# Risk Preferences, Time Preferences, and Willingness-to-Pay with Mobile Money versus Cash in Bangladesh

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## 1. Introduction

The digitization of money heralds profound changes to the banking sector and who it serves (Voorhies 2016). Digitization promises to slash costs, expand geographic reach, speed up transactions, and generate a wealth of new data. All of that hinges on new (and improved) functionality. The question here is different, and in some ways more fundamental: Does the digitization of money change how individuals and households spend, invest, and save? Specifically, does the form of money (rather than the functionality of mobile money) change perceptions and thus choices? Is there something importantly different about holding 20 taka on your mobile phone rather than holding a 20 taka banknote in your hand? Maurer (2012) raises related questions about perceptions of mobile money as a whole, and here we focus on the way that mobile money shifts specific consumer choices.

Economists generally assume that money is fungible, a dollar is a dollar, a taka is a taka (Morduch 2017). But studies show that the form of money matters. Viviana Zelizer's *The Social Meaning of Money* (1994) describes how money obtained through different channels get earmarked for certain purposes and thus may not be viewed as being fungible. That can lead to different monies being spent in different ways. Her focus is not on the form of money (cash vs. check, say, or credit card), but it provides one explanation for differentiation.

Motivated by experiments with US college students by Priya Raghubir and Joydeep Srivastava (2008), we ask respondents about the willingness to pay for set of common goods, distinguishing between amounts when they (hypothetically) purchase the goods in cash versus mobile money. We asked the study participants how much they would be willing to pay for a quantity of fine rice, a good bar of soap, particular pieces of clothing (a *salwar kameez* and a *lungi*), a bag of potato chips, and a packet of biscuits (cookies). The aim is to see whether their choices shift when mobile money is at stake rather than cash. We call these "payment effects" to reflect that the form of payment can affect choices.

We anticipated that when consumers think of mobile money, with its more abstract (digitized) form of stored value, they may make different consumption choices relative to those made when the spending is in cash. We asked questions to elicit responses about quantities consumed, quality consumed, and the willingness-to-pay. We relate the choices to education, age, gender, and other demographic characteristics, as well as prior exposure to the mobile money technology.

While the study draws inspiration from the study by Raghubir and Srivastava (2008), which focused on credit cards vs cash, we look at a very different context (mobile money in Bangladesh) and analyze a broader set of covariates (including measurement of time and risk preferences). In addition, we have experimental variation in the amount of prior experience individuals have with the technology, to test for the effects of learning.

Moreover, rather than being restricted to a population of college students, we test for these effects in a population where mobile money has just been introduced and is growing fast.

To preview our results, we find clear payment effects in both the urban and rural samples. The gap due to the payment effect though take different signs in the two samples.

In our sample of urban migrants, we find, similarly to Raghubir and Srivastava (2008), that when respondents think of their decisions in terms of mobile money, they choose greater total consumption measured in kilograms of food per month and greater willingness-to-pay for a given basket of consumption goods. We find little evidence in the urban data for quality upgrading when using mobile money. In the urban survey we also find experimental evidence that prior exposure to the mobile money technology narrows the payment effect.

In the rural survey on the same household counterpart, we find that when respondents think of their decisions in terms of mobile money they reduce projected total consumption and lower their willingness-to-pay for the basket of goods. (Again, effects on quality upgrading are economically insignificant). We find that rather than narrowing the payment effect, exposure to mobile banking technology, if anything, increases differences across payment modes. We find some differences by gender but none for education in the rural sample. But in the urban sample, there is some evidence that more education reduces the payment effect. Finally, when examining risk and time preferences, we find that risk-averse individuals exhibit a greater payment effect in both the urban and rural surveys, and that present-biased individuals exhibit less of a bias towards cash in the rural surveys.

Altogether, our urban results show a greater willingness to pay when using mobile money. That effect, though, is reduced with education, exposure to the technology, and less aversion to risk. The findings suggest that the payment effect may diminish over time as mobile banking becomes more established.

