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Combining Financial-Literacy Training and Text-Message Reminders to Influence Mobile-Money Use and Financial Behavior among Members of Village Savings and Loan Associations: Experimental Evidence from Malawi

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Abstract

Mobile money is increasingly promoted as a strategy to improve financial outcomes and livelihoods in low-income countries. However, its adoption and use among the poor remains low. We exploited a randomized experiment that exposed members of Village Savings and Loan Associations in Malawi to a financial-literacy and mobile-money training program, which was reinforced by weekly text-message reminders. We analyzed the impact of our intervention using survey data collected in the field as well as administrative data from the main telecommunications operators in the area. We found that treated individuals were more likely to have greater knowledge of mobile-money transactions than non-treated ones. They were also more likely to report receiving and saving money using mobile money and were more likely to report that they kept their savings in a formal financial institution. Interestingly, these effects were concentrated in relatively less economically developed areas. We used administrative data to analyze the effects of our intervention on the volume of mobile-money transactions. While the estimated effect had the expected positive sign, it was not statistically significant. We hypothesized that this result may be related to the fact that individuals also relied on local agents to perform mobile-money transactions; such behavior was not captured in administrative data. This is among the first studies to provide rigorous field-based evidence regarding how financial training supported by text-message reminders can influence mobile-money behavior. It is also among the very first to study the effects of such an intervention among members of Village Savings and Loan Associations.

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I. Introduction

There is increasing recognition, supported by rigorous field evidence, of the direct consequences of financial development and inclusion on poverty reduction and overall economic performance (Ksoll et al., 2016; Otchere, Senbet & Simbanegavi, 2017; Ozili, 2018; Zins & Weill, 2016). According to the 2017 Global Financial Index, however, 1.7 billion adults around the globe are still unbanked and are without access to a financial institution or to a mobile-money account. The report also stated that most of these individuals were concentrated in least-developed countries (LDCs). Financial development and inclusion, therefore, remain incomplete tasks in LDCs (Allen et al., 2014; Otchere, Senbet & Simbanegavi, 2017) despite their clear benefits and a wave of financial innovations over recent decades (Ozili, 2018).

In recent years, financial innovations have facilitated access to financial services through mobile phones, the internet, and cards linked to digital-payment systems (Ozili, 2018), dramatically transforming the financial sector in Africa and other developing areas of the world (Allen et al., 2014; Demirgüç-Kunt, et al., 2018). The promotion of savings groups, such as Village Savings and Loans Associations (hereafter, VSLAs) is also reshaping the landscape of opportunities for financial inclusion in LDCs (Meyer, 2015; Ouma, Odongo & Were, 2017).

Mobile money is one of the most promising financial platforms for improving access to financial services in LDCs. Recent studies have suggested that mobile money increases money circulation, makes capital readily available when most needed, and has positive benefits for farm employment and for savings (Abiona & Koppensteiner, 2018; Demombynes & Thegeya, 2012; Fanta et al., 2016; Jack & Suri, 2014; Mbiti & Weil, 2013; Ntwiga, 2016; Otchere, Senbet & Simbanegavi, 2017). The positive effects of mobile money have so far mostly been concentrated among high- and middle-income users, however (Fanta et al., 2016; Zins & Weill, 2016; Ozili, 2018). The limited adoption and use of mobile money among low-income individuals is likely related to several factors, among which the most important appear to be perceived insecurity, lack of trust, difficulty in using financial technology, and low levels of financial literacy (Oliveira et al., 2016; Ozili, 2018). In this sense, carefully designed

financial education could bridge the financial-inclusion gap, increasing the adoption and use of digital finance services among the poor (Abebe, Tekle & Mano, 2018; Cohen, Hopkins & Lee, 2008; Xu & Zia, 2012).

VSLAs have also transformed the financial sector in several African countries, with positive impacts among women and other society members historically excluded from the formal financial markets (Meyer, 2015; Ouma, Odongo & Were, 2017; Karlan et al., 2017). Developed in the early 1990s in Mali by CARE, VSLAs are a model of savings-led microfinance (Karlan et al., 2017). Members make money contributions or take loans at regular meetings that all members are expected to attend.1 Money is normally saved in a cash box that is kept by the group treasurer. Members can contribute more than the minimum agreed amount, and loans earn interest (Karlan et al., 2017). The group shares accumulated interest and savings at the end of the saving cycle. The share received by individual members depends upon their savings and interest earned, which provides incentives for members to save and participate actively.2 Such features of VSLAs, as well as their accessibility, make them attractive to low-income individuals who cannot afford bank fees and other costs related to formal financial services.

Mobile money and VSLAs can be complements to the process of financial inclusion for the poor in Africa, in particular, and in other LDCs in general. The introduction of mobile money to individuals in savings groups offers several potential benefits to individual members, to the group, and to the economy more generally. For example, the use of mobile-money platforms in VSLAs (known as digital VSLAs or electronic VSLAs) can reduce risks and uncertainties such as cash theft, which has been reported as one of the risks of savings groups (Le Polain, Sterck & Nyssens, 2018). Digital VSLAs can also enable absent members to deposit or take loans from the

[1] The minimum contribution is determined by group members based on income level. This could be a restriction on participation; however, we did not assess this issue in our paper because we studied a sample of individuals who were already members of a VSLA.

[2] Though this also puts pressure on members to borrow because financial rewards largely accrue to active participants (Le Polain, Sterck & Nyssens, 2018).

group.[3] Moreover, opening a mobile-money account can be the first step towards sustained access to other formal financial services. Recent reports indicate that savings groups in Kenya and Uganda have started using mobile-money saving accounts (Meyer, 2015) and that pockets of this practice can also be found in Malawi. To the best of our knowledge, however, there are no studies related to the promotion and dissemination of such practices or to their impact on the financial behavior of members of a VSLA. Our research aimed to identify promotion strategies to encourage the digitalization of VSLAs.

Our study was implemented in Malawi, in southern Africa, where, by 2017, only 34% of adults owned a bank account (Demirgüç-Kunt, et al., 2018) and only 21% had activated a mobile-money account (United Nations Capital Development Fund, 2018). Malawi also has an increasing presence of VSLAs as platforms to promote savings. There were 37,461 VSLAs with 610,596 members across the twenty-eight country districts in 2015 (Ministry of Finance, Economic Planning and Development, 2015), which amounted to 7% of the adult population at the time.[4] In terms of the policy environment, the main goals of the Malawi Financial Sector Development Strategy for 2016-2020 (Government of Malawi, 2017) and the related Payment Systems Act of 2015 were expanding the reach of digital payments (mobile money inclusive), increasing savings through savings groups (VSLAs), and improving financial literacy. This context represents a unique opportunity for the promotion of mobile money through VSLAs.

We partnered with a local non-governmental organization (Emmanuel International), and two mobile phone companies, Airtel Malawi (Airtel) and Telekom Networks Malawi (hereafter, TNM), to implement a Randomized Control Trial to study the effects of financial-literacy training, reinforced by text-message reminders on mobile-money knowledge and use among members of a VSLA. We provided training on mobile-money use and financial literacy to 342 individuals from twenty-one VSLAs

[3] This may, however, disadvantage the group because the presence of all members at weekly meetings assists in building the transparency and social networks on which VSLAs thrive (Aggarwal, Goodell & Selleck, 2015; Bongomin et al., 2018; Ksoll et al., 2016; Musinguzi, 2016).

[4] Adults aged 15-64 years as estimated by World Bank's World Development Indicators.

in southern Malawi in December 2018. The control group was composed of 298 individuals from another twenty-one VSLAs. One month after training, text-message messages with mobile-money- and financial-literacy-related content were delivered to treated individuals on a weekly basis. Data were collected before and after the intervention. The follow-up survey collected data on mobile-money account activation[5] and use in April 2019. We also obtained administrative data for those individuals who reported having access to a phone account operated by either TNM or Airtel. These administrative data correspond to the months of April and May 2019.

Our follow-up results showed that treated VSLA members were more likely to report knowing that mobile money could be used to pay bills and save money. They were also more likely to report that they used mobile money to receive and save money and that they had a bank account and saved with a microcredit institution. Interestingly, we found that the positive effects of self-reported mobile-money knowledge and use were concentrated in the Machinga District, which is relatively less economically developed than the Mangochi District. We did not find consistent evidence of heterogeneous effects related to trust, education, or sector of employment. We also exploited the administrative data provided by the two main telecommunication companies in the country to estimate the effect of our intervention on the volume of transactions. While the estimated effect had the expected positive sign, it was not statistically significant. We hypothesized that this may have been related to the fact that individuals also relied on local agents to perform mobile-money transactions and that such behavior was not captured in administrative data. Indeed, 15% of respondents reported receiving money through mobile money but had no matched cell phone for the transaction, implying that an agent was used. Alternatively, the failure to reject the null in this latter case may have been related to the reduced sample of individuals (276) for which administrative data were available.

The evidence on the role of financial-literacy training on subsequent financial behavior is vast but mixed, and limited studies deal properly with self-selection into

[5] Please note that mobile-money account activation does not require ownership of bank account but does require a registered cell phone number. It is, however, possible to transfer money from a bank account to a mobile-money account through mobile banking.

training (Drexler, Fischer & Schoar, 2014; Mandell & Klein 2009; Sayinzoga, Bulte & Lensink, 2014). On the other hand, recent development literature has suggested that text-message reminders are increasingly used to influence behavior in several contexts, such as promoting agricultural practices (Cole & Fernando, 2012; Larochelle et al., 2017; Murray et al., 2015) and influencing health-seeking behaviors (Gurman, Rubin & Roess, 2012). Some studies have also used text-message reminders to influence financial behavior and mobile-money use (Karlan et al., 2017). Among farmers in Tanzania, experimental data have shown that interactive text-message and behavioral-economics principles improved savings and borrowing on a mobile savings and credit product (M-PAWA) (Dyer, Mazer & Ravichandar, 2017). Along similar lines, an Ethiopian experiment showed that financial training combined with text-message reminders increased financial literacy and savings among micro-entrepreneurs (Abebe, Tekle & Mano, 2018). Others, like Cole, Sampson, and Zia (2011), combined financial training with price subsidies and found an increased demand for bank accounts.

