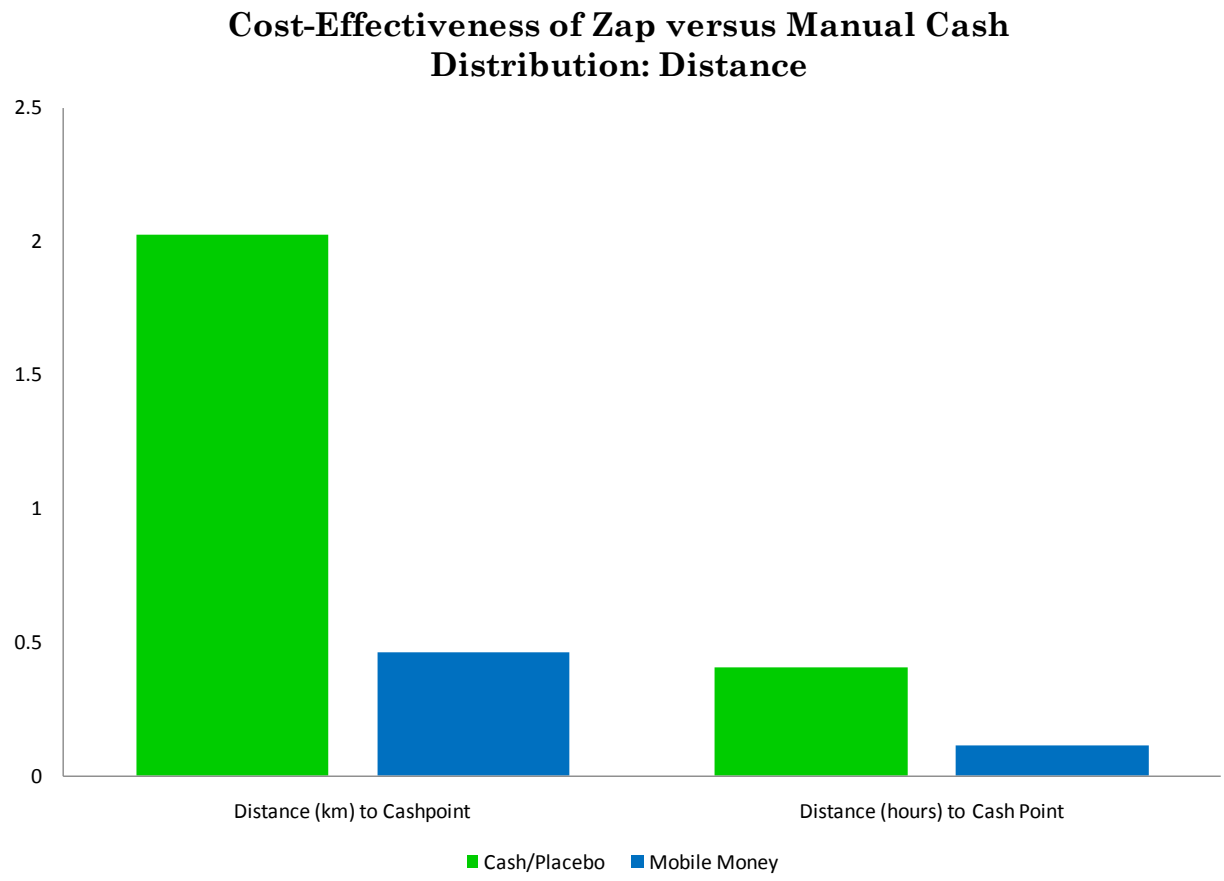

Table 1: Baseline Individual and Household Covariates (by Program Status)

