# Can mobile money help overcome temptation spending and social pressures among microfinance clients?

# PRELIMINARY DRAFT - DO NOT CITE

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## Abstract

I examine how changing the way microfinance loans are disbursed to utilise widespread mobile money services impacts the business and household financial outcomes of female microfinance borrowers. I test the behavioural hypothesis that the integration of mobile money accounts and microfinance loans increases the economic benefits of the loans by facilitating business investment and saving. By keeping business funds separate from household funds both mentally and physically, mobile money may create behavioural impediments to acting in impulse and thereby facilitate saving and investment, while also serving to hide money from others. To test this, I randomly assigned 3,000 borrowers of BRAC Uganda in Kampala to receive either a mobile money account or a mobile money account and disbursement of their microfinance loan on this account. I compare these treatments to a control group who received no mobile money account. After 9 months, women who received their microfinance loan on the mobile money account had 16% high business profits and 18% higher levels of business assets. These results suggest that the manner in which borrowers receive their loan has an impact on how they spend it.

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# 1 Introduction

Behavioural obstacles to saving can account for the large popularity of microfinance loans in developing countries (Bauer et al., 2012). The poor find it hard to save incrementally and have shown a preference for lump-sum amounts either in the form of loans or from being a member of a ROSCA (Anderson and Baland, 2002; Afzal et al., 2014). In addition, the poor suffer relatively more from spending on temptation goods such as tea and sweets (Banerjee and Mullainathan, 2010), and demonstrate a preference for commitment devices which provide a small obstacle to access (Ashraf et al., 2006; Dupas and Robinson, 2013). Designing microfinance products to further take into account the behavioural obstacles the poor face could increase their benefits.

Recent evidence showed that the benefits from microfinance loans have not been realised as hoped (Banerjee et al., 2015) and, in particular, investments did not lead to an increase in profits for female entrepreneurs or have other transformational impacts. However, women's businesses have been found to benefit from in-kind grants not cash, with the reason linked to self-control difficulties (Fafchamps et al., 2014). There is also evidence that women who are able to hide money from their spouse and family benefit from business grants and that pressure to share with family and give money towards a husband's business explains poor performance of women when given microfinance loans (Fiala, 2017; Bernhardt et al., 2017).

This evidence suggests that providing loans in a way that provides a small obstacle to access, as opposed to as cash, would act as a commitment device and partially hide the money, reducing expenditures on temptation goods and pressure to share the money with family and spouses. Mobile money accounts, which are provided in an individual's name, can only be accessed or the balance checked by the individual and require the small barrier of going to an agent to withdraw money, can enable these behavioural and social obstacles to be overcome.

In this paper I examine the impact of mobile money accounts on women's business and household financial situation using a Randomised Controlled Trial of 3000 female microfinance clients in Kampala, Uganda. I examine the impact of providing a mobile money account designated for their business to micro-entrepreneurs and the additional impact of also providing the microfinance loan on this account. This study individually randomised both existing and new clients of the NGO BRAC Uganda who applied for a new loan. All clients had an existing business.

I find that providing a business-designated mobile money account, and also the microfinance loan on this account, leads to a 16% increase in business profits and an 18% increase in the value of business assets. I do not find any effects on savings or effects on any outcomes from just getting a mobile money account. This may be because over 95% of the sample had already used a mobile money account before at baseline and so simply designating an account for their businesses did not have an impact.

This research builds upon the early work on mobile money services and the larger body of research examining how to make financial services meet the needs of the poor, particularly with regards to behavioural constraints. There is early evidence that mobile money accounts can serve as an alternative saving device to keeping money as cash or using a bank account (Blumenstock et al., 2015; Mas and Mayer, 2011; Mbiti and Weil, 2011). The evidence on mental accounting suggests that simply labelling something as a saving account can increase savings (Thaler, 1985, 1999). This research adds to this early evidence by showing that mobile money accounts can be used to facilitate business investment through labelling and the storage of funds on an account.

The rest of this paper is organised as follows: Section 2 discusses the interventions and experiment design. Section 3 goes over the data used in this study. Section 4 contains the empirical specification and results. Section 5 concludes.