Our paper is among the first to provide rigorous, field-based evidence on how financial training supported by text-message reminders can influence mobile-money transactions and related financial behavior in the short term. It is also among the very first to study the effects of such an intervention among members of VSLAs. This is particularly relevant in the Malawian and African contexts because many financially excluded individuals are increasingly served by savings groups.

II. Experimental Design

2.1 The Intervention

The experiment was implemented among VSLA members in the Mangochi and Machinga Districts in southern Malawi (Figure 1). The two districts are geographically adjacent and share common cultural traits because the dominant ethnic groups in both districts are the same. However, Mangochi is more urbanized and has greater economic development than Machinga, mostly because of the tourism and fishing industries that have developed around Lake Malawi, and poverty is higher in

Machinga (66%) than in Mangochi (52%) (National Statistical Office & ICF International, 2017). We chose the Mangochi and Machinga Districts for our study because our partner NGO, Emmanuel International, had active VSLAs in these districts. Emmanuel International promotes different types of VSLAs in the two districts. In Mangochi, VSLAs are promoted among both men and women with the aim of increasing the commercialization of fishing activities, VSLAs in Machinga primarily target women with the aim of empowering them (although men may also participate). Unlike previous studies (Karlan et al., 2017; Ksoll et al., 2016), whose interventions involved the establishment of VSLAs from scratch, we used VSLAs that were active prior to the study to assess the impact of adding mobile-money promotion to their activities.

The intervention aimed to improve financial literacy and knowledge of mobile-money use and related benefits. It involved face-to-face trainings followed by weekly reminder text-messages. The reminder texts were expected to reinforce knowledge of training materials and encourage take up of mobile-money services. Appendix I provides details of training content, while Appendix II provides the details of the text message. The intervention contents (training and reminder text-messages) were promoted as a package, following previous experimental evidence (Abebe, Tekle & Mano, 2018; Dyer, Mazer & Ravichandar, 2017) that showed that training alone did not lead to significant financial outcomes but was more effective when combined with reminders.

Training was implemented in two stages. First, the research team (researchers and research assistants) were trained by Airtel and TNM on how VSLAs and their members could use mobile money for transactions. Simultaneously, the Reserve Bank of Malawi trained researchers on issues related to financial literacy. This first stage of training took place on December 3-4, 2018. After the first stage, the research team trained VSLA members in the treatment group only (342 participants). The second stage took place from December 9-17, 2018. Each training session was facilitated by four members of the research team. In addition to face-to-face trainings, individuals in the treatment group received reminder text-messages twice weekly for two months starting on January 21, 2019. The training materials were translated into the local language, Chichewa, and delivered in sessions that lasted about four hours (see

Appendix I and Appendix II for more details).

Our intervention period overlapped with the lean season in Malawi, the period between pre-planting and harvest, which is typically associated with reduced food stocks and reduced circulation of money in businesses because funds are diverted into the purchase of farm inputs and other agriculture-related investments (Anderson et al., 2017; Chirwa, Dorward & Vigneri, 2012). VSLAs in rural areas often end their cycle by sharing savings and interests just before planting time in order to channel funds to farming activities (Ksoll et al., 2016). Thus, the level of VSLA transactions may have been at their lowest point during our intervention.

2.2 Experimental Design and Data

Establishing a credible counterfactual free of selection bias is a common challenge in impact evaluation (Gertler et al., 2016; Ksoll et al., 2016). To achieve this objective, we implemented a cluster randomized trial in which the experimental units were the VSLAs supported by our NGO partner. Our study contained forty-two clusters (twenty-one treated and twenty-one control), which allowed us to achieve a reasonable level of statistical power.[6] Selection of VSLAs in our study area was based on a group village head (GVH). A GVH is a traditional administrative jurisdiction under a chief and often consists of six to ten villages. The number of VSLAs in a given GVH ranges from one to thirteen, with an average of seven. There is an important degree of interaction among VSLAs within the same GVH because they attend the same social gatherings. We worked with field staff from Emmanuel International to randomly select our experimental participants. To minimize contamination, we randomly selected a single VSLA from each of the GVHs, which placed participating VSLAs geographically far apart. This potentially minimized the chances of interaction between different participating VSLAs. Further, the VSLAs were randomly assigned to either control or

[6] Statistical power was calculated with a p-value set at 0.05, the base value of mobile money used to receive money at 11%, and an impact size of 10%. The number of clusters equaled forty-two with a 95% CI of the impact between 8% and 24% and an average cluster size of thirteen. The statistical power was 81%.

treatment groups in the experiment. All members of the sampled VSLAs who consented to participate were included in the study.

We exploited survey (self-reported) and administrative data. Survey data[7] were collected before (November 4-23, 2018) and after the intervention (March 29-April 18, 2019). In both cases, participants answered questions related to mobile-money knowledge and use and financial behavior. Survey data were collected by administering questionnaires[8] to VSLA members in face-to-face interviews by trained research assistants. The NGO partner, Emmanuel International, assisted with field-related logistics, such as locating VSLAs and making appointments, which facilitated research assistants' access to the communities.

In the baseline survey, we collected data from 640 members of a VSLA, 342 in the treatment group and 298 in the control group. In the end-line survey, we were able to reach 87% of individuals in the baseline sample (554 individuals in total: 291 from the treatment group and 263 from the control group). The observed decline in sample size represented a 13% attrition rate, which was relatively high for a four-month observation period[9] (Ksoll et al., 2016). Attrition in our study was affected by adverse weather conditions that led to heavy flooding in some parts of the study area in March and April 2018 (Government of Malawi, 2018).

Attrition is a problematic issue in randomized control trials (RCTs). First, the treatment may be related to attrition, which can destroy the comparability of treatment and control groups (Gertler et al., 2016) and henceforth the internal validity of the study. To assess whether attrition was related to our treatment, we followed Thomas et al. (2012) and estimated a simple regression of the attrition variable on the treatment status. The results from this regression indicated there was no significant relationship between the two variables (p=0.931), suggesting that the treatment did not influence attrition. We also performed balance tests for treatment and control

[7] Survey CTO was used to collect data.

[8] The survey protocol and tools were approved by the Malawi National Committee on Research in Humanities and Social Sciences (NCRHS), and respondents consented to participate in the project.

[9] Most of the cases were lost because some respondents were not available on the survey day. Others presented identification information different from what had been provided at baseline and therefore could not be matched.

individuals in the follow-up sample (see Section 3.1) and found that both groups were, on average, comparable. Second, attrition can affect external validity because the remaining sample in the follow-up may be substantially different from the baseline sample. To assess the effect of attrition on external validity, we followed Miller & Wright (1995) and estimated a logit model whose dependent variable took the value of 1 if the individual participated in the follow-up survey and 0 otherwise, and in which respondent characteristics were used as control variables.[10] All control variables in the estimation were insignificant, suggesting that attrition was likely random and that the remaining sample was comparable to the original one, thereby maintaining the original external validity of the study.

Administrative data provided by the two main telecommunications companies in the country, Airtel Malawi) and Telekom Networks Malawi, on subscribers' mobile-money-account use were also used for estimation purposes. Confidentiality and non-disclosure agreements were signed with the telecommunication companies before data were supplied. The data were provided for mobile phone numbers owned by study participants as well as for mobile phone numbers of individuals who did not participate in the study but whose phones were accessible by some of the study participants (as reported in our baseline and follow-up surveys). There is evidence that sharing of mobile phones is common in certain areas in Africa and hence it was important to include such type of phone access in our study (James & Versteeg, 2007; Wesolowski et al., 2012). Although there were 276 mobile phone numbers[11] reported in the surveys, administrative data from TNM and Airtel showed that only 101 mobile phones were active in the observation months of April and May 2019.

[10] Independent variables included educational level, marital status, employment status, and district of residence. The same independent variables were used in subsequent models

[11] Of this total, 155 (56%) were phones owned by respondents, while 121 (44%) were the phones of relatives or friends to which respondents had access.

2.3 Empirical Strategy

Following Abebe, Tekle, and Mano (2018), Dupas et al. (2018), and McKenzie (2012), we estimated an analysis of covariance (ANCOVA) regression models. That is, we regressed the outcome variable on the treatment status dummy variable and the pre-treatment value of the outcome variable. As discussed in McKenzie (2012), ANCOVA regression yields important gains in power over differences-in-differences (DID) regression, which is a common analytical tool used in impact evaluations. The ANCOVA regression model in our paper is specified as follows:

$$Y_{jf} = \varsigma + \beta Z_j + \vartheta Y_{jb} + \Omega' X + \eta_j \quad (1)$$

where Y_{jf} denoted the outcome indicators for individual *j* at follow-up survey; Z_j was the dummy variable for treatment status for individual j (taking the value 1 if treated and zero otherwise); Y_{jb} denoted the value of the outcome indicator for individual j at baseline; *X* denoted a vector of control variables that were included in some specifications for robustness check (these included educational level, marital status, employment status, and district of residence)[12]. The outcome indicators of interest refer to mobile-money knowledge and use as well as financial behavior. We used individual elements of the outcomes as well as composite indicators constructed as averages of related outcomes. The parameter of interest was $\boldsymbol{\beta}$, which measured an intention to treat effect (ITT) —that is, the average increase of the outcome variable in treatment group relative to the control group. The standard errors in all regressions were clustered at the VSLA level (randomization unit) and the analyses were done using Stata 15 software.

[12] Employment status was a dummy equal to 1 if the respondent's main source of income was agriculture and zero otherwise; education level was a dummy equal to 1 if the respondent received some education and zero otherwise; marital status was a dummy equal to 1 if the respondent was married and zero otherwise; district of residence was a dummy variable equal to 1 if the residence was in the Machinga District and zero otherwise.