	Cash Mean (s.d.)	Zap-Cash Coeff (s.e.)	Placebo-Cash Coeff (s.e.)	Zap-Placebo Coeff (s.e.)
Panel A: Socio-Demographic Characteristics				
Age of respondent	34.32	0.37	-2.29*	2.66*
	(11.96)	(1.60)	(1.36)	(1.50)
Respondent is household head	0.13	0.05	-0.00	0.05
	(0.34)	(0.04)	(0.03)	(0.04)
Polygamous household	0.28	0.02	0.00	0.02
	(0.45)	(0.04)	(0.04)	(0.04)
Respondent is member of Hausa ethnic group	0.83	-0.12	0.08	-0.19**
	(0.38)	(0.08)	(0.07)	(0.08)
Number of household members	9.34	-0.64	-0.40	-0.24
	(4.92)	(0.62)	(0.46)	(0.56)
Number of household members over 15	3.53	0.07	-0.05	0.12
	(2.09)	(0.25)	(0.19)	(0.24)
Respondent has some education	0.15	-0.08**	-0.03	-0.05*
	(0.36)	-0.03	(0.03)	(0.03)
Panel B: Household Income Sources and Assets				
Agriculture is an income source	0.97	-0.02	-0.01	-0.01
	(0.16)	(0.02)	(0.02)	(0.02)
Livestock is an income source	0.62	0.01	-0.08	0.09
	(0.48)	(0.05)	(0.06)	(0.06)
Remittances are an income source	0.35	-0.03	-0.04	0.01
	(0.48)	(0.04)	(0.04)	(0.04)
Number of income source categories	2.46	-0.03	-0.19	0.16
	(1.07)	(0.10)	(0.11)	(0.10)
Number of asset categories	3.59	-0.04	-0.18	0.14
	(1.56)	(0.17)	(0.17)	(0.17)
Panel C: Mobile Phone Ownership and Usage				
Household owns mobile phone	0.29	-0.01	-0.06	0.05
	(0.45)	(0.04)	(0.05)	(0.05)
Respondent is owner of mobile phone	0.25	-0.05	-0.07	0.00
	(0.43)	(0.07)	(0.06)	(0.00)
Respondent has used mobile phone since last harvest	0.63	-0.02	-0.05	0.03
	(0.48)	(0.05)	(0.05)	(0.05)
Used phone to make call since last harvest	0.29	-0.07*	-0.06	-0.01
	(0.45)	(0.04)	(0.05)	(0.05)
Used phone to send or receive m-money transfer	0.01	0.01	0.01	0.01
	(0.00)	(0.01)	(0.01)	(0.01)

Panel D: Shocks				
Household experienced drought in past year	0.99	-0.00	0.01	-0.01
	(0.12)	(0.01)	(0.01)	(0.01)
Household experienced crickets in past year	0.82	-0.06	-0.07	0.01
	(0.27)	(0.05)	(0.05)	(0.05)

Notes: This table presents a comparison of individual and household covariates in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households, whereas Columns 2 and 3 show the average difference between the different treatments and the cash households. Column 4 shows the average difference between the zap and placebo treatment households. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 2: Baseline Individual and Household Outcomes (by Program Status)

	Cash Mean (s.d.)	Zap-Cash Coeff (s.e.)	Placebo-Cash Coeff (s.e.)	Zap-Placebo Coeff (s.e.)
Panel A: Food Security Outcomes and Coping Strategies				
Number of months of household food provisioning (scale of 6)	1.9	0.12	0.03	0.08
	(1.56)	(0.16)	(0.17)	(0.16)
Household diet diversity index (scale of 12)	3.07	-0.10	-0.31	0.21
	(2.04)	(0.21)	(0.19)	(0.21)
Reduced meals	0.46	0.06	0.10	-0.04
	(0.50)	(0.09)	(0.08)	-0.08
Panel B: Migration and Remittances				
One household member migrated since the last harvest	0.49	0.01	0.01	-0.01
	(0.50)	(0.06)	(0.05)	(0.05)
Number of household members who migrated since last harvest	0.64	0.05	0.06	-0.01
	(0.80)	(0.10)	(0.08)	(0.10)
Number of remittances received	2.11	-0.28	-0.18	-0.09
	(1.27)	-0.17	(0.22)	(0.22)
Received remittance via m-money transfer (zap)	0.05	-0.00	0.01	-0.02
	(0.21)	(0.03)	(0.03)	(0.03)
Panel C: Agricultural Production and Livestock				
Cultivate land	0.98	-0.01	-0.00	-0.01
	(0.13)	(0.01)	(0.01)	(0.01)
Produce millet	0.97	-0.00	0.01	-0.02
	(0.18)	(0.01)	(0.01)	(0.01)
Quantity of millet produced (kg)	269	4.20	-35.42	39.63
	(354)	(48.70)	(46.00)	(44.66)
Produce cowpea	0.87	-0.00	-0.02	0.02
	(0.34)	(0.04)	(0.04)	(0.04)
Quantity of cowpea produced (kg)	10.81	2.03	0.48	1.55
	(32)	(2.87)	(3.19)	(3.51)
Sold millet	0.04	-0.00	0.00	-0.01
	(0.19)	(0.02)	(0.02)	(0.02)
Sold cowpea	0.00	0.02**	0.01*	0.01
	(0.00)	(0.01)	(0.00)	(0.01)
Practice livestock	0.71	0.01	-0.09	0.10*
	(0.46)	(0.06)	(0.06)	(0.06)