However, the payment effect seen in the rural sample is amplified by education and experience with the technology. There, we find greater willingness to pay when in cash. This may reflect the structural reality of rural markets, where purchases may be more difficult to make in mobile money than in urban contexts. It may also reflect a desire to use mobile money accounts as commitment savings devices (rather than spending the stored funds). We explore these explanations further in the results section below.

## 2. Related Literature

Raghubir and Srivastava (2008) present the results of an experiment in which 114 college students were primed to think of decisions in credit cards or cash. In their first study, the students were asked to imagine a restaurant in New Orleans and to indicate how much they would be willing to pay for 9 menu items (a menu was presented to the students without prices). They find that when eliciting willingness-to-pay, subjects display a higher willingness-to-pay for the same items when primed to think about credit, and speculate that credit cards can make it seem like one is spending "play money" or that expenditures are less material. The pain of spending is less salient and immediate.

Feinberg (1986) found similar results, although these results failed to be replicated in Feinberg (1990), Hunt et al (1990) and Shimp and Moody (2000). Prelec and Simester (2001) find that in genuine transactions of

substantial value, the effect of instructing individuals to use a credit card rather than cash for transactions can be large and does not appear to be driven by liquidity constraints. Runnemar, Hedman and Xiao (2014) conduct an incentivized experiment to test whether the willingness-to-pay is greater for debit cards than for cash and find evidence for similar effects on willingness-to-pay as in Feinberg (1986), Prelec and Simester (2001) and Raghubir and Srivastava (2008).

In exploring the mechanisms by which this may happen, Chatterjee and Rose (2012) propose that consumers primed to think about credit cards rather than cash focus on benefits rather than costs when evaluating products. They measure this by measuring the frequency of recall errors for cost and benefit attributes of products in different priming treatment conditions. Soman (2003) finds that lower payment modality transparency is associated with greater willingness-to-pay. The psychological effects documented in our experiment may have substantive welfare effects if payment modality has large enough effects on the composition or total amount of consumption, or saving. Thomas, Desai and Seenivasan (2011) argue that the restrictiveness of paying in cash can serve to curb impulsive purchases. Finally, our findings relate to a larger literature on mental accounting and how different sources of money or accounts may be viewed differently by individuals (see e.g. Prelec and Loewenstein, 1998).

## 3. Study Context

The study took place in two sites. The first is Gaibandha District, Rangpur. Rangpur is one of the poorest regions of Bangladesh, with exposure to the *monga*, a seasonal famine that lasts from September through November. Even outside of the monga season, Rangpur has significantly lower rates of food consumption per capita than other regions of Bangladesh.

The second is Dhaka, the capital of Bangladesh and the location of a large garment industry that employs young workers from around the country. The urban (Dhaka) sample consists of 768 people who migrated from Gaibandha, and the rural sample comprises 826 respondents from sending families (i.e., the families that sent the migrants to Dhaka).

We identified our sample population initially starting with a sample of migrants trained through a garment worker training program run by Gana Unnayan Kendra (GUK) in Gaibandha. This training intervention targeted the ultra-poor, and many of the sending households had initial incomes of less than $1 per day. From this sample, we snowball-sampled a larger population of migrants using referrals. Our final sample of urban migrants is likely to be familiar with mobile technologies and bKash due to their migration status, and we find high rates of mobile ownership at baseline.

Half of the sample was exposed to mobile money in the form of encouragement to enroll in a particular service, bKash, experimentally in the context of our larger field study. We achieved high rates of enrollment in that phase of the experiment in our treatment arm. One implication of this is that we are able to experimentally test whether prior familiarity with mobile money affects possible biases in decision-making that may arise due to the electronic, more distant, or unfamiliar nature of mobile money transactions and mobile money. Other dimensions of heterogeneity that may matter include gender, wealth/income, age, rural-urban geography, education and risk and time preferences, all of which were measured in a baseline survey.

We look at the role of mobile money in a context in which bKash is the market leader. Enrollment in bKash nationally has grown fast since its inception in 2011. The company started as a joint venture between BRAC Bank and Money in Motion LLC, USA. Equity investors now include the International Finance Corporation (part of the World Bank Group) and the Bill and Melinda Gates Foundation. By 2014, there were 105,000 agent points nationwide providing cash-in and cash-out service and 14 million subscribers. By April 16, there were 22 million users (Daily Star 2016). The service offered by bKash includes money transfer services and a mobile wallet (mobile phone top up, salary deposit, and shopping payment).