III. Results

3.1 Baseline Characteristics

As mentioned, attrition was not related to treatment status or other participant characteristics, which alleviated our concerns regarding the effect of attrition on the internal and external validity of our study. We used the remaining follow-up sample of 554 observations to assess the balance in observables between treatment and control groups. In Table we present the baseline characteristics for the treatment group, control group, and the entire sample. We include cluster robust p-values for statistical tests of observable raw mean differences between treated and control units in the sample.

Table 1: Demographic and Socioeconomic Characteristics of the Sample

Variable	Control (n=263)	Treatment (n=291)	Mean Test Difference	P-value	Whole sample (n=554)	
	Mean	Mean			Mean	Std. Dev.
Age	39.407	38.010	1.397	0.445	38.673	14.858
Household size	5.624	5.763	-0.139	0.559	5.697	2.041
Sex (Male=1)	0.106	0.041	0.065	0.189	0.072	0.259
Education level	2.144	2.134	0.010	0.935	2.139	0.992
Housework	0.049	0.107	-0.057**	0.013	0.080	0.271
Wage employment	0.076	0.079	-0.003	0.907	0.078	0.268
Casual work	0.118	0.079	0.039	0.208	0.098	0.297
Agricultural work	0.327	0.266	0.061	0.219	0.295	0.456
Self employed	0.380	0.403	-0.023	0.721	0.392	0.489
Fisheries work	0.038	0.045	-0.007	0.783	0.042	0.200
Remittances	0.008	0.017	-0.010	0.271	0.013	0.112
Other employment	0.004	0.003	0.000	0.945	0.004	0.060
Monogamous	0.536	0.536	0.000	0.999	0.536	0.499
Polygamous	0.202	0.230	-0.029	0.535	0.217	0.412
Divorced	0.110	0.065	0.045*	0.076	0.087	0.282
Separated	0.061	0.062	-0.001	0.966	0.061	0.240
Widowed	0.068	0.086	-0.017	0.587	0.078	0.268
Never Married	0.023	0.021	0.002	0.870	0.022	0.146
Mangochi	0.274	0.199	0.074	0.562	0.235	0.424

Notes: Mean and standard deviation of baseline characteristics of the sample as well as mean separated by treatment status. We have also included difference in mean values between treatment and control group.
Variable definitions; Sex is the sex of respondent (male = 1), Education level is the highest education level for the respondent measured as an ordinal indicator. Housework, wage

employment, casual work, self-employed, fisheries work, remittances, and other employment reflect major occupation (=1 if the respondent had this as major occupation. Monogamous, polygamous, divorced, separated, widowed, and never married were dummy variables for marital status, and Mangochi was a dummy variable for residential district.

The relevant column here is p-value because it shows whether estimated difference was significant. In a joint-balance test, we regressed treatment variables on all the baseline characteristics and found that the model had a significant F-statistic at 5%. Robustness checks used some of these regressors in the ANCOVA regressions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Our findings showed that the treatment and control groups were, on average, similar in demographic and socioeconomic characteristics. Of the nineteen variables (the results appear in Table 1), the p-values indicated that a statistically significant difference existed in only two cases (divorced status and employment status), but only at the 10% level; the difference in point estimates was relatively small. Moreover, these two variables appeared as non-statistically significant when a multiple regression for the treatment status on the control variables, reported in Table 1, was estimated.

In terms of overall sample characteristics, respondents were, on average, 39 years old and the majority (93%) were women. The predominance of women is in line with our study context because women's participation in VSLAs has generally been higher than men's in several African settings (Aggarwal, Goodell & Selleck, 2015; Cassidy & Fafchamps, 2015; Garikipati, 2012). Additionally, our NGO VSLA program in the Machinga District specifically targeted women. In some cases, men participated in VSLAs through a backdoor by sending women partners to save and obtain loans on their behalf (Garikipati, 2012). Table 1 also indicates that about 76% of the individuals in our study were married and that the average household included six members. The education level of the sample was low, with an average educational indicator of 2.14, which corresponds to junior primary education (typically one to four years of primary education). Most individuals in our sample were self-employed in such areas as businesses (39%), agriculture (29%), and fisheries (4%).

Table 2 presents the baseline status regarding mobile-money use for the treatment and control groups. Treated and control units were also similar in their baseline access and use of mobile money. The ownership of mobile phones in our baseline was 32%, which is close to the 34% national level of ownership reported by the National Statistical Office and the Malawi Communications Regulatory Authority (National Statistical Office and Malawi Communications Regulatory Authority, 2015).

Of the 68% of individuals who did not own a mobile phone, 84% had access to a relative's or friend's phone, implying that that about 70% of our sample had some form of access to a mobile phone. The results in Table 2 also show that about 16% of individuals in the baseline had mobile-money accounts.

Table 2: Comparison of Baseline Characteristics on Mobile-Money Access and Use

Variable	Control		Treatment		Mean Test	
	Obs	Mean	Obs	Mean	Difference	P-Value
Access to Phone						
Own Phone	263	0.319	291	0.326	-0.007	0.920
Access to Relative's Phone	121	0.868	130	0.808	0.060	0.163
Mobile-money account	263	0.167	291	0.151	0.016	0.679
Knowledge of mobile money						
Receiving money	263	0.228	291	0.210	0.019	0.672
Sending money	263	0.144	291	0.127	0.017	0.645
Paying Bills	263	0.053	291	0.034	0.019	0.413
Buying phone credit	263	0.118	291	0.096	0.022	0.531
Transferring phone credit	263	0.144	291	0.110	0.035	0.315
Saving money	263	0.103	291	0.100	0.003	0.924
Obtain a loan	263	0.156	291	0.120	0.036	0.321
Use of Mobile money						
Receiving money	263	0.289	291	0.216	0.072	0.127
Sending money	263	0.125	291	0.103	0.022	0.525
Paying Bills	263	0.023	291	0.014	0.009	0.435
Buying phone credit	263	0.114	291	0.079	0.035	0.224
Transferring phone credit	263	0.103	291	0.100	0.003	0.918
Saving money	263	0.103	291	0.072	0.030	0.387
Obtain a loan	263	0.110	291	0.096	0.014	0.627
MM use by VSLA	263	0.011	291	0.010	0.001	0.910
Financial Behavior Indicators						
Non-VSLA Credit	263	0.080	291	0.127	-0.047	0.132
Own bank account	263	0.030	291	0.031	-0.001	0.973
Save with bank	263	0.027	291	0.017	0.009	0.448
Save with MM	263	0.103	291	0.058	0.044	0.134
Save with microcredit group	263	0.049	291	0.058	-0.009	0.656

Notes: Baseline mobile-money access and use status by treatment and control groups. P-values indicate level of significance of difference between the two groups. MM = Mobile Money, MK=Malawi Kwacha.

Variable definitions: "Own phone" is a dummy variable that reflects the respondent owned a phone. Access to Relative's Phone is a dummy variable for access to a phone owned by a relative; Mobile-money account is a dummy variable for ownership of a mobile-money account. Variables under knowledge of mobile money and use of mobile money were dummy variables for whether the respondent knew that mobile money could be used to or had used mobile money to receive money, send money, pay bills, buy phone credit, transfer phone credit, save money, and obtain a loan. MM use by VSLA is a dummy variable that has to do with whether the

respondent's VSLA used mobile money to make transactions. Variables under Financial Behavior indicators were dummy variables reflecting whether the respondent obtained non-VSLA credit, owned a bank account, saved with a bank, saved with mobile money, or saved with microcredit groups.

The results in Table 2 also indicate that knowledge of mobile-money and related services was relatively low at baseline. While 22% of individuals indicated knowing that mobile money could be used to receive money, only 4% knew that mobile money could be used to pay bills. The baseline information also showed that only 1% of VSLA members had ever used mobile money to perform VSLA transactions. This proportion was the same for control and treatment VSLAs. Table 2 also indicates that about 25% of the respondents had used mobile money to receive money and that only 2% had used it to pay bills. These statistics were consistent with national estimates, which show that cash-in/out and airtime purchases were the most popular mobile financial transactions, while payment of bills was rarely adopted (Reserve Bank of Malawi, 2019).

Table 2 also shows the results of comparisons between treatment and control groups at baseline on conventional and non-conventional financial behavior indicators, such as bank account ownership, access to credit from sources other than VSLAs, mobile-money savings, and savings in banks and microcredit groups. The results show that participants in the control and treatment groups were also similar in this respect. Table 2 shows that, for both treatment and control groups, levels of formal financial inclusion were very low, and only 3% of the sample owned a bank account. We also found that only 10% of individuals in the sample had accessed credit from sources other than a VSLA. In terms of the institutions where the study participants saved money, we found that 8%, 5%, and 2% of them used mobile money, microcredit groups, and a commercial bank, respectively.

3.2 Impact of the Intervention

We started our analysis by studying the impact of the intervention on knowledge regarding mobile-money services, including whether treated individuals were more likely to know that mobile money could be used to receive money, send money, pay bills, save money, and obtain a loan than those in the control group. In

Table 3, we present estimated treatment coefficients, which were relatively similar for all the related knowledge binary indicators we analyzed, but they were only statistically significant (at the 5% level) for knowledge related to mobile-money use to pay bills, which increased by 4.5 percent points. We also constructed a simple average indicator for all knowledge categories and found that our intervention had a statistically significant effect (at the 10% level), implying that the intervention increased average mobile-money knowledge by five percentage points. In this sense, our findings provide some (although weak) evidence that financial and mobile-money trainings and text-message reminders increased knowledge about mobile money and related services, with the strongest impacts observed on knowledge of using mobile money to pay bills. This evidence confirms previous experimental findings which showed that financial-literacy training increased financial-literacy rates in African contexts (Sayinzoga, Bulte, and Lensink 2014).