Notes: This table presents a pre-treatment comparison of individual and household outcomes in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households, whereas Columns 2 and 3 show the average difference between the different treatments and the cash households. Column 4 shows the average difference between the zap and placebo treatment households. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 3: Uses of the Cash Transfer

	(1) Cash average	(2) Zap-Cash	(3) Placebo-Cash	(4) Zap-Placebo	(5) Zap-Both
Panel A: Uses of Cash Transfer for Food Items					
Number of food and non-food items purchased with cash transfer	4.12	0.86***	0.03	0.83***	0.85***
	(2.64)	(0.28)	(0.26)	(0.27)	(0.24)
Transfer used to buy staple grains (millet, sorghum)	0.99	-0.01	-0.00	-0.00	-0.00
	(0.05)	(0.01)	(0.01)	(0.01)	(0.01)
Transfer used to buy other grains (corn, rice)	0.58	0.20***	-0.02	0.22***	0.21***
	(0.50)	(0.05)	(0.05)	(0.06)	(0.05)
Transfer used to buy cowpea	0.42	0.09*	-0.02	0.11**	0.10**
	(0.49)	(0.05)	(0.05)	(0.05)	(0.05)
Transfer used to buy condiments	0.7	0.13***	0.00	0.13***	0.13***
	(0.46)	(0.05)	(0.04)	(0.05)	(0.04)
Transfer used to buy oil	0.7	0.16***	0.00	0.16***	0.16***
	(0.46)	(0.05)	(0.05)	(0.05)	(0.04)
Transfer used to buy meat	0.4	0.15***	-0.02	0.17***	0.16***
	(0.49)	(0.04)	(0.04)	(0.05)	(0.04)
Panel B: Uses of Cash Transfer for Non-Food Items					
Pay school fees	.07	-0.00	-0.01	0.01	0.00
	(0.25)	(0.02)	(0.02)	(0.02)	(0.02)
Pay health expenses	.29	0.02	-0.02	0.05	0.03
	(0.45)	(0.03)	(0.04)	(0.04)	(0.03)
Buy clothes	.04	0.01	0.02	-0.01	0.00
	(0.19)	(0.01)	(0.02)	(0.02)	(0.01)

Notes: This table presents a simple difference comparison of households in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash and placebo) households, whereas Column 2 shows the difference between the zap treatment and the cash/placebo treatment. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 4: Impact on Food Security, Coping Strategies and Assets