# 2 Intervention and experiment Design

## 2.1 Setting

The study location is Kampala, Uganda, which was chosen since it has both a high prevalence of microfinance borrowing and high mobile money penetration. The study took place in 6 microfinance branches of the NGO BRAC Uganda.

BRAC Uganda is one of the largest providers of financial services to the poor in Uganda. This study took place at 6 of their microfinance branches in Kampala. BRAC offer microfinance loans to women of between 250,000 USH and 4mn USH ($70 - $1100) for expanding a small enterprise. Owning an existing enterprise is a pre-requisite for obtaining a microfinance loan, and a check of the business is carried out by credit officers before a loan is given. Loan durations varying between 20 and 40 weeks depending on the needs of the woman, with the interest rate set at 13% for the 20 week loan and 25% for the 40 week loan. Women apply for loans in groups of between 8 and 30 women, and they meet weekly with these women to repay their loans. While groups are not formally liable for repayment of their members' loans, and women each have a guarantor from outside the group who is meant to repay the loan if a woman defaults, in practice a woman cannot get a new loans if other women from her group are in default.

The subject population is composed of any microfinance client applying for a new loan (whether as a first time borrower or a repeat loan) who owns a mobile phone of her own. The mobile phone requirement was not often binding in this urban sample, and only 6 women were excluded from taking part in this study because they did not have their own mobile phone.

## 2.2 Interventions

The study involved two interventions:

**Intervention One**

Women seeking a loan from BRAC were randomly offered a mobile money account designated for their business. Women were provided with a new sim card, helped in setting up their mobile money account and trained how to use it. The account was described as specifically for their business but no formal restrictions were placed on how they use the account nor money paid into the account. Women in this group continued to receive their microfinance loan as cash.

**Intervention Two**

Women seeking a loan from BRAC were offered the same business mobile money account as in Intervention One but, additionally, their microfinance loan will be paid directly into this account. These loans were paid through a mobile money provider and include an additional amount to cover

the fee of approximately 1% of the loan amount for withdrawing the money from an agent so as not to disadvantage women receiving the loan this way. A training fully explained this process so as to maximize take-up.

## 2.3 Experiment design

The study involved 3,000 female micro-entrepreneurs, of which 1,000 act as controls receiving the microfinance loan in the usual way as cash and nothing else, 1,000 were signed up for a business designated mobile money account but still receive their loan as cash and 1,000 were signed up for the business designated mobile money account and receive their loan on that account.

All other aspects of the BRAC microfinance loan product remained the same, including the requirement to be physically present at the branch for the disbursement of the loan and signing of final agreements and the repayment of the loans via weekly group collection meetings within the borrower's community.

Randomisation took place weekly in blocks of 150-200 women determined by the timing of requesting a new loan. All women who were both accepted for a loan with BRAC and who had a mobile phone were individually randomised into the treatment or control groups. This continued for approximately 5 months until the sample size of 3,000 was achieved.

The randomisation was done in Stata. It was stratified by present bias and behaviour in a willingness-to-pay-to-hide-money game (see Section 3.4, first time borrower with BRAC, microfinance branch and also by business profits at baseline. The first two variables were chosen based on the idea that women who are present bias or show a desire to hide money from their spouse might benefit more from having their loan disbursed on a mobile money account instead of as cash. I stratified by first time borrower and branch in case there were systematic differences between these groups and to ensure an even amount of mobile disbursement by branch. I stratified by profit since Fafchamps et al. (2014) showed heterogeneous effects loans for women based on their profitability.

For those assigned a treatment, the treatment was offered to the woman when she went to have her loan disbursed. At this point, if she was assigned to Treatment One she was offered a mobile money account and trained in how to use it. The account was framed as for her business but without any constraints. Women were free to refuse the account if they wanted.

If she was assigned to Treatment Two, she was offered both the mobile money account and to have her loan disbursed on this account. She could refuse either the disbursement and/or the sim card, permitting partial compliance if she wanted the sim card but not the disbursement. The additional amount to cover fees was explained to the woman and the same training and framing as in Treatment One given.