Table 3: Treatment Effects on Knowledge of Mobile Money Related Services

	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan	Average knowledge
Treatment	0.032	0.044	0.045**	0.059	0.043	0.050*
	(0.052)	(0.048)	(0.021)	(0.036)	(0.031)	(0.029)
_cons	0.228***	0.129***	0.035***	0.099***	0.084***	0.084***
	(0.040)	(0.028)	(0.012)	(0.020)	(0.024)	(0.018)
Adj. R^2	0.112	0.085	0.052	0.144	0.023	0.156
N	554	554	554	554	554	554

Notes: ANCOVA regression coefficients of treatment effect on knowledge of mobile-money uses for the whole sample. All models controlled for lagged variables. Standard errors reported in brackets were clustered at the village level. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

The effects of the intervention treatment on the use of mobile-money services are shown in Table 4. We found that the intervention increased the proportion of individuals who reported using mobile money for receiving and saving money by ten and five percentage points, respectively. In the case of mobile-money use to send money, pay bills, and take out loans, the estimated coefficients were relatively close to zero and not statistically significant. Regarding mobile-money-account ownership and mobile-money use in conducting VSLA transactions, the estimated treatment coefficients were positive; they were not, however, statistically significant.

As we did in the case of mobile-money knowledge, we also constructed an

average indicator for mobile-money use (a simple average of the first five binary indicators analyzed in Table 4). The average number of reported mobile-money transactions was higher after the intervention for individuals in the treatment group than for those in the control group (the effect was statistically significant at the 10% level).There was an increase in average mobile-money use of about three percentage points after financial-literacy and mobile-money training. Our findings therefore suggest that financial literacy and mobile-money training increased use of mobile-money services.

Table 4: Treatment Effects on Mobile-Money Use

	Receive Money	Send money	Pay Bills	Save Money	Obtain loan	VSLA transaction	Own MM account	Average Use
Treatment	0.098**	0.011	0.005	0.046*	-0.001	0.067	0.028	0.032*
	(0.038)	(0.028)	(0.008)	(0.027)	(0.012)	(0.043)	(0.043)	(0.019)
_cons	0.112***	0.025*	0.005	0.019	0.017*	0.018*	0.138***	0.023***
	(0.024)	(0.013)	(0.005)	(0.012)	(0.009)	(0.010)	(0.030)	(0.010)
Adj. R^2	0.132	0.138	0.119	0.135	0.009	0.021	0.198	0.216
N	554	554	554	554	554	554	554	554

Notes: ANCOVA regression coefficients of treatment effect on mobile-money use. All models controlled for lagged variables. MM account = Mobile-money account. Standard errors were clustered at the village level at the village level and are shown in brackets. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Finally, in Table 5, we explore the intervention treatment effects on financial behavior. Our findings show that the intervention affected financial behavior indicators related to patterns of saving money. In particular, the intervention increased the number of individuals with bank savings by 2.6 percentage points, the proportion of individuals with mobile money savings by 6.2 percentage points, and the proportion of individuals with microcredit group savings by 5.9 percentage points. For other standard measures of financial inclusion, such as ownership of bank accounts and access to credit through channels other than VSLAs, the intervention did not have statistically significant effects. As in Tables 3 and 4, we also constructed an average measure that comprised all indicators studied in Table 5. Our treatment seems to have significantly influenced average financial behavior (at the 10% significance level).

Table 5: Treatment Effects on Financial Behavior

	Non VSLA credit	Own bank account	Save with bank	Save with VSLA	Save with MM	Save with microcredit group	Average number
Treatment	-0.023	0.021	0.026**	-0.007	0.062*	0.059**	0.018*
	(0.028)	(0.014)	(0.013)	(0.004)	(0.033)	(0.026)	(0.010)
_cons	0.100***	0.015*	0.008	1.001***	0.041***	0.042**	0.136***
	(0.020)	(0.008)	(0.007)	(0.001)	(0.015)	(0.016)	(0.014)
Adj. R^2	0.026	0.121	0.113	-0.000	0.197	0.026	0.123
N	554	554	554	554	554	554	554

Notes: ANCOVA regression coefficients of treatment effect on financial behavior for the whole sample. All models controlled for lagged variables. MM account = mobile-money account. Standard errors were clustered at the village level and are shown in brackets. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

3.3 Alternative Specifications

Tables 3, 4, and 5 show the results of our tests of the robustness of the ANCOVA estimations to the inclusion of potential confounders. Specifically, we added indicators for employment status, education level, marital status, and district of residence (Mangochi or Machinga) as controls in the ANCOVA estimations. In general, the results were consistent with the regressions reported in Section 3.2.

First, the results shown in Panel A in Table 6 confirm that the intervention influenced knowledge of mobile money to pay bills but, in this case, the intervention effect on knowledge of mobile money for savings also appeared statistically significant. Panel B in the same Table confirms that our intervention affected (self-reported) use of mobile money to receive and save money, while the results in Panel C confirm that the intervention had a significant effect on bank, mobile-money, and microcredit-group savings. Interestingly, in Panel C the treatment effect on bank-account ownership also appeared statistically significant. In the case of the aggregate (average) indicators, the estimated point coefficients were relatively close to those shown in Tables 3, 4, and 5; however, we lost statistical significance for the aggregate indicators that corresponded to mobile-money knowledge and use.

3.4 Heterogeneous Treatment Effects

The results in the previous sections measured the average treatment effects of financial literacy and mobile-money trainings complemented by text-message remainders. It is, however, relevant to explore how these effects were influenced by pre-treatment factors that could be expected to play a role in the context of financial-related interventions. Following similar studies, we therefore explored heterogeneous effects related to baseline (pre-treatment) trust,[13] education level, financial literacy, employment status, and district of residence. We assessed heterogeneous effects by multiplying these variables with the treatment indicator. As is noted below, our evidence suggested the presence of heterogeneous effects related to district of residence.

To measure trust in digital payments, respondents were asked whether they agreed or disagreed with the statement: *"I trust a cash payment more than a digital payment using a cell phone."* The responses were given in a five-level Likert scale, where 1 indicated strong agreement and 5, strong disagreement. We considered Scales 4 and 5 to represent trust in mobile-money payments and, in such cases, the trust indicator took the value of 1 (0 otherwise). To measure financial literacy, respondents were asked five questions consistent with Cole, Sampson, and Zia (2011) and Lusardi (2008). The questions related to economic concepts like savings or inflation, competencies like calculating interest earned, and knowledge of risk diversification. Respondents who correctly answered at least three questions correctly were considered financially literate and, in this case, the related indicator took the value of 1; otherwise they were considered financially illiterate and the indicator took the value of zero. Tables 7, 8, and 9 present the heterogeneous effects related to knowledge of mobile money, use of mobile money, and financial behavior, respectively.

[13] Various authors have suggested that financial literacy coupled with trust in digital finance is important to create awareness and understanding for effective demand and use of financial services (Cohen, Hopkins & Lee, 2008; Malady, 2016; Ozili, 2018).

Table 7: Heterogeneous Treatment Effects on Knowledge of Mobile-Money Services

	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan
Panel A: Heterogeneous Effects Related to Baseline Trust in Mobile-Money Transactions					
Treatment	0.005	0.048	0.053**	0.039	0.007
	(0.060)	(0.059)	(0.026)	(0.047)	(0.044)
Trust	0.025	0.014	0.023	-0.027	-0.041
	(0.051)	(0.053)	(0.028)	(0.047)	(0.047)
Treatment *Trust	0.062	-0.009	-0.015	0.042	0.079
	(0.081)	(0.066)	(0.040)	(0.054)	(0.053)
Adj. R^2	0.113	0.082	0.050	0.141	0.023
Panel B: Heterogeneous Effects Related to Education					
Treatment	0.093	0.106**	0.041	0.072*	0.086**
	(0.057)	(0.044)	(0.027)	(0.038)	(0.040)
Education	0.212***	0.151***	0.037*	0.138***	0.092**
	(0.039)	(0.030)	(0.020)	(0.027)	(0.036)
Treatment *Education	-0.076	-0.082	0.009	-0.010	-0.059
	(0.061)	(0.055)	(0.032)	(0.049)	(0.052)
Adj. R^2	0.137	0.099	0.054	0.166	0.027
Panel C: Heterogeneous Effects Related to Financial Literacy (FL)					
Treatment	0.048	0.060	0.033	0.096**	0.063*
	(0.064)	(0.061)	(0.031)	(0.039)	(0.037)
FL	0.067	0.026	-0.001	0.059	0.042
	(0.045)	(0.044)	(0.030)	(0.035)	(0.042)
Treatment *FL	-0.025	-0.029	0.023	-0.064	-0.034
	(0.056)	(0.057)	(0.046)	(0.054)	(0.060)
Adj. R^2	0.112	0.082	0.050	0.143	0.021
Panel D: Heterogeneous Effects Related to Employment in Agriculture (Agric)					
Treatment	0.038	0.025	0.040	0.055	0.021
	(0.062)	(0.056)	(0.025)	(0.043)	(0.038)
Agric	0.007	-0.067*	-0.019	-0.076***	-0.056
	(0.048)	(0.035)	(0.023)	(0.028)	(0.034)
Treatment *Agric	-0.020	0.054	0.014	-0.003	0.069
	(0.077)	(0.077)	(0.040)	(0.056)	(0.054)
Adj. R^2	0.108	0.085	0.049	0.149	0.022
Panel E: Heterogeneous Effects Related to Residential District (District)					
Treatment	-0.236**	-0.155*	-0.025	-0.110**	-0.039
	(0.103)	(0.088)	(0.036)	(0.048)	(0.051)
District	-0.166	-0.152*	-0.044	-0.141 ***	-0.079*
	(0.104)	(0.082)	(0.034)	(0.050)	(0.046)
Treatment *District	0.350***	0.262**	0.091**	0.225***	0.109*
	(0.115)	(0.103)	(0.043)	(0.063)	(0.062)
Adj. R^2	0.133	0.102	0.054	0.157	0.025
N	554	554	554	554	554