	(1) Cash average Mean (s.d.)	(2) Zap-Cash Coeff (s.e.)	(3) Placebo-Cash Coeff (s.e.)	(4) Zap-Placebo Coeff (s.e.)	(5) Zap-Both Coeff (s.e.)
Panel A: Food Security					
Household diet diversity score (out of 12)	3.07	0.16	-0.26	0.43**	0.30
	(2.04)	(0.21)	(0.15)	(0.19)	(0.18)
Consumption of:					
Grains	0.96	-0.01	-0.01	-0.01	-0.01
	(0.20)	(0.01)	-0.01	-0.01	(0.01)
Legumes	0.19	0.06	-0.02	0.08	0.07
	(0.35)	(0.05)	(0.04)	(0.05)	(0.04)
Fruit	0.05	0.04***	-0.01	0.05***	0.04***
	(0.22)	(0.01)	(0.01)	(0.01)	(0.01)
Fats	0.32	0.06	-0.06	0.12**	0.09*
	(0.47)	(0.05)	(0.04)	(0.05)	(0.04)
Panel B: Coping Strategies					
Sell land	0.03	-0.01	0.02	-0.03	-0.02
	(0.17)	(0.03)	(0.02)	(0.02)	(0.02)
Cut trees	0.16	-0.03	-0.02	-0.01	-0.02
	(0.37)	(0.04)	(0.03)	(0.04)	(0.03)
Search anthills	0.02	-0.02	-0.00	-0.01	-0.02
	(0.13)	(0.02)	(0.01)	(0.01)	(0.01)
Panel C: Durable and Non-Durable Goods					
Number of asset categories owned (out of 12)	3.59	0.66***	0.20	0.46***	0.56***
	(1.56)	(0.14)	(0.13)	(0.13)	(0.12)
Durable assets	0.2	0.03	-0.01	0.04	0.04
	(0.58)	(0.05)	(0.03)	(0.04)	(0.04)
Non-durable assets	1.85	0.15*	-0.09	0.24***	0.20***
	(0.96)	(0.08)	(0.09)	(0.07)	(0.07)

Notes: This table presents the difference in difference estimates for each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households in the pre-treatment period, whereas Columns 2 and 3 show the DD estimator between the different treatments and the cash households. Column 4 shows the DD estimator for zap and placebo treatments. Column 5 compares the zap treatment with the joint placebo/cash treatment. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 5: Impact on Agricultural Outcomes

	(1) Cash average Mean (s.d.)	(2) Zap-Cash Coeff (s.e.)	(3) Placebo-Cash Coeff (s.e.)	(4) Zap-Placebo Coeff (s.e.)	(5) Zap-Both Coeff (s.e.)
Panel A: Agricultural Production					
Cultivated in past growing season	0.98	0.01	0.01	0.01	0.01
	(0.13)	(0.01)	(0.01)	(0.01)	(0.01)
Own land	0.89	-0.00	-0.00	0.01	0.01
	(0.31)	(0.02)	(0.02)	(0.02)	(0.02)
Types of crops grown	4.44	0.49**	0.12	0.36*	0.42**
	(2.31)	(0.19)	(0.19)	(0.21)	(0.18)
Use improved seeds	0.18	0.06	0.07	-0.01	0.03
	(0.39)	(0.05)	(0.05)	(0.05)	(0.04)
Grow millet	0.97	0.00	0.00	0.00	0.00
	(0.18)	(0.00)	(0.00)	(0.00)	(0.00)
Grow cowpea	0.87	0.06	0.03	0.03	0.05
	(0.33)	(0.04)	(0.04)	(0.04)	(0.04)
Grow vouandzou or gombo	0.53	.17***	0.07	0.09*	0.13***
	(0.50)	(0.05)	(0.05)	(0.05)	(0.05)
Quantity cowpea produced (kg)	10	-0.41	-1.69	1.28	0.44
	(32)	(5.18)	(4.45)	(6.62)	(5.52)
Quantity vouandzou and okra produced	5.25	0.15	0.64	0.49	-2.21
	(14.70)	(2.82)	(3.36)	(4.59)	-3.57
Panel B: Agricultural Marketing					
Sell millet	0.04	0.03	-0.01	0.04	0.03
	(0.02)	(0.04)	(0.04)	(0.04)	(0.04)
Sell cowpea	0.00	0.02	0.01	0.01	0.01
	(0.00)	(0.01)	(0.01)	(0.02)	(0.02)
Sell vouandzou or okra	0.01	0.01	0.01*	0.00	0.00
	(0.10)	(0.01)	(0.00)	(0.01)	(0.00)
Quantity millet sold (kg)	92	-5.45	-8.84	3.40	-0.41
	(175)	(8.23)	(9.34)	(7.22)	(6.24)
Quantity cowpea sold (kg)	27.1	-2.01	14.15	-16.16	-14.77
	(32)	(20.77)	(14.57)	(25.94)	(24.75)