## 4. Data

We implemented a baseline and midline survey to collect data on our urban migrants and their rural sending households in 2014 and 2015. The baseline survey included extensive modules on household composition, age, gender, education, land holdings, employment status, risk and time preferences, and other characteristics. The midline survey included questions on the quantity of items purchased for a set of food items (coarse rice, fine/regular rice, pilau/atap/basmati rice, pulses, milk, eggs and meat) and on the willingness-to-pay for a set of consumer goods (10 Kg of fine/regular rice, beauty soap, salwar-kameez, lungi, potato chips and biscuits).

Tables 1 and 2 show summary statistics for these outcomes for the urban and rural samples, respectively.

**Table 1: Summary Statistics, Urban Sample**

| Variable | Cash Mean | Mobile Money Mean | Cash Median | Mobile Money Median |
|---|---|---|---|---|
| *Willingness to Buy* | | | | |
| Coarse Rice | 12.38 | 12.36 | 10 | 10 |
| Fine Rice | 22.42 | 23.84 | 20 | 20 |
| Basmati Rice | 1.39 | 2.76 | 1 | 1 |
| Pulses | 1.17 | 1.18 | 1 | 1 |
| Milk | 3.93 | 4.28 | 3 | 3 |
| Eggs | 13.64 | 14.40 | 12 | 12 |
| Meat | 1.93 | 2.98 | 2 | 2 |
| *Willingness to Pay* | | | | |
| Rice | 395.41 | 407.09 | 400 | 400 |
| Beauty Soap | 72.12 | 66.72 | 30 | 30 |
| Salwar Kameez | 687.55 | 746.00 | 700 | 700 |
| Lungi | 323.29 | 343.67 | 300 | 325 |
| Potato Chips | 35.66 | 39.70 | 25 | 30 |
| Biscuits | 72.22 | 79.57 | 50 | 60 |

**Table 2: Summary Statistics, Rural Sample**

| Variable | Cash Mean | Mobile Money Mean | Cash Median | Mobile Money Median |
|---|---|---|---|---|
| *Willingness to Buy* | | | | |
| Coarse Rice | 0.43 | 0.01 | 0 | 0 |
| Fine Rice | 31.73 | 25.71 | 30 | 28 |
| Basmati Rice | 2.51 | 1.79 | 2 | 2 |
| Pulses | 2.14 | 1.60 | 2 | 1.5 |
| Milk | 4.88 | 3.05 | 4 | 3 |
| Eggs | 17.37 | 12.47 | 14 | 10 |
| Meat | 2.48 | 1.66 | 2 | 1.5 |
| *Willingness to Pay* | | | | |
| Rice | 300.82 | 299.36 | 300 | 300 |
| Beauty Soap | 368.21 | 286.79 | 350 | 290 |
| Salwar Kameez | 884.02 | 649.02 | 850 | 650 |
| Lungi | 389.33 | 310.08 | 350 | 300 |
| Potato Chips | 73.66 | 40.05 | 60 | 30 |
| Biscuits | 131.43 | 89.93 | 120 | 80 |

Tables 3 and 4 show balance on observables for the urban and rural samples, respectively. Overall, in our urban sample, there were some differences in follow-up rates across the cash treatment and mobile money treatment arms, resulting in significant differences across treatment groups in baseline characteristics. Thus in all of the specifications, we present results with controls, although we are in the process of gathering additional data for the households that we were originally not able to follow in our midline survey and hope to achieve balance in the final version of the study. In the rural sample, there was only one difference at the 10 percent level, which is less than what would be expected to happen by chance. To be conservative, we also present results with controls for the rural sample.

## 5. Results

We find substantial differences in average quantities proposed to purchase and willingness-to-pay in our urban sample based on assignment to the cash ("Treatment") or mobile money ("Control") treatments (Table 5). Willingness-to-pay is 90 Taka lower on the whole when urban migrants are primed to look at decisions in terms of cash rather than mobile money, an economically significant effect representing 6 percent of total hypothetical expenditure (significant at the 5 percent level). Quantities proposed to be purchased also decline by 4.3 kilos, or 8 percent of the total on average, although this effect is only marginally significant at the 10 percent level.