# 3 Data

A baseline survey was conducted on all women applying for a new loan at the 6 BRAC microfinance branches. Baseline surveys were conducted between January and June 2017 before randomisation and assignment to treatment group occurred. Approximately 1 week after the baseline survey, randomisation took place and a woman was disbursed her loan by BRAC in the assigned manner. Lists of treatment assignment were sent to the BRAC branches weekly, and only women who had been baselined and assigned a treatment could have a loan disbursed to them. This ensured that all women applying for loans during this 5 month period were part of the study. The endline survey began in October 2017 and ran until January 2018. This is approximately 8 months after the loan disbursement, and was chosen so that the women would still be repaying a 40 week loan when we went to conduct the endline survey with them, helping to reduce attrition.

## 3.1 Balance test and summary statistics

I confirm the validity of my randomisation by performing a balance test, results of which are shown in Table 1. None of the variables are significantly different across the 3 groups at the 10% level.

Around 80% of the sample are taking out a second or further loan with BRAC and so are classed as repeat borrowers. The branches varied significantly in size, with 2 branches representing 50% of the sample.

Looking at the game behaviour; 20% of the display hyperbolic preferences and 60% of them switch above the median in the hiding money game, meaning they are willing to give up at least $2 in order retain control over the money offered.

Moving onto demographics; the sample was well educated with 80% of women completing primary school and 15% going onto complete secondary school. On average they are 35 with 3 other household members. Two-thirds of them were married and 20% had a job in addition to their business.

The households earnt on average $274 a month and spent $245 a month. Nearly 90% had savings of on average $100. They owned nearly $1000 in household assets on average. 97% of women reported already having used mobile money before.

The average loan was $380 and half the loans were for 40 weeks. Women reported making $120 a month in their businesses.

## 3.2 Take-up

Since women were free to accept or reject the assigned treatment, take-up rates were a concern. However, the interventions had high take-up rates. 94% of the individuals assigned to the mobile

Table 1: Summary statistics and balance test

| | Mobile disbursement | | | Mobile account | | | Control | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | mean | sd | obs | mean | sd | obs | mean | sd | obs | p |
| current client | 0.82 | 0.38 | 984 | 0.82 | 0.38 | 993 | 0.81 | 0.39 | 982 | 0.83 |
| high profit | 0.54 | 0.5 | 984 | 0.53 | 0.5 | 993 | 0.53 | 0.5 | 982 | 0.95 |
| hyperbolic | 0.21 | 0.4 | 984 | 0.22 | 0.41 | 993 | 0.18 | 0.39 | 982 | 0.13 |
| hide money | 0.59 | 0.49 | 982 | 0.59 | 0.49 | 989 | 0.58 | 0.49 | 980 | 0.87 |
| branch1 | 0.23 | 0.42 | 984 | 0.23 | 0.42 | 993 | 0.24 | 0.42 | 982 | 0.98 |
| branch2 | 0.24 | 0.43 | 984 | 0.24 | 0.43 | 993 | 0.26 | 0.44 | 982 | 0.53 |
| branch3 | 0.12 | 0.33 | 984 | 0.15 | 0.36 | 993 | 0.13 | 0.33 | 982 | 0.19 |
| branch4 | 0.12 | 0.32 | 984 | 0.11 | 0.31 | 993 | 0.13 | 0.33 | 982 | 0.52 |
| branch5 | 0.11 | 0.31 | 984 | 0.11 | 0.31 | 993 | 0.1 | 0.3 | 982 | 0.68 |
| branch6 | 0.18 | 0.38 | 984 | 0.16 | 0.37 | 993 | 0.16 | 0.36 | 982 | 0.49 |
| primary school | 0.81 | 0.39 | 984 | 0.81 | 0.4 | 993 | 0.79 | 0.41 | 982 | 0.70 |
| secondary school | 0.14 | 0.35 | 984 | 0.12 | 0.32 | 993 | 0.14 | 0.35 | 982 | 0.11 |
| household size | 4.22 | 1.7 | 984 | 4.27 | 1.55 | 993 | 4.30 | 1.65 | 982 | 0.54 |
| age | 35.76 | 8.7 | 981 | 36.01 | 9.06 | 993 | 35.99 | 8.95 | 980 | 0.79 |
| married | 0.65 | 0.48 | 984 | 0.66 | 0.48 | 993 | 0.67 | 0.47 | 982 | 0.60 |
| job | 0.21 | 0.41 | 984 | 0.19 | 0.39 | 993 | 0.19 | 0.39 | 982 | 0.47 |
| monthly income | 1041.38 | 936.72 | 984 | 1037.38 | 864.61 | 993 | 1034.8 | 862.1 | 982 | 0.99 |
| monthly consumption | 944 | 569.43 | 981 | 933.87 | 558.72 | 991 | 948.77 | 543.52 | 980 | 0.83 |
| saves | 0.88 | 0.33 | 984 | 0.87 | 0.34 | 993 | 0.86 | 0.35 | 982 | 0.35 |
| amount saved | 434.1 | 703.21 | 984 | 452.8 | 733.27 | 993 | 465.75 | 818.91 | 982 | 0.64 |
| mobile account | 0.97 | 0.18 | 984 | 0.96 | 0.019 | 993 | 0.97 | 0.18 | 982 | 0.68 |
| household asset value | 3620.48 | 3205.73 | 984 | 3694.25 | 3349.99 | 993 | 3518.23 | 2844.93 | 982 | 0.46 |
| loan amount | 1382.09 | 749.55 | 967 | 1430.16 | 774.42 | 985 | 1372.95 | 768.92 | 977 | 0.20 |
| loan 40 weeks | 0.52 | 0.50 | 984.00 | 0.52 | 0.50 | 993.00 | 0.50 | 0.50 | 982.00 | 0.46 |
| monthly profit calculated | 679.77 | 922.54 | 980 | 682.07 | 894.09 | 991 | 681.5 | 922.26 | 979 | 1.00 |
| monthly profit reported | 451.18 | 454.41 | 984 | 462.45 | 480.44 | 993 | 430.89 | 398.59 | 982 | 0.28 |