Notes: This table presents the difference in difference estimates for each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households in the pre-treatment period, whereas Columns 2 and 3 show the DD estimator between the different treatments and the cash households. Column 4 shows the DD estimator for zap and placebo treatments. Column 5 compares the zap treatment with the joint placebo/cash treatment. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. Regressions control for seed distribution village. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 6: Location, Knowledge and Timing of Cash Transfer Expenses

	(1) Cash average	(2) Zap-Cash	(3) Placebo-Cash	(4) Zap-Placebo	(5) Zap-Both
Panel A: Location and Timing of Expenditures					
Spent transfer at kiosk in village	0.43	0.03	-0.05	0.09	0.06
	(0.49)	(0.06)	(0.05)	(0.06)	(0.05)
Spent transfer at market within village	0.22	0.06	0.06	-0.00	0.03
	(0.42)	(0.08)	(0.07)	(0.08)	(0.07)
Spent transfer at market outside village	0.61	-0.04	-0.05	0.01	-0.01
	(0.49)	(0.08)	(0.07)	(0.08)	(0.07)
Spent money all at once	0.54	-0.00	-0.01	-0.00	-0.01
	(0.50)	(0.04)	(0.04)	(0.04)	(0.04)
Panel B: Knowledge of Cash Transfer					
Knew amount of cash transfer	0.27	0.03	0.03	-0.00	0.02
	(0.44)	(0.06)	(0.05)	(0.06)	(0.06)
Knew duration of cash transfer	0.26	-0.01	-0.08	0.07	0.03
	(0.44)	(0.05)	(0.05)	(0.06)	(0.05)
Panel C: Sharing of Cash Transfer					
Shared cash transfer	0.18	0.05	0.02	0.03	0.04
	(0.38)	(0.04)	(0.04)	(0.04)	(0.03)
Shared with friend or family within village	0.91	0.01	0.03	-0.02	-0.01
	(0.30)	(0.05)	(0.06)	(0.06)	(0.04)

Notes: This table presents a simple difference comparison of households in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households, whereas Column 2 shows the difference between the zap treatment and the cash treatment. Column 3 shows the difference between placebo and cash, Column 4 shows the difference between zap and placebo, and Column 5 shows the difference between Zap and Cash/Placebo. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 7. M-Money and Private Transfers

	(1) Cash average	(2) Zap-Cash	(3) Placebo-Cash	(4) Zap-Placebo	(5) Zap-Both
	Mean	Coeff	Coeff	Coeff	Coeff
	(s.d.)	(s.e.)	(s.e.)	(s.e.)	(s.e.)
Received remittances as income	0.35	0.09**	0.04	0.05	0.07**
	(0.48)	(0.04)	(0.04)	(0.04)	(0.03)
Amount of remittances received for last transfer (CFA)	22057	-423	2163	-2586	-1277
	(16630)	(3446)	(2524)	(3147)	(3059)
Number of remittances since last harvest	2.11	0.19	0.12	0.06	0.13
	(1.28)	(0.22)	(0.25)	(0.24)	(0.19)
Received remittance via Western Union	.34	-0.09	-0.04	-0.05	-.06
	(0.48)	(0.08)	(0.07)	(0.08)	(0.07)
Received remittance via friend	0.53	0.01	-0.02	0.04	.02
	(0.50)	(0.10)	(0.10)	(0.11)	(0.09)
Received remittance via zap	0.05	0.01	0.02	0.02	0.01
	(0.21)	(0.03)	(0.03)	0.03	(0.03)
Transferred credit via Zap	0.00	-0.00	-0.00	-0.00	-0.00
		(0.01)	(0.01)	(0.01)	(0.01)

Notes: This table presents a simple difference comparison of households in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households, whereas Column 2 shows the difference between the zap treatment and the cash treatment. Column 3 shows the difference between placebo and cash, Column 4 shows the difference between zap and placebo, and Column 5 shows the difference between Zap and Cash/Placebo. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 8: Intra-Household Decision-Making