We find no evidence of quality upgrading on average in the urban sample. We posited that when imagining using mobile money, participants might favor higher quality goods (less coarse rice, more proteins). We find no evidence for this on average in Table 5, although as noted below in Table 6, we find some evidence for quality upgrading effects in a subsample unexposed to bKash prior to the survey experiment.

We next examine whether there is an effect of prior exposure to the bKash technology by interacting the cash treatment dummy with an indicator for treatment status in our main field experiment (Table 6). Our point estimates suggest that the payment gap (the gap between the willingness to pay under cash versus mobile money) is completely eliminated for those participants randomly selected for training with mobile money. The main differences due to the form of payment thus are due to the control group. Similarly, we see

evidence of a quality upgrading effect in the unexposed main experiment control group of 6 percentage points (significant at the 1 percent level), which is if anything more than totally mitigated by experimental exposure to the bKash technology (interaction term significant at the 5 percent level).

We then examine heterogeneity of these effects by respondent characteristics (Table 7). We begin by examining interactions with gender, age and education. In our urban sample, we find evidence that education appears to have a de-biasing effect. There is a large and positive coefficient on the interaction between the cash treatment and the indicator for having completed primary school, although this is statistically insignificant. In our quality upgrading measures, we find that there are average effects that indicate greater willingness to pay with mobile money appearing for the sample that did not complete primary school, but these effects are completely mitigated in the sample that did complete primary school. We find no significant effects by age or gender.

We also examine heterogeneity by risk and time preferences (Tables 8 and 9). We find less of a payment effect for individuals who are more risk-neutral, as reflected in total quantities proposed to purchase. We find no other statistically significant evidence for interactions between these characteristics and the cash/mobile money priming.

In our rural sample, we find very different results. On average, quantities proposed to purchase and willingness-to-pay are significantly greater in the cash priming treatment rather than in the mobile money treatment (Table 10). Both of these effects are statistically significant at the one percent level. There is a 461 Taka increase in willingness-to-pay when individuals in our rural sample are primed to think about cash, or a 21 percent increase relative to mean overall expenditures. There is in addition a 15.1 kilo response to the cash priming, also economically as well as statistically significant.

We find some evidence for quality upgrading when individuals in our rural sample are imagining spending with mobile money, but the effects are economically small. Spending with mobile money results in an approximately 1 percent decrease in expenditure on the lowest categories of goods for rice and proteins, both statistically significant at the 1 percent level.

To better understand the rural results in the context of the urban results, we again examine heterogeneity by prior exposure, by household characteristics, and by risk and time preferences. We find evidence that prior exposure leads to greater, not lesser biases towards cash spending (Table 11, Columns 1 and 2), although these effects are not statistically significant. We also find that experience increases the quality upgrading effect, if anything, although this effect is small (Table 11, Column 4). Being female significantly increases the favoring of cash when looking at quantities proposed to be consumed and quality upgrading in proteins (Table 12, Columns 2 and 4). Education similarly increases the favoring of cash in quality upgrading (Table 12, Column 11). More risk-neutral rural respondents are again less likely to exhibit a payment effect (Table 13), and present-biased individuals are significantly less likely to favor cash (Table 14).