All monetary amounts in 1000 USH and winsorised at the 99% level

money account (treatment one) received a mobile money account and 71% of those assigned to receive a mobile money account and their loan on the mobile money account (treatment two) received this. Additionally, 14% of those assigned to receive a mobile money account and their loan on the mobile money account received only a mobile money account and their loan as cash (they were assigned to receive treatment two and got treatment one). The reasons for those assigned to treatment two getting treatment one were both refusal of treatment two but also problems completing mobile disbursement, such as power cuts or networks outages. Lastly 15% of women assigned to mobile disbursement refused the entire treatment (sim card and mobile disbursement). This is summarized in Table 2 below.

Table 2: Treatment compliance

| | mobile account | mobile disburse |
|---|---|---|
| Received mobile money account and loan as mobile money | - | 71% |
| Received mobile money account and loan as cash | 94% | |
| Refused mobile disbursement | | 5% |
| Technical problem for mobile disbursement | | 9% |
| Received no mobile money account (refused) | 6% | 15% |
| Total | 100% | 100% |

### 3.3 Attrition

The survey team made a great effort to follow up with this highly mobile population of women. Even though the endline survey was only on average 8 months after the baseline, half the sample had taken loans of a shorter duration than this and so were not necessarily still attending their microfinance groups. Despite this 89% of the sample were found and re-surveyed for endline. Of these 25 refused to be surveyed and 292 couldn't be found. Attrition rates of approximately 10% are common in mobile populations such as this urban sample. However, of concern is whether treatment was correlated with attrition. I test for this in Table 3 and find no significant differences in attrition rates across treatment arms.

Table 3: Attrition

| | (1) |
|---|---|
| | attrition |
| Mobile account | 0.008 |
| | (0.014) |
| Mobile disbursement | 0.011 |
| | (0.014) |
| Constant | 0.101*** |
| | (0.010) |
| Observations | 2,959 |
| R-squared | 0.000 |

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

### 3.4 Behavioural games

In order to test the hypothesis that the women who benefit most from receiving the loan on a mobile money account are those who are most likely to give in to temptation goods or most subject to pressure to transfer money to others, incentivised games were played at baseline to elicit time preferences and willingness to pay to hide money from the spouse. The time preference game used were standard multiple price lists (Andersen et al., 2008), which have been used frequently in a developing country context (Ashraf et al., 2006). Individuals were asked to choose between a fixed monetary reward in one period and various larger rewards in a later period. The periods were either today and 2 weeks or 2 weeks and 4 weeks time. The near payment was fixed at $2 and the far payment varies between $1.8 and $8. One in five respondents was randomly chosen to be paid one of her choices from this game at the specified time period.