Notes: Heterogeneous effects of education, trust, district, and financial literacy on impact of treatment on knowledge of mobile-money uses. All models control for lagged variables. Standard errors reported in brackets were clustered at the village level. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Table 8: Heterogeneous Treatment Effects on Use of Mobile Money

	Receive money	Save money	Pay bills	Send Money	Obtain Loan	VSLA Trans.	Own MM account
Panel A: Heterogeneous Effects Related to Baseline Trust in Mobile-Money Transactions							
Treatment	0.038	0.009	0.005	-0.007	-0.012	0.057	-0.010
	(0.050)	(0.036)	(0.011)	(0.031)	(0.017)	(0.05)	(0.07
Trust	-0.046	-0.027	-0.006	-0.021	-0.016	-0.007	-0.025
	(0.047)	(0.030)	(0.009)	(0.026)	(0.019)	(0.02)	(0.07)
Treatment *Trust	0.131	0.082**	-0.000	0.038	0.023	0.021	0.077
	(0.085)	(0.039)	(0.019)	(0.031)	(0.024)	(0.04)	(0.08)
Adj. R^2	0.135	0.139	0.116	0.136	0.007	0.015	0.028
Panel B: Heterogeneous Effects Related to Education							
Treatment	0.103*	0.046**	0.005	-0.003	-0.004	0.049	0.027
	(0.059)	(0.020)	(0.018)	(0.027)	(0.017)	(0.04)	(0.06)
Education	0.059	0.052**	-0.001	0.019	0.008	0.008	0.104**
	(0.043)	(0.019)	(0.016)	(0.024)	(0.019)	(0.02)	(0.05)
Treatment *Education	-0.004	0.004	0.000	0.021	0.005	0.027	0.001
	(0.068)	(0.032)	(0.021)	(0.030)	(0.022)	(0.03)	(0.06)
Adj. R^2	0.132	0.141	0.116	0.138	0.007	0.018	0.033
Panel C: Heterogeneous Effects Related to Financial Literacy (FL)							
Treatment	0.096*	0.034	-0.001	0.012	-0.003	0.080	-0.008
	(0.051)	(0.032)	(0.011)	(0.039)	(0.016)	(0.05)	(0.07)
FL	-0.018	-0.014	-0.003	0.023	0.004	0.017	-0.007
	(0.052)	(0.023)	(0.011)	(0.033)	(0.018)	(0.02)	(0.05)
Treatment *FL	0.002	0.021	0.011	0.001	0.003	-0.023	0.057
	(0.083)	(0.043)	(0.016)	(0.042)	(0.026)	(0.03)	(0.07)
Adj. R^2	0.129	0.132	0.117	0.137	0.006	0.015	0.022
Panel D: Heterogeneous Effects Related to Employment in Agriculture (Agric)							
Treatment	0.107**	0.060*	0.010	0.015	-0.006	0.047	0.023
	(0.045)	(0.034)	(0.010)	(0.032)	(0.014)	(0.44)	(0.06)
Agric	0.013	0.012	0.000	0.022	0.001	-0.011	-0.003
	(0.043)	(0.029)	(0.013)	(0.026)	(0.020)	(0.02)	(0.05)
Treatment *Agric	-0.030	-0.048	-0.019	-0.010	0.018	0.072	-0.002
	(0.074)	(0.044)	(0.015)	(0.036)	(0.030)	(0.04)	(0.08)
Adj. R^2	0.129	0.134	0.119	0.136	0.007	0.022	0.020
Panel E: Heterogeneous Effects Related to Residential District (District)							
Treatment	0.023	-0.016	-0.017	-0.096*	-0.006	-0.007	-0.143
	(0.074)	(0.048)	(0.021)	(0.056)	(0.024)	(0.04)	(0.10)
District	-0.079	-0.093**	-	-0.072	-0.001	-0.031	-0.222**
	(0.059)	(0.041)	0.034**	(0.048)	(0.018)	(0.03)	(0.09)
			(0.016)				
Treatment *District	0.101	0.086	0.031	0.140**	0.005	0.096	0.227**
	(0.085)	(0.056)	(0.022)	(0.063)	(0.027)	(0.07)	(0.11)
Adj. R2	0.132	0.143	0.125	0.149	0.006	0.023	0.046
N	554	554	554	554	554	554	554

Notes: Heterogeneous effects of education, trust, district, and financial literacy on impact of treatment on knowledge of mobile-money uses. All models controlled for lagged variables. Standard errors reported in brackets were clustered at the village level. *p< 0.10, **p< 0.05, ***p< 0.01.

Table 9: Heterogeneous Treatment Effects on Financial Behavior

	Save with bank	Save with MM	Save with VSLA	Save with MM	Own bank account
Panel A: Heterogeneous Effects Related to Baseline Trust in Mobile-Money Transactions					
Treatment	0.012	0.008	-9.64e-17***	0.062*	0.010
	(0.017)	(0.061)	(1.20e-17)	(0.028)	(0.022)
Trust	0.005	-0.012	-7.59e-17***	0.009	0.003
	(0.015)	(0.053)	(2.45e-18)	(0.022)	(0.019)
Treatment*Trust	0.032	0.082	-0.016	-0.006	0.026
	(0.034)	(0.069)	(0.011)	(0.038)	(0.038)
Adj. R^2	0.116	0.127	0.005	0.023	0.121
Panel B: Heterogeneous Effects Related to Education					
Treatment	0.033*	0.052	-0.010	0.033	0.039
	(0.016)	(0.054)	(0.010)	(0.037)	(0.020)
Education	0.034*	0.097*	0.000	0.008	0.042**
	(0.013)	(0.040)	(0.000)	(0.022)	(0.013)
Treatment*Education	-0.008	-0.004	0.005	0.039	-0.023
	(0.022)	(0.057)	(0.012)	(0.045)	(0.027)
Adj. R^2	0.117	0.135	-0.003	0.026	0.124
Panel C: Heterogeneous Effects Related to Financial Literacy (FL)					
Treatment	0.034	-0.011	-7.98e-17*	0.023	0.038
	(0.018)	(0.064)	(3.74e-17)	(0.034)	(0.019)
FL	0.011	-0.010	-2.81e-17	-0.028	0.022
	(0.014)	(0.055)	(2.78e-17)	(0.025)	(0.018)
Treatment*FL	-0.014	0.103	-0.013	0.065	-0.030
	(0.024)	(0.070)	(0.008)	(0.048)	(0.023)
Adj. R^2	0.111	0.130	0.002	0.026	0.120
Panel D: Heterogeneous Effects Related to Employment in Agriculture (Agric)					
Treatment	0.027	0.045	-0.005	0.084**	0.022
	(0.014)	(0.051)	(0.005)	(0.028)	(0.016)
Agric	0.008	0.013	0.000	0.034	0.010
	(0.017)	(0.046)	(0.000)	(0.026)	(0.024)
Treatment*Agric	-0.002	0.004	-0.008	-0.085	-0.002
	(0.035)	(0.075)	(0.012)	(0.050)	(0.042)
Adj. R^2	0.110	0.198	-0.002	0.028	0.118
Panel E: Heterogeneous Effects Related to Residential District (District)					
Treatment	0.028	-0.107	0.000	0.157*	0.0043
	(0.030)	(0.090)	(0.000)	(0.060)	(0.028)
District	-0.035	-0.157	-0.000	-0.035	-0.065***
	(0.018)	(0.087)	(0.000)	(0.045)	(0.011)
Treatment*District	0.000	0.202	-0.009	-0.118	0.027
	(0.033)	(0.102)	(0.005)	(0.065)	(0.030)
Adj. R^2	0.117	0.138	-0.002	0.0503	0.132

Notes: Heterogeneous effects of education, trust, district, and financial literacy on impact of treatment on knowledge of mobile-money uses. All models controlled for lagged variables. Standard errors reported in brackets were clustered at the village level. *p< 0.10, **p< 0.05, ***p< 0.01.

Our findings, as reported in Table 7, show that baseline levels of trust in mobile money, education, financial literacy, and employment in agriculture did not influence the size of the treatment effect on mobile-money knowledge. We did find, however, that the district of residence influenced the size of the treatment effect for all five dimensions of mobile-money knowledge, which can be clearly seen in the significant coefficients for the corresponding interactions in Panel E. In other words, our evidence indicated that the effect of the interventions on the participants' knowledge of mobile-money services was higher in the Machinga than in the Mangochi District. A similar pattern was observed in the use of mobile-money services (Table 8) but not on financial behavior (Table 9). For mobile-money use, the heterogeneous effects related to district of residence were more salient when it came to ownership of a mobile-money account and saving money. Because the Mangochi and Machinga Districts have different levels of economic and financial development, these findings strongly suggest that the treatment effects on mobile-money knowledge and use depended upon the development state of the area where the intervention was implemented.

In Panel A in Table 8, we show results indicating that the treatment effect on mobile-money use for sending money depended upon the trust participants had in mobile-money services. Those who had more trust on mobile money at baseline were more likely to experience positive treatment effects. Panel D of Table 8 shows that the treatment effects on mobile-money use for VSLA transactions depended upon employment status. VSLA participants who were employed in agriculture were more likely to experience positive treatment effects than those employed in other sectors. However, these were just two isolated cases and, in general, Tables 7, 8, and 9 do not provide consistent evidence on heterogeneous effects related to trust, employment, financial literacy, or education.

We further explored the different effects of our intervention in the Machinga and Mangochi Districts. We estimated separate ANCOVA regressions for individuals in each district. The results shown in Tables 10a to 10f confirmed our earlier findings.

While the treatment did not affect outcome variables in Mangochi, it affected several outcome variables in Machinga. The treatment increased the proportion of individuals who reported knowing that mobile money could be used to pay bills, save money, and obtain a loan by seven, ten, and seven percentage points, respectively, in

Machinga. No such significant effects were found in Mangochi. Regarding the use of mobile-money services, the results show that the intervention increased the proportion of individuals who reported using mobile money to receive money and pay bills by ten and one percentage points, respectively, in Machinga; no significant effect were found in Mangochi. Similarly, the treatment effects on ownership of a bank account, saving with a bank, saving with mobile money, and saving with microcredit group in Machinga were three, three, seven, and five percentage points, respectively. For the Machinga District, the only significant effect was on savings with a microcredit group.