	(1) Cash average	(2) Zap-Cash	(3) Placebo-Cash	(4) Zap-Placebo	(5) Zap-Both
Panel A: Decision-Making Regarding Cash Transfer					
Respondent responsible for spending cash transfer	0.53	-0.01	-0.03	0.02	0.00
	(0.49)	(0.04)	(0.04)	(0.04)	(0.03)
Respondent involved in decision-making of transfer	0.99	0.01*	0.01*	0.00	0.01
	(0.10)	(0.01)	(0.01)	(0.01)	(0.01)
Panel B: Results for Fulani and Touareg Ethnic Groups					
Respondent responsible for spending cash transfer	0.52	0.10	0.10	0.06	0.08
	(0.50)	(0.12)	(0.12)	(0.09)	(0.09)
Used transfer to pay health expenses	0.19	.17***	.20***	-0.03	0.07
	(0.40)	.05	.07	(0.07)	(0.07)
Used transfer to pay for school fees	0.05	-0.02	-0.02	0.01	-0.01
	(0.21)	(0.02)	(0.04)	(0.04)	(0.03)
Spent transfer at market outside village	0.81	-0.03	0.09	-0.12	-0.07
	(0.40)	(0.10)	(0.08)	(0.08)	(0.08)
Panel C: Results for Hausa Ethnic Group					
Respondent responsible for spending cash transfer	0.53	-0.01	-0.05	0.04	0.01
	(0.50)	(0.04)	(0.04)	(0.04)	(0.03)
Used transfer to pay health expenses	0.31	0.01	-0.05	0.06	0.03
	(0.46)	(0.04)	(0.04)	(0.04)	(0.03)
Used transfer to pay for school fees	0.08	-0.00	-0.01	0.01	0.00
	(0.26)	(0.02)	(0.02)	(0.02)	(0.02)
Spent transfer at market outside village	0.57	-0.03	-0.07	0.04	0.01
	(0.50)	(0.10)	(0.08)	(0.09)	(0.09)

Notes: This table presents a simple difference comparison of households in each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households, whereas Column 2 shows the difference between the zap treatment and the cash treatment. Column 3 shows the difference between placebo and cash, Column 4 shows the difference between zap and placebo, and Column 5 shows the difference between Zap and Cash/Placebo. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 9: Impact of Mobile Money on Mobile Phone Ownership and Usage

	(1) Cash average Mean (s.d.)	(2) Zap-Cash Coeff (s.e.)	(3) Placebo-Cash Coeff (s.e.)	(4) Zap-Placebo Coeff (s.e.)	(5) Zap-Both Coeff (s.e.)
Panel A: Mobile Phone Ownership					
Respondent owns a mobile phone	0.25	0.71***	0.61***	0.10	0.27***
		(0.07)	(0.08)	(0.09)	(0.07)
Used mobile phone since last harvest	0.63	0.31***	0.13**	0.18***	0.25***
		(0.05)	(0.05)	(0.05)	(0.04)
Made calls	0.29	0.33***	0.21***	0.12*	0.22***
		(0.06)	(0.06)	(0.06)	(0.06)
Received calls	0.98	-0.04	-0.01	-0.03	-0.03
		(0.03)	(0.03)	(0.04)	(0.03)
Wrote or received SMS	0.01	0.01*	0.008	0.003	0.007
		(0.01)	(0.01)	(0.01)	(0.01)
Sent or received a "beep"	0.06	0.14***	0.04*	0.09***	0.12***
		(0.03)	(0.03)	(0.03)	(0.03)
Transferred credit via Zap	0.00	-0.00	-0.00	-0.00	-0.00
		(0.01)	(0.01)	(0.01)	(0.01)
Received credit via Zap	0.01	0.45***	0.01	0.44***	0.44***
		(0.06)	(0.02)	(0.06)	(0.06)
Panel B: Uses of Mobile Phones					
Communicate with family/friends inside Niger	0.24	0.18***	0.13**	0.04	0.11*
		(0.06)	(0.05)	(0.06)	(0.06)
Communicate with commercial contacts inside Niger	0.00	-0.00	0.01	-0.01	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)
Communicate with family/friends outside Niger	0.46	0.01	0.03	-0.02	0.00
		(0.07)	(0.07)	(0.07)	(0.06)
Used mobile phone to Communicate death/ceremony	0.27	0.16***	0.15***	0.00	0.08*
		(0.05)	(0.05)	(0.05)	(0.04)
Used mobile phone to share general information	0.59	0.03	0.07	-0.04	-0.00
		(0.06)	(0.06)	(0.07)	(0.06)
Used mobile phone to ask for help/support	0.27	0.08	0.07	0.01	0.05
		(0.05)	(0.05)	(0.05)	(0.04)