The propensity to pay to hide money from others has been used as a measure of women's empowerment in the literature (Almas et al., 2015; Fiala, 2017; Mani, 2011). Here I expand upon the version used in Fiala (2017) by conducting a variant of the (Almas et al., 2015) game with multiple choices between whether the woman or her spouse receives set amounts of money the next day. Women had to make a series of 8 choices between receive a fixed amount of money themselves ($2) or having their spouse receive varying amount of money between $1.8 and $8. This set up allowed an approximate willingness to pay to be calculated for those who did switch to their spouse receiving as the mid-point of the difference between the payments on the choice she switched on and the previous choice.

One in five respondents was randomly chosen to be paid one of her choices from this game to either herself or her spouse tomorrow. Tomorrow was chosen to always be the payment date to remove effects of strong present bias and to allow the enumeration team time to contact and find the spouse if necessary.

# 4 Empirical strategy and results

## 4.1 Estimation methodology

McKenzie (2012) showed that in the case of a single baseline and follow-up with an autocorrelation less than 0.5 (as is the case for business profits, saving and spending), power is highest when regressing an outcome measure at endline on baseline covariates, the treatment measure and the baseline value of the outcome measure. There are large power gains from using ANCOVA rather than a difference-in-difference specification. The study will therefore be analysed using an OLS regression of the form:

$$Y_{i1} = \alpha_0 + \alpha_1 T_{1i} + \alpha_2 T_{2i} + \alpha_X X_i 0 + Y_{i0} + \epsilon_{i1} \tag{1}$$

Where $Y_1$ is the outcome of interest, $T_1$ the mobile money account only treatment dummy, $T_2$ the mobile money account and loan on the mobile money account dummy, X a set of randomization strata dummies (Bruhn and McKenzie, 2009), $Y_0$ is the baseline value of the outcome (if measured at baseline, otherwise excluded) and $\epsilon$ random error for individual i.
OLS estimation of the above regression will return the unbiased estimate of the Intent to Treat (ITT) effects, $\alpha_1$ and $\alpha_2$. To estimate the local average treatment effect, the above equation will be estimated where assignment to treatment is replaced with actual take-up, which is instrument by assignment, giving the two-stage least squares estimator.

## 4.2 Hypothesis testing

For each outcome listed, I will test the following hypotheses:

1. whether a mobile money account alone has any effect (H0: $\alpha_1 = 0$)
2. whether the mobile money account and loan as mobile money has any effect (H0: $\alpha_2 = 0$)
3. whether these differ (H0: $\alpha_1 = \alpha_2$).

## 4.3 Primary results

As outlined in my pre-analysis plan, the primary outcomes of this study are profits, savings and the value of enterprise assets. The results for treatment effects using intent-to-treat estimates on those 3 outcomes are shown in Table 4. I find no effects from treatment with just the mobile money account but strong and significant effect when the loan is also disbursed on the mobile money account. Those in the mobile disbursement treatment experience a 15% increase in their profits and an 18% increase in the value of their business assets. There are no effects on saving amounts. These results are consistent with the hypothesis that disbursing the loan on a mobile money account

Table 4: Treatment effects on primary outcomes

| | (1) | (2) | (3) |
|---|---|---|---|
| | profit | savings | enterprise assets |
| Mobile account | -8.845 | -33.49 | 58.19 |
| | (17.55) | (42.83) | (65.39) |
| Mobile disbursement | 64.75*** | 27.35 | 131.8** |
| | (17.77) | (43.55) | (66.39) |
| Observations | 2,601 | 2,630 | 2,601 |
| Control mean | 420.8 | 646.3 | 744.6 |

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Intent-to-treat estimates. Profits refers to the self-reported monthly business profit. Savings is individual savings held by the woman. Enterprise asset is the value of all assets the woman uses in her business. All outcomes are winsorized at the 99% level. All regressions include strata dummies and include the baseline value of the outcome. Differences in observations are due to women who shut down their businesses between baseline and endline

increased the amount of the loan used to buy business assets and that these increased businesses assets lead to gains in profit.

# 5 Conclusion

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