Given the different levels of economic and financial development observed between Mangochi and Machinga Districts, these findings suggest that the intervention was more effective in relatively less developed areas than in more developed ones. In relatively less developed areas, the level of knowledge and use of the financial innovations were very low, and they benefited from higher marginal returns of the interventions, while the relatively developed regions had lower marginal returns because their levels of knowledge and use were relatively higher. For example, the proportion of individuals who reported knowing that mobile money could be used to receive money in Machinga before the intervention was 18% compared to 33% in Mangochi. After the intervention, the proportion in Machinga rose to 33% while the proportion in Mangochi remained at 33%, which clearly shows that the two districts converged in terms of knowledge levels.

3.5 Administrative Data Analysis

We also had access to administrative data on mobile-money account use for phones owned by our respondents or by relatives/friends to which the respondents had access. Out of the 276 mobile phone numbers reported in our data set, 101 had an active mobile-money account during the follow-up months of April and May 2019 (half in the treatment and half in the control groups). In Appendix Table 11, we report estimates of the effect of our treatment on total mobile-money amount transacted only for those individuals who reported owning or having access to a mobile phone. In all our estimations, respondents without active mobile-money accounts were imputed the value of zero as the amount transacted. We found positive but statistically insignificant treatment effects when we

considered all individuals in this subsample and when we considered solely individuals who owned the phone number they reported. When we restricted the estimation to individuals who did not own a phone but had access to a relative's or friend's phone, the estimate coefficient was negative but not statistically significant.

Appendix Table 12 displays heterogeneous treatment effects related to trust, education, financial literacy, type of employment, and district of residence. We found no evidence of differential treatment effects related to any of the above-mentioned variables. The absence of statistically significant effects in the administrative data may be related to two factors. First, individuals in the area relied on mobile-money agents or mobile-money kiosks located in the main villages, and administrative data did not capture transactions that occurred at that level. For example, 30% of the cases that reported to have received money through mobile money did not have access to their or a relative's phone, suggesting that they used an agent to receive the money. Significant numbers of individuals also reported having used mobile money to perform other transactions despite their lack of access to mobile-money accounts. In the second place, administrative data analysis was based on only 276 individuals who reported access to a mobile phone at baseline, of which only 101 had activated a mobile-money account during the relevant period. We may, therefore, have lacked enough statistical power in this reduced administrative sample to assess the impact of our intervention.

IV. Conclusions

Using experimental data from two rural districts in Malawi, we studied the effects of mobile-money and financial-literacy training reinforced by text-message reminders on mobile-money knowledge, use, and financial behavior among VSLA members. To the best of our knowledge, ours is among the very first studies that have explored the adoption of mobile money among VSLA members in Africa. It is also among the very first to combine financial training with text-message reminders.

We found that our intervention positively and significantly influenced individuals' knowledge and use of mobile money. In particular, treated units were more likely to report that mobile money could be used to pay bills, as well as more likely to report that they had used mobile money to transfer and save money. Further, our study suggests that treated VSLA members reported increasing their savings in bank accounts, mobile-money devices, and microcredit groups. These results were robust to the inclusion of potential confounding factors such as education and employment.

Interestingly, we found that our intervention primarily affected individuals in the Machinga District, which has a lower level of economic and financial development than Mangochi. This suggests that financial literacy interventions had a higher effect in a context in which knowledge and use of mobile money was relatively low.

Several factors could potentially have limited the effect of our interventions. In particular, the timing of experiment coincided with a lean period, when food stocks were running out, business activities were reduced, and VSLA cycles came to an end as households in rural areas channeled funds toward the next farming season. In addition, the four-month duration of the intervention was relatively short to allow for wide diffusion of mobile-money knowledge. Up-take may also have been constrained by user fees on mobile-money transactions. Future studies, therefore, should rule out the potential effects of lean season and user fees and allow for a longer intervention period. Notwithstanding these limitations, our findings suggest that the expansion of digital payments and savings promotions may be achievable through well designed financial-literacy interventions reinforced by behavioral elements that focus on members of a VSLA. A digital finance inclusion program that combined training and reminder text-message would be effective especially in locations with prior low knowledge and use of financial innovations.

References

Abebe, G., Tekle, B., and Mano, Y. (2018). Changing Saving and Investment Behaviour: The Impact of Financial Literacy Training and Reminders on Micro-Businesses. Journal of African Economies, 27(5), 587-611.

Abiona, Olukored and Koppensteiner, Martin F. (2018, October). Financial Inclusion, Shocks and Poverty: Evidence from the Expansion of Mobile Money in Tanzania. International Business Review, 24(1), 55-65. Available at http://dx.doi.org/10.1016/j.ibusrev.2014.05.008.

Aggarwal, R., Goodell, J. W., and Selleck, L. J. (2015). Lending to Women in Microfinance: Role of Social Trust. International Business Review, 24(1), 55-65. Available at http://dx.doi.org/10.1016/j.ibusrev.2014.05.008.

Allen, F., Carletti, E., Cull, R., and Qian, J. "QJ" (2014). African Financial Development and Financial Inclusion Gaps. Journal of African Economies, 23(5), 614-642.

Anderson, C. Leigh, Reynolds, T., Merfeld, J. D., and Biscaye, P. (2017). Relating Seasonal Hunger and Prevention and Coping Strategies: A Panel Analysis of Malawian Farm Households. Journal of Development Studies, 54(10), 1737-55. Available at https://doi.org/10.1080/00220388.2017.1371296.

Bongomin, G. O, Ntayi, J. M., Munene, J. C., and Malinga, C. A. (2018). Mobile Money and Financial Inclusion in Sub-Saharan Africa: The Moderating Role of Social Networks. Journal of African Business, 19(3), 361-384. Available at https://doi.org/10.1080/15228916.2017.1416214.

Cassidy, Rachel and Fafchamps, Marcel (2015). Can Community-Based Microfinance Groups Match Savers with Borrowers? Evidence from Rural Malawi. CSAE Working Paper WPS/2015-13. Oxford, UK: Centre for the Study of African Economies.

Chirwa, E. W., Dorward, A., and Vigneri, M. (2012). Seasonality and Poverty: Evidence from Malawi in Seasonality. In S. Devereux, R. Sabates-Wheeler, and R. Longurst, Eds, Seasonality, Rural Livelihoods and Development. New York: Earthscan.

Cohen, M., Hopkins, D., and Lee, J. (2008). Financial Education: A Bridge between Branchless Banking and Low-Income Clients, Microfinance Opportunities. Working Paper No. 4. Global Financial Education Program. Washington, DC: Microfinance Opportunities. Available at http://www.microfinancegateway.org/sites/default/files/mfg-en-paper-financial-education-a-bridge-between-branchless-banking-and-low-income-clients-aug-2008.pdf.

Cole, S., Sampson, T., and Zia, B. (2011). Prices or Knowledge? What Drives the Demand for Financial Services in Developing Countries? Harvard Business School Working Paper No. 09-117 LXVI (6), 1933-1967.

Cole, Shawn A., and Fernando, A. Nilesh (2012). The Value of Advice: Evidence from Mobile Phone-Based Agricultural Extension. HBS Working Paper No. 13-047. Boston, MA: Harvard Business School. Available at http://nrs.harvard.edu/urn-3:HUL.InstRepos:10007889.

Demirgüç-Kunt, A. L. K., Singer, D., Saniya, A., and Hess, J. (2018). The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. Washington, DC: World Bank Group. Available at

http://documents.worldbank.org/curated/en/332881525873182837/The-Global-Findex-Database-2017-Measuring-Financial-Inclusion-and-the-Fintech-Revolution.

Demombynes, Gabriel and Thegeya, Aaron (2012). Kenya's Mobile Revolution and the Promise of Mobile Savings. Policy Research Working Paper No. 5988. Washington, DC: The World Bank. Available at http://documents.worldbank.org/curated/en/docsearch/document-type/620265.

Drexler, A., Fischer, G., and Schoar, A. (2014). Keeping It Simple: Financial Literacy and Rules of Thumb. American Economic Journal: Applied Economics, 6(2), 1-31. Available at http://dx.doi.org/10.1257/app.6.2.1.

Dupas, P., Karlan, D. S., Robinson, J., and Ubfal, D. (2018). Banking the Unbanked? Evidence from Three Countries. American Economic Journal: Applied Economics, 10(2), 257-297.

Dyer, J., Mazer, R., and Ravichandar, N. (2017). Increasing Digital Savings and Borrowing Activity with Interactive SMS: Evidence from an Experiment with M-PAWA Savings and Loan Mobile Money Product in Tanzania, Washington, DC: Consultative Group to Assist the Poor (CGAP). Available at https://www.findevgateway.org/library/increasing-digital-savings-and-borrowing-activity-interactive-sms.

Fanta, A. B., Mutsonziwa, K., Goosen, R., Emanuel, M., and Kettles, N. (2016). The Role of Mobile Money in Financial Inclusion in the SADC Region: Evidence Using FinScope Surveys. FinMark Trust Policy Research Paper No. 3. Johannesburg, South Africa: FinMark Trust. Available at https://www.finmark.org.za/wp-content/uploads/2016/12/mobile-money-and-financial-inclusion-in-sadc.pdf.

Garikipati, Supriya (2012). Microcredit and Women's Empowerment: Through the Lens of Time-Use Data from Rural India. Development and Change, 43(3), 719-750.

Gertler, P. J., Martinez, S., Premand, P., Rawlings, L. B., and Vermeersch, C. M. J. (2016). Impact Evaluation in Practice, Second Ed. Washington, DC: Inter-American Development Bank and World Bank. Available from https://openknowledge.worldbank.org/handle/10986/25030.