**Table 3: Summary Statistics by assignment to cash intervention, Urban Sample**

| Variable | Treatment Mean | Treatment SD | Treatment N | Control Mean | Control SD | Control N | Treatment-Control p-value |
|---|---|---|---|---|---|---|---|
| Any bank account | 0.08 | 0.28 | 371 | 0.14 | 0.35 | 406 | 0.012** |
| Formal employment | 0.89 | 0.31 | 371 | 0.91 | 0.28 | 406 | 0.258 |
| Log(Average monthly earnings) | 8.88 | 0.31 | 366 | 8.97 | 0.30 | 403 | 0.000*** |
| Female | 0.35 | 0.48 | 371 | 0.25 | 0.43 | 406 | 0.002*** |
| Age | 23.89 | 5.19 | 371 | 24.34 | 5.24 | 406 | 0.235 |
| Tenure at factory | 1.35 | 1.58 | 370 | 1.47 | 1.50 | 406 | 0.282 |
| Tenure in Dhaka | 3.42 | 1.67 | 370 | 3.46 | 1.69 | 406 | 0.748 |
| Total remittances | 17433.96 | 12426.15 | 371 | 18188.79 | 12072.44 | 406 | 0.392 |
| Mean remittances | 2490.57 | 1775.16 | 371 | 2602.62 | 1721.05 | 406 | 0.373 |
| Completed Primary School | 0.41 | 0.49 | 371 | 0.50 | 0.50 | 406 | 0.010*** |

**Table 4: Summary Statistics by assignment to cash intervention, Rural Sample**

| Variable | Treatment Mean | Treatment SD | Treatment N | Control Mean | Control SD | Control N | Treatment-Control p-value |
|---|---|---|---|---|---|---|---|
| Any mobile | 0.99 | 0.099 | 402 | 0.986 | 0.119 | 420 | 0.570 |
| Household size | 4.366 | 1.556 | 402 | 4.474 | 1.646 | 420 | 0.333 |
| Number of children | 1.214 | 1.066 | 402 | 1.231 | 1.042 | 420 | 0.817 |
| Age of household head | 45.738 | 12.634 | 401 | 47.468 | 13.8 | 419 | 0.061* |
| Female household head | 0.14 | 0.347 | 401 | 0.11 | 0.313 | 419 | 0.197 |
| Percentage of agricultural land owned | 10.448 | 33.237 | 402 | 9.831 | 25.948 | 420 | 0.768 |
| Own dwelling | 0.940 | 0.237 | 402 | 0.938 | 0.241 | 420 | 0.895 |
| Number of rooms | 1.818 | 0.733 | 402 | 1.814 | 0.756 | 420 | 0.937 |
| Share of households from Gaibandha | 0.507 | 0.501 | 402 | 0.529 | 0.5 | 420 | 0.545 |
| Share of households from Sadar | 0.4 | 0.491 | 402 | 0.367 | 0.482 | 420 | 0.319 |
| Share of households from other areas | 0.092 | 0.289 | 402 | 0.105 | 0.307 | 420 | 0.541 |
| Female | 0.588 | 0.493 | 301 | 0.571 | 0.496 | 301 | 0.680 |
| Age | 43.063 | 13.84 | 301 | 44.535 | 13.958 | 301 | 0.194 |
| Completed Primary School | 0.155 | 0.363 | 303 | 0.179 | 0.384 | 302 | 0.435 |