Notes: This table presents the difference in difference estimates for each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households in the pre-treatment period, whereas Columns 2 and 3 show the DD estimator between the different treatments and the cash households. Column 4 shows the DD estimator for zap and placebo treatments. Column 5 compares the zap treatment with the joint placebo/cash treatment. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table 10: Impact of Cash Transfers on Agricultural Prices

	(1)	(2)	(3)	(4)
Dependent variable: Log of prices	Price	Any cash transfer	Zap transfer	Cash Transfer
		Coeff	Coeff	Coeff
	Mean (s.d.)	(s.e.)	(s.e.)	(s.e.)
Millet (tia)	381	-0.00	0.01	-0.02
	(140)	(0.01)	(0.01)	(0.02)
Millet (100-kg bag)	22,480	0.01	0.01**	0.00
	(3442)	(0.01)	(0.01)	(0.01)
Sorghum (tia)	359.76	0.01	0.04	-0.01
	(129)	(0.02)	(0.02)	(0.02)
Cowpea (tia)	403	-0.00	-0.00	-0.00
	(241)	(0.01)	(0.02)	(0.01)
Cowpea (60-kg bag)	18721	-0.00	-0.02	0.07***
	(4775)	(0.01)	(0.03)	(0.02)
Rice (1 kg)	431.29	0.01	0.03***	-0.02
	(37)	(0.01)	(0.01)	(0.01)
Rice (50-kg bag)	19,527	-0.00	0.02*	-0.02**
	(3447)	(0.01)	(0.01)	(0.01)
Vegetable oil (1 liter)	883.73	0.01	0.01	0.01
	(170)	(0.02)	(0.03)	(0.02)
Spaghetti (1 kg)	634	0.00	0.01	-0.01
	(40)	(0.01)	(0.01)	(0.01)

Notes: "Any cash transfer" is a binary variable equal to 1 at time t if there was a cash transfer during that week, 0 otherwise. "Zap transfer" is equal to 1 in week t if there was a zap transfer during that week, 0 otherwise. Column 1 shows the mean and s.d. of the agricultural commodity over the period, whereas Column 2 shows the impact of any transfer on prices. Columns 3 and 4 shows the coefficients for the zap and cash transfers, respectively. Heteroskedasticity-consistent s.e. clustered at the market-level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.

Table A1: Alternative Explanations

	(1) Cash average Mean (s.d.)	(2) Zap-Cash Coeff (s.e.)	(3) Placebo-Cash Coeff (s.e.)	(4) Zap-Placebo Coeff (s.e.)
Beneficiary received cash transfer	0.87	-0.03	-0.00	-0.03
	(0.33)	(0.03)	(0.02)	(0.03)
Respondent was present for follow-up survey	0.95	0.02	0.01	0.01
	(0.23)	(0.02)	(0.02)	(0.02)
Household was affected by drought in 2011	0.64	0.02	-0.03	0.05
	(0.48)	(0.07)	(0.06)	(0.08)
Household was affected by illness in 2011	0.74	-0.09	-0.05	-0.04
	(0.44)	(0.06)	(0.05)	(0.06)

Notes: This table presents the difference in difference estimates for each of the different treatment areas. Column 1 shows the mean and s.d. of the basic treatment (cash) households in the pre-treatment period, whereas Columns 2 and 3 show the DD estimator between the different treatments and the cash households. Column 4 shows the DD estimator for zap and placebo treatments. Column 5 compares the zap treatment with the joint placebo/cash treatment. Heteroskedasticity-consistent s.e. clustered at the village level are presented in parentheses. *** significant at the 1 percent level, ** significant at the 5 percent level, * significant at the 10 percent level.