Government of Malawi (2017). National Financial Inclusion Strategy 2016-2020. Lilongwe, Malawi: Ministry of Finance and Economic Planning and Development.

Government of Malawi (2018). The Malawi Vulnerability Assessment Committee (MVAC) Bulletin No. 15/18 Volume 1: Food Security Forecast for the 2018/2019 Consumption Year. Lilongwe, Malawi. Available at https://reliefweb.int/report/malawi/malawi-vulnerability-assessment-committee-mvac-bulletin-no-1518-volume-1-food-security.

Gurman, T. A., Rubin, S. E., and Roess, A. A. (2012). Effectiveness of Health Behavior Change Communication Interventions in Developing Countries: A Systematic Review of the Literature. Journal of Health Communication, 17 (SUPPL. 1), 82-104.

Jack, William and Suri, Tavneet (2014). Risk Sharing and Transactions Costs: Evidence from Kenya's Mobile Money Revolution. American Economic Review, 104(1), 183-223.

James, Jeffrey and Versteeg, Mila (2007). Mobile Phones in Africa: How Much Do We Really Know? Social Indicators Research, 84(1), 117-126.

Karlan, D., Savonitto, B., Thuysbaert, B., and Udry, C. (2017). Impact of Savings Groups on the Lives of the Poor. Proceedings of the National Academy of Sciences, 114(12), 3079-3084.

Ksoll, C., Lilleør, H. B., Lønborg, J. H., and Rasmussen, O. D. (2016). Impact of VSL: Evidence from a Cluster Randomized Trial. Journal of Development Economics, 120, 70-85. Available at http://dx.doi.org/10.1016/j.jdeveco.2015.12.003.

Larochelle, C., Alwang, J., Travis, E., Barrera, V. H., and Andrade, J. M. D. (2017). Did You Really Get the Message ? Using Text Reminders to Stimulate Adoption of Agricultural Technologies. Journal of Development Studies, 55(4), 548-564. Available at https://doi.org/10.1080/00220388.2017.1393522.

Le Polain, Maïté, Sterck, Olivier, and Nyssens, Marthe (2018). Interest Rates in Savings Groups: Thrift or Threat? World Development, 101, 162-172.

Lusardi, Annamaria (2008). Financial Literacy: An Essential Tool for Informed Consumer Choice? NBER Working Paper No. W14084. Cambridge, MA: National Bureau for Economic Research. Available at https://www.nber.org/papers/w14084.

Mandell, Lewis, and Klein, Linda Schmid (2009). The Impact of Financial Literacy Education on Subsequent Financial Behavior. Journal of Financial Counseling and Planning, 20(1), 15-24. Available at http://ssrn.com/abstract=2224231%0A15.

Mbiti, Isaac, and Weil, David N. (2013). The Home Economics of E-Money: Velocity, Cash Management, and Discount Rates of M-Pesa Users. American Economic Review, 103(3), 369-374.

McKenzie, David (2012). Beyond Baseline and Follow-up: The Case for More T in Experiments. Journal of Development Economics, 99(2), 210-221. Available from http://dx.doi.org/10.1016/j.jdeveco.2012.01.002.

Meyer, Richard L. 2015. Financing Agriculture and Rural Areas in Sub-Saharan Africa the Way Forward. IIED Working Paper. London: International Institute for Environment and Development (IIED). Available at https://pubs.iied.org/14652IIED.

Miller, Richard B. and Wright, David W. (1995). Detecting and Correcting Attrition Bias in Longitudinal Family Research. Journal of Marriage and the Family, 57(4), 921-929. Available at http://www.jstor.org/stable/353412.

Ministry of Finance, Economic Planning and Development. (2015). Village Savings and Loans Program Mapping Report (No. 1). Lilongwe, Malawi: Government of Malawi.

Murray, K. W., Woodruff, K., Moon, C., and Finney, C. (2015). Using Text Messaging to Improve Attendance and Completion in a Parent Training Program. Child and Family Studies, 24(10), 3107-3116.

Musinguzi, Laban Kashaija (2016). The Role of Social Networks in Savings Groups: Insights from Village Savings and Loan Associations in Luwero, Uganda. Community Development Journal, 51(4), 499-516.

National Statistical Office and ICF International (2017). Malawi Demographic and Health Survey 2015-2016. Zomba, Malawi and Rockville, MD: NSO and ICF International. Available at https://dhsprogram.com/pubs/pdf/FR319/FR319.pdf.

National Statistical Office and Malawi Communications Regulatory Authority (2015, June). Survey on Access and Use of ICT Services in Malawi-2014. Available at http://www.macra.org.mw/wp-content/uploads/2014/09/Survey_on-_Access_and_Use_of_ICT_Services_2014_Report.pdf.

Ntwiga, Davis Bundi (2016). Financial Inclusion and Cream Skimming in Kenya's Financial Sector. International Journal of Research in Finance and Marketing, 6(1), 41-47.

Oliveira, T., Thomas, M., Baptista, G., and Campos, F. (2016). Mobile Payment: Understanding the Determinants of Customer Adoption and Intention to Recommend the Technology. Computers in Human Behavior, 61, 404-414.

Otchere, Isaac, Senbet, Lemma, and Simbanegavi, Witness (2017). Financial Sector Development in Africa: An Overview. Review of Development Finance, 7, 1-5.

Ouma, A. S., Odongo, T. M., and Were, M. (2017). Mobile Financial Services and Financial Inclusion: Is It a Boon for Savings Mobilization? Review of Development Finance, 7(1), 29-35. Available at http://dx.doi.org/10.1016/j.rdf.2017.01.001.

Ozili, Peterson K. (2018). Impact of Digital Finance on Financial Inclusion and Stability. Borsa Istanbul Review, 18(4), 329-340. Available at https://doi.org/10.1016/j.bir.2017.12.003.

Reserve Bank of Malawi (2019). Quarterly National Payment Systems Report. Lilongwe, Malawi. Available at https://www.rbm.mw/PaymentSystems.

Sayinzoga, A., Bulte, E. H., and Lensink, R. (2014). Financial Literacy and Financial Behaviour: Experimental Evidence from Rural Rwanda. The Economic Journal, 126(594), 1571-1599.

Thomas, D., Firman, W., Frankenberg, E., Sikoki, B., Strauss, J., Sumantri, C., and Suriastini, W. (2012). Cutting the Costs of Attrition: Results from the Indonesia Family Life Survey. Journal of Development Economics, 98(1), 108-23. Available at http://dx.doi.org/10.1016/j.jdeveco.2010.08.015.

United Nations Capital Development Fund (UNCDF) (2018, February). The MM4P Story of Digital Financial Services in Malawi: The Journey of MM4P in the Warm Heart of Africa. New York. New York: UN Capital Development Fund. Available from https://mw.one.un.org/malawi-stands-out-in-the-2017-global-findex.

Wesolowski, A., Eagle, N., Noor, A. M., Snow, R. W., and Buckee, C. O. (2012). Heterogeneous Mobile Phone Ownership and Usage Patterns in Kenya. PloSOne 7(4), 1-6.

Xu, Lisa, and Zia, Bilal (2012). Financial Literacy around the World: An Overview of the Evidence with Practical Suggestions for the Way Forward. Policy Research Working Paper No. 6107. Washington, DC: The World Bank.

Zins, Alexandra, and Weill, Laurent (2016). The Determinants of Financial Inclusion in Africa. Journal of Advanced Research, 6(1), 46-57. Available at http://dx.doi.org/10.1016/j.rdf.2016.05.001.

Figure 1: Map of Mangochi and Machinga Districts Showing the Location of Treated and Control VSLAS