**Table 5: Aggregated Results, With Controls, Urban Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk |
|---|---|---|---|---|
| Cash Treatment | -90.09*** | -4.256* | 0.0131 | -0.00452 |
| | (32.10) | (2.225) | (0.00968) | (0.00471) |
| Observations | 768 | 765 | 765 | 765 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 6: Interaction with main bKash training treatment, With Controls, Urban Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk |
|---|---|---|---|---|
| Cash Treatment | -140.7*** | -7.523 | 0.0600*** | -0.00530 |
| | (52.52) | (7.639) | (0.0179) | (0.00758) |
| Cash Treatment * Main Treatment | 154.4** | 5.719 | -0.112*** | 0.00466 |
| | (75.43) | (9.176) | (0.0249) | (0.0103) |
| Observations | 768 | 765 | 765 | 765 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 7: Heterogeneous treatment effects, With Controls, Urban Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk | (9) Total expenditure | (10) Total Quantity Purchased | (11) Share of coarse rice | (12) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Treatment | -83.14** | -4.346 | 0.00758 | -0.00712 | -29.13 | 14.25 | -0.00330 | -0.00308 | -133.7*** | -2.181 | 0.0352*** | -0.0142** |
| | (40.62) | (2.912) | (0.0115) | (0.00579) | (158.4) | (12.31) | (0.0471) | (0.0229) | (40.94) | (3.001) | (0.0131) | (0.00602) |
| Cash Treatment * Female | -23.85 | 0.309 | 0.0188 | 0.00889 | | | | | | | | |
| | (64.37) | (4.402) | (0.0209) | (0.00932) | | | | | | | | |
| Cash Treatment * Age | | | | | -2.525 | -0.767 | 0.000678 | -0.0000594 | | | | |
| | | | | | (6.538) | (0.537) | (0.00192) | (0.000956) | | | | |
| Cash Treatment * Completed Primary School | | | | | | | | | 95.20 | -4.540 | -0.0484** | 0.0212** |
| | | | | | | | | | (64.73) | (4.897) | (0.0192) | (0.00944) |
| Observations | 768 | 765 | 765 | 765 | 768 | 765 | 765 | 765 | 768 | 765 | 765 | 765 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 8: Heterogeneous treatment effects by risk preferences, With Controls, Urban Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|
| Cash Treatment | -120.7* | -10.40** | 0.0344* | -0.00779 | -79.61** | -3.429 | 0.0117 | -0.00451 |
| | (69.41) | (4.537) | (0.0192) | (0.00921) | (33.00) | (2.282) | (0.0100) | (0.00476) |
| Cash Treatment * CRRA | 43.30 | 7.334** | -0.0228 | 0.00384 | | | | |
| | (66.12) | (3.700) | (0.0175) | (0.00859) | | | | |
| Cash Treatment * Inconsistency | | | | | -121.8 | -10.62 | 0.00917 | 0.00711 |
| | | | | | (137.1) | (10.43) | (0.0368) | (0.0226) |
| Observations | 715 | 712 | 712 | 712 | 768 | 765 | 765 | 765 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 9: Heterogeneous treatment effects by time preferences, With Controls (Urban Survey)**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk | (9) Total expenditure | (10) Total Quantity Purchased | (11) Share of coarse rice | (12) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Treatment | -87.67*** | -3.267 | 0.0133 | -0.00441 | -96.11** | -4.317 | 0.0188 | -0.00680 | -145.5 | -34.90 | -0.0206 | -0.0248 |
| | (32.67) | (2.071) | (0.00995) | (0.00477) | (42.67) | (3.652) | (0.0130) | (0.00640) | (613.7) | (57.52) | (0.161) | (0.0902) |
| Cash Treatment * Present Biased | -147.6 | -44.25 | 0.0131 | 0.0140 | | | | | | | | |
| | (193.8) | (39.33) | (0.0520) | (0.0323) | | | | | | | | |
| Cash Treatment * Future Biased | | | | | 9.963 | -0.745 | -0.0108 | 0.00588 | | | | |
| | | | | | (65.35) | (4.930) | (0.0191) | (0.00939) | | | | |
| Cash Treatment * Discount Factor | | | | | | | | | 52.79 | 29.34 | 0.0329 | 0.0203 |
| | | | | | | | | | (592.5) | (54.73) | (0.155) | (0.0869) |
| Observations | 762 | 759 | 759 | 759 | 762 | 759 | 759 | 759 | 762 | 759 | 759 | 759 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 10: Aggregated Results, With Controls, Rural Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk |
|---|---|---|---|---|
| Cash Treatment | 461.2*** | 15.09*** | 0.00697*** | 0.0123*** |
| | (29.60) | (0.972) | (0.00116) | (0.00239) |
| Observations | 826 | 826 | 826 | 826 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 11: Interaction with main bKash training treatment, With Controls, Rural Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk |
|---|---|---|---|---|
| Cash Treatment | 456.0*** | 13.57*** | 0.00692*** | 0.00773** |
| | (45.32) | (1.310) | (0.00159) | (0.00315) |
| Cash Treatment * Main Treatment | 10.47 | 3.033 | 0.000125 | 0.00920** |
| | (62.19) | (1.934) | (0.00222) | (0.00466) |
| Observations | 826 | 826 | 826 | 826 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 12: Heterogeneous treatment effects, With Controls, Rural Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk | (9) Total expenditure | (10) Total Quantity Purchased | (11) Share of coarse rice | (12) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Treatment | 430.1*** | 9.726*** | 0.00312** | 0.00694** | 595.7*** | 12.78*** | 0.00594* | 0.00979 | 472.6*** | 13.67*** | 0.00300*** | 0.0123*** |
| | (54.19) | (1.179) | (0.00149) | (0.00322) | (99.71) | (3.099) | (0.00355) | (0.00904) | (39.77) | (1.146) | (0.00111) | (0.00303) |
| Cash Treatment * Female | 77.77 | 6.575*** | 0.00285 | 0.00992** | | | | | | | | |
| | (68.50) | (1.544) | (0.00208) | (0.00413) | | | | | | | | |
| Cash Treatment * Age | | | | | -2.745 | 0.0170 | -0.0000266 | 0.0000656 | | | | |
| | | | | | (2.058) | (0.0618) | (0.0000765) | (0.000181) | | | | |
| Cash Treatment * Completed Primary School | | | | | | | | | 17.27 | -0.940 | 0.0113** | 0.00255 |
| | | | | | | | | | (95.33) | (3.351) | (0.00441) | (0.00928) |
| Observations | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 603 | 603 |

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 13: Heterogeneous treatment effects by risk preferences, With Controls, Rural Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|
| Cash Treatment | 443.2*** | 17.66*** | 0.0105*** | 0.0102** | 462.0*** | 14.67*** | 0.00709*** | 0.0128*** |
| | (69.00) | (1.954) | (0.00254) | (0.00491) | (30.66) | (1.021) | (0.00120) | (0.00248) |
| Cash Treatment * CRRA | 20.55 | -3.265* | -0.00364* | 0.00263 | | | | |
| | (70.12) | (1.782) | (0.00212) | (0.00445) | | | | |
| Cash Treatment * Inconsistency | | | | | -55.80 | 3.798 | -0.00259 | -0.00815 |
| | | | | | (124.2) | (2.685) | (0.00479) | (0.00875) |
| Observations | 763 | 763 | 763 | 763 | 826 | 826 | 826 | 826 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 14: Heterogeneous treatment effects by time preferences, With Controls, Rural Sample**

| | (1) Total expenditure | (2) Total Quantity Purchased | (3) Share of coarse rice | (4) Share of pulses and milk | (5) Total expenditure | (6) Total Quantity Purchased | (7) Share of coarse rice | (8) Share of pulses and milk | (9) Total expenditure | (10) Total Quantity Purchased | (11) Share of coarse rice | (12) Share of pulses and milk |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cash Treatment | 470.0*** | 15.19*** | 0.00714*** | 0.0120*** | 438.8*** | 15.15*** | 0.00517*** | 0.0135*** | -234.4 | 12.47 | -0.0283 | 0.0411 |
| | (30.45) | (0.984) | (0.00119) | (0.00244) | (42.45) | (1.348) | (0.00143) | (0.00302) | (498.8) | (20.96) | (0.0175) | (0.0405) |
| Cash Treatment * Present Biased | -236.2** | -0.363 | -0.00490 | 0.00920 | | | | | | | | |
| | (101.8) | (6.450) | (0.00591) | (0.0105) | | | | | | | | |
| Cash Treatment * Future Biased | | | | | 55.05 | 0.0684 | 0.00422* | -0.00304 | | | | |
| | | | | | (59.66) | (2.001) | (0.00226) | (0.00474) | | | | |
| Cash Treatment * Discount Factor | | | | | | | | | 673.3 | 2.626 | 0.0341** | -0.0279 |
| | | | | | | | | | (478.9) | (20.18) | (0.0170) | (0.0394) |
| Observations | 820 | 820 | 820 | 820 | 820 | 820 | 820 | 820 | 820 | 820 | 820 | 820 |

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## 6. Conclusion

Overall, the results suggest that there are significant differences in proposed spending behavior when imagining the use of mobile money versus cash. Our urban results are consistent with the previous literature on modern payment modalities (which find greater willingness to pay when in digital form). Since respondents are likely to have more cash available than mobile money, this is unlikely to be driven by simple liquidity considerations. The payment effect is attenuated by education, experience with the technology, and weaker aversion to risk.

However, the main rural results pose a puzzle and we will continue to explore them. We are currently awaiting additional data from about 60 urban respondents, and will incorporate their data into the final research paper.

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