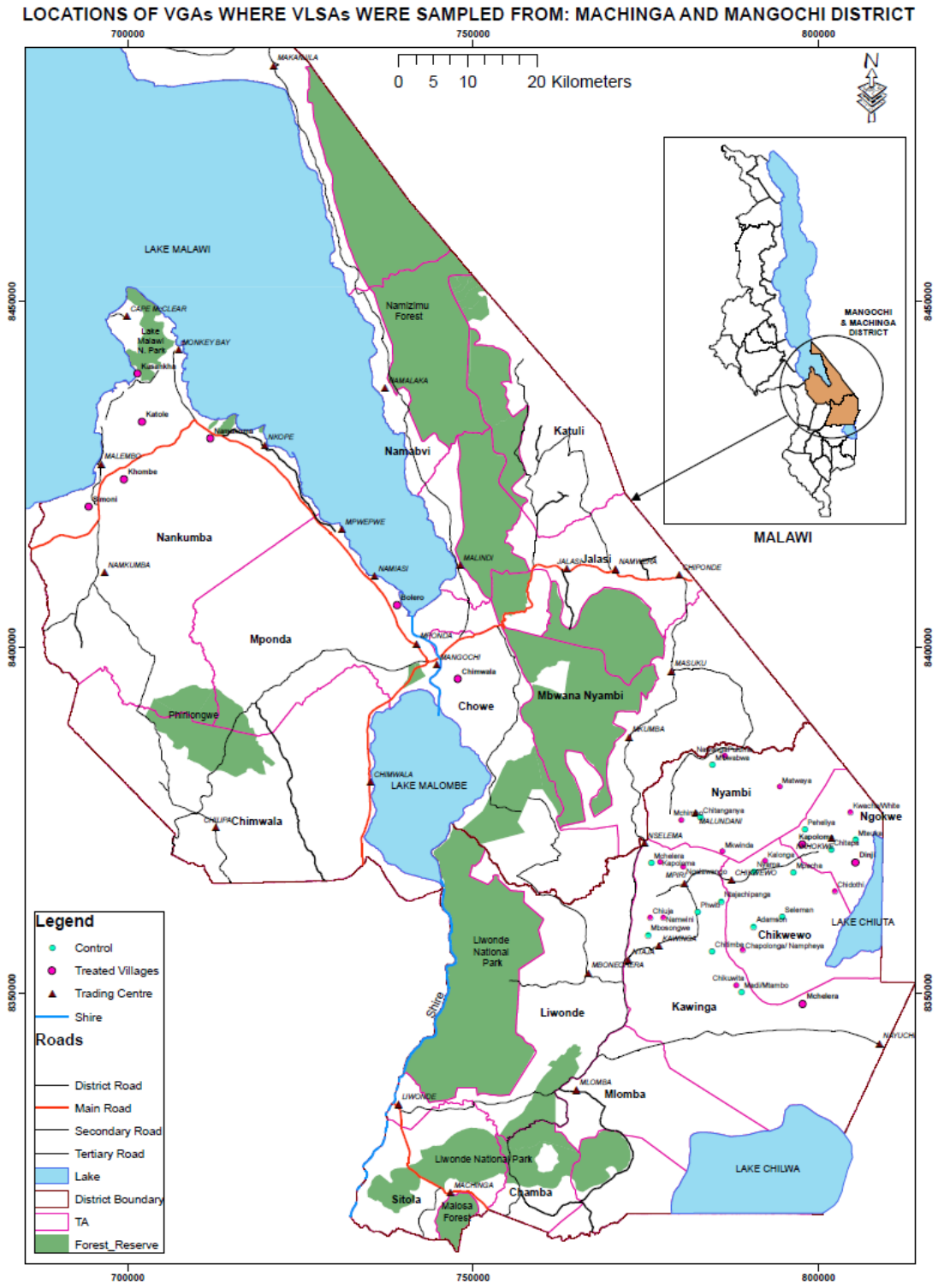

Table 6: Treatment Effects (Robustness Checks)

Panel A: Treatment Effects on Knowledge of Mobile-Money-Related Services						
	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan	Average knowledge
Treatment	0.038	0.045	0.034	0.056*	0.035	0.043
	(0.042)	(0.041)	(0.021)	(0.032)	(0.031)	(0.026)
_cons	0.095	0.074	0.090*	-0.015	0.026	0.036
	(0.103)	(0.074)	(0.047)	(0.076)	(0.056)	(0.053)
Adj. R^2	0.226	0.163	0.095	0.218	0.063	0.243

Panel B: Treatment Effects on Mobile-Money Use								
	Receive Money	Send money	Pay Bills	Save Money	Obtain loan	VSLA transaction	Own MM account	Average Use
Treatment	0.097***	0.009	-0.001	0.045**	-0.005	0.072*	0.041	0.027
	(0.035)	(0.023)	(0.007)	(0.021)	(0.012)	(0.037)	(0.035)	(0.016)
_cons	0.012	-0.040	0.018	-0.088**	-0.032	0.052	-0.119*	-0.040*
	(0.083)	(0.041)	(0.015)	(0.039)	(0.025)	(0.051)	(0.067)	(0.021)
Adj. R^2	0.176	0.193	0.151	0.217	0.027	0.100	0.261	0.291

Panel C: Treatment Effects on Financial Behavior							
	Non VSLA credit	Own bank account	Save with bank	Save with VSLA	Save with MM	Save with microcredit group	Average number
Treatment	-0.018	0.018	0.021*	-0.006*	0.061**	0.057**	0.018**
	(0.028)	(0.012)	(0.012)	(0.003)	(0.028)	(0.023)	(0.008)
_cons	0.164**	-0.107***	-0.105***	0.983***	-0.107*	-0.070	0.077***
	(0.078)	(0.034)	(0.036)	(0.010)	(0.062)	(0.074)	(0.026)
Adj. R^2	0.039	0.176	0.159	-0.012	0.265	0.050	0.191
N	554	554	554	554	554	554	554

Note: Realized coefficients for models that assessed the effect of treatment on knowledge of mobile money, use of mobile money, and financial behavior of VSLA members. Effect size was realized after controlling for respondent' employment, education, marital status, and residence in the Machinga District. Standard errors were clustered at the village level and are presented in brackets. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.

Table 10a: Impact of Treatment on Mobile-Money Knowledge for Mangochi Subsample

	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan	Average knowledge
Treatment	-0.147	-0.107	-0.023	-0.085	-0.020	-0.041
	(0.095)	(0.092)	(0.043)	(0.057)	(0.057)	(0.051)
_cons	0.241**	0.174*	0.060	0.175**	0.102*	0.097
	(0.101)	(0.084)	(0.041)	(0.059)	(0.050)	(0.058)
Adj. R^2	0.301	0.217	0.192	0.259	0.099	0.367
N	114	114	114	114	114	114

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

Table 11b: Impact of Treatment on Mobile-Money Knowledge for the Machinga Subsample

	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan	Average knowledge
Treatment	0.079	0.083	0.068***	0.099**	0.067*	0.077**
	(0.058)	(0.054)	(0.021)	(0.041)	(0.034)	(0.033)
_cons	0.220***	0.115***	0.025**	0.078***	0.075***	0.080***
	(0.044)	(0.029)	(0.010)	(0.020)	(0.026)	(0.018)
Adj. R^2	0.081	0.056	0.026	0.109	0.011	0.105
N	440	440	440	440	440	440

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

Table 12c: Impact of Treatment on Mobile-Money use for the Mangochi Subsample

	Receive Money	Send money	Pay Bills	Save Money	Obtain loan	VSLA transaction	Own MM account	Average Use
Treatment	0.074	-0.097	-0.009	0.049	-0.001	0.018	-0.044	0.014
	(0.069)	(0.062)	(0.020)	(0.038)	(0.012)	(0.041)	(0.081)	(0.034)
_cons	0.084	0.099	0.014	0.017	0.017*	0.018	0.132	0.013
	(0.051)	(0.057)	(0.019)	(0.027)	(0.009)	(0.017)	(0.079)	(0.035)
Adj. R^2	0.211	0.098	0.541	0.220	0.009	-0.015	0.454	0.374
N	114	114	114	114	554	114	114	114

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

Table 13d: Impact of Treatment on Mobile-Money Use for the Machinga Subsample

	Receiving money	Sending money	Paying bills	Saving money	Obtaining loan	Average knowledge
Treatment	0.104**	0.034	0.013*	0.048	0.002	0.080
	(0.044)	(0.031)	(0.007)	(0.034)	(0.013)	(0.053)
_cons	0.118***	0.009	0.000	0.018	0.017*	0.017
	(0.028)	(0.012)	(0.000)	(0.015)	(0.009)	(0.012)
Adj. R^2	0.108	0.170	0.002	0.080	0.000	0.027
N	440	440	440	440	440	440

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

Table 14e: Impact of Treatment on Financial Behavior for Mangochi Subsample

	Non VSLA credit	Own bank account	Save with bank	Save with VSLA	Save with MM	Save with microcredit group	Average number
Treatment	-0.099	-0.018	0.034	-	0.035	0.128*	0.009
	(0.068)	(0.022)	(0.026)	-	(0.062)	(0.068)	(0.021)
_cons	0.151**	0.037**	0.019	-	0.065	0.046	0.126***
	(0.057)	(0.016)	(0.016)	-	(0.041)	(0.052)	(0.027)
Adj. R^2	0.040	0.643	0.477	.	0.421	0.091	0.282
N	114	114	114	114	114	114	114

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

Table 15f: Impact of Treatment on Financial Behavior for the Machinga Subsample

	Non VSLA credit	Own bank account	Save with bank	Save with VSLA	Save with MM	Save with microcredit group	Average number
Treatment	-0.002	0.033**	0.030**	-0.009	0.074*	0.047*	0.026**
	(0.028)	(0.015)	(0.013)	(0.005)	(0.038)	(0.025)	(0.011)
_cons	0.087***	0.008	0.003	1.001***	0.033**	0.039**	0.156***
	(0.018)	(0.007)	(0.006)	(0.001)	(0.016)	(0.015)	(0.014)
Adj. R^2	0.022	0.010	0.016	-0.001	0.098	0.005	0.054
N	440	440	440	440	440	440	440

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

Table 16: Simple Regression of Treatment Effects on Logarithm of Volume of Mobile-Money Transactions

	Reported phone on MM		
	Own phone	Relative phone	Any phone
Treatment	0.130	-0.055	0.041
	(0.852)	(0.531)	(0.581)
_cons	1.544***	0.655*	1.158***
	(0.495)	(0.322)	(0.308)
Adj. R^2	-0.006	-0.008	-0.004
N	156	121	277

Notes: Treatment effects on the volume of Malawi Kwacha mobile-money transactions for the whole sample and subsamples by district and ownership of cell phone with activated mobile-money account. Standard errors were clustered at the village level and presented in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01

Table 17: Multiple Regression of Treatment Effects on Logarithm of Volume of Mobile-Money Transactions

	(1)	(2)	(3)	(4)	(5)
Treatment	0.110	0.469	-0.454	0.407	-0.391
	(0.584)	(0.692)	(0.524)	(0.539)	(0.632)
Trust_MM	0.608				
	(0.670)				
Treatment*trust	-0.206				
	(0.896)				
Some_edu		0.736			
		(0.462)			
Treatment*edu		-0.563			
		(0.534)			
Financial_literacy			0.160		
			(0.526)		
Treatment*FL			0.731		

			(0.761)		
Mangochi				2.073**	
				(0.793)	
Treatment*MH				-0.804	
				(1.661)	
Agri_employment					-0.907
					(0.603)
Treatment*agri					1.222
					(0.771)
_cons	0.833**	0.605	1.054***	0.499**	1.481***
	(0.338)	(0.389)	(0.346)	(0.212)	(0.477)
Adj. R^2	-0.005	-0.006	-0.002	0.042	-0.002
N	277	277	277	277	277

Notes: Treatment effects on the volume of Malawi Kwacha mobile-money transactions. All models controlled for treatment and its interaction with heterogeneous variables of interest. Model 1 presents treatment effects that account for trust, (2) for education; (3) for financial literacy; (4) for Mangochi District and (5) for employment in agriculture. Standard errors reported in brackets were clustered at the village level. $^{*}p< 0.10$, $^{**}p< 0.05$, $^{***}p< 0.01$.