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# Information, Price, and Barriers to Adoption and Usage of Mobile Money

## Evidence from a Field Experiment in The Gambia

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## Abstract

Mobile money has been heralded as a way to foster financial inclusion. While it has become popular in developing countries, most notably in African nations, there are still strong barriers to its adoption and usage. The purpose of this study is to examine the extent to which a lack of information and high prices are limiting factors in the adoption of mobile money. We implemented a simple randomized controlled trial among a group of difficult-to- access potential users: mobile phone users in The Gambia who had opened mobile money wallets but had not made a transaction. We offered meaningful price discounts on withdrawal charges, and made these discounts salient by reminding users about them every month for a period of six months. Our analysis measures different dimensions of mobile money use by drawing from administrative mobile phone company records. We also carried out a post-treatment survey to gauge knowledge about, and attitudes towards, mobile money. Our results indicate that treated individuals were substantially more aware than controls about the uses of mobile wallets and about the meaningful discounts of 15% and 30% offered. However, only a small fraction of treated individuals started using mobile wallets, and the difference was not statistically significant. Perceptions of safety, trust in the platform, and service reliability were not significantly different between treated and controls. However, treated individuals were more likely to perceive the service charges to be expensive. We interpret this as evidence that our population of interest was uninformed about the platform at large. While our treatment increased awareness about its capabilities and operation, potentially fostering its adoption, it also increased awareness of the relatively high fees it involves, which in turn limited usage. Both a lack of information and high prices need to be addressed to foster the adoption and usage of mobile money in developing countries.



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**JEL:** D13, G21, O16, P34


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# Contents

**1 Introduction** **1**

**2 Context and Experimental Design** **4**
2.1 Context of the Experiment . . . . . 4
2.2 Experimental Design and Description of the Intervention . . . . . 5
2.3 Randomization Units and Selection of Sample . . . . . 7

**3 Data Sources** **8**
3.1 Baseline Survey . . . . . 8
3.2 Endline Survey . . . . . 9
3.3 Administrative Data . . . . . 9

**4 Experimental Results** **10**
4.1 Baseline Data . . . . . 10
4.2 Treatment Effectiveness: Awareness of Discount Offer and Mobile Money Services . 11
4.3 Effects on Mobile Money Use . . . . . 12
4.4 Potential Barriers to Usage . . . . . 14
4.4.1 Trust, Safety, and Ease of Use Factors . . . . . 14
4.4.2 Awareness about Service Prices . . . . . 15

**5 Discussion and Conclusion** **16**

# List of Tables

1 Baseline Survey Balance Test . . . . . 21
2 Treatment Effects: Awarness of Treatment (Endline Survey) . . . . . 22
3 Treatment Effects: Usage of Mobile money (Endline Survey) . . . . . 22
4 Treatment Effects: Usage of Mobile money (Administrative Records) . . . . . 23
5 Treatment Effects: Why not used (Endline Survey) . . . . . 24

# List of Figures

1 Evaluation Design . . . . . 20
2 Timeline of Intervention . . . . . 25
3 MM perceptions (Post-Treatment) (I) . . . . . 26
4 MM perceptions (Post-Treatment) (II) . . . . . 27
5 MM perceptions (Post-Treatment) (III) . . . . . 28

# 1 Introduction

Mobile money has been heralded as a way to foster financial inclusion in developing countries. The growth in popularity of mobile money services stems from the fact that, in many developing countries, access to mobile phones has outweighed access to formal banking services (GSM, 2018). Evidence from ground-breaking studies such as Suri and Jack (2016) has been further encouraging and contributed to interest among policymakers in promoting access to Digital Financial Services (DFS) as a way of catalyzing financial inclusion among the un-banked population. In line with this quest, African leaders have recently made a commitment to extend DFS access in the continent to about 400 million more people, 60 percent of whom are women (Bill & Melinda Gates Foundation, 2019). DFS will continue to attract attention as global efforts focus on its potential for generating financial inclusion in developing countries. Better understanding the barriers to adoption and usage of such technologies is important to foster these goals and, ultimately, to generate economic development.

In The Gambia, a large fraction of the adult population is financially excluded. A study by Jaabi (2017) reports that only 25 percent of adults have access to bank accounts. However, a far greater percentage of adults, nearly two-thirds, has access to mobile phones, according to a report by GSM (2017). Given this, technology that uses mobile phones as a way to make bank services more readily available is seen as a crucial development in broadening financial access. In 2016, the introduction of mobile money services by two of the biggest cellphone companies in The Gambia, Qcell and Africell, have been key to the expansion of these programs. The companies established what is now called, respectively, QMoney and Afrimoney financial services. Together, these two mobile money service providers have about 800 mobile money service points (agents) across the country. While these kinds of services have been widely-adopted in developing countries, and particularly so in Africa, there are still strong barriers to its adoption and use in some countries, such as The Gambia. Accordingly, mobile money has thus far had a modest role in generating financial inclusion (Demirgüç-Kunt et al., 2017). The number of active users of Qmoney (based on the administrative records), for example, is no more than 5,000. Most subscribers open wallets but fail to use them afterwards. The barriers to adoption and use could be associated with lack of information about the services available on the platform, inconvenience (such as insufficient number of agents), high service fees, and a lack of trust in the platform, among others. Evidence gathered by Karlan et al. (2014) has shown that a high monetary cost and a lack of information have the potential to deter the poor from using financial services. Our experiment builds off of these observations by combining information on provision and price discounts.

The objective of this study is to establish to what extent high prices and a lack of in-

formation limit the use of mobile money in The Gambia. Individuals' use of mobile money services does not only depend on whether those services are available and affordable, but also on individuals' awareness and knowledge of the services. Less-educated users often engage in a pattern of subscribing to these platforms to carry out a specific transaction and then abandoning use of the product for future transactions unless they are made aware that the platform can also be used for other purposes. Low levels of awareness generates low adoption, and high fees can further discourage use. Given this, if we are to improve access to mobile money, it is important to understand to what extent these constraints are actually obstacles to adoption. If the fees are the main barriers to adoption or usage, then simply offering discounts should motivate more adoption and use of the wallets. On the other hand, if information is the main problem, then, price interventions will not suffice and information provision of should encourage adoption and usage.

We develop a simple randomized controlled trial among a difficult-to-reach group: mobile phone users in The Gambia who had opened mobile money wallets (i.e. signed up) but did not use them. Specifically, we collaborate with QMoney, a private mobile money service provider in The Gambia to offer meaningful price discounts on withdrawal charges to the targeted group and make the discounts known to users via monthly telephone reminders that last for the duration of the experiment (i.e. six months). The monthly reminders also included information about the services offered on the platform; in particular, that the wallets can be used for bill payments, receiving transfers, sending transfers, and cashing-in and cashing-out. The experiment involved three experimental arms: one control arm and two treated arms. While the treated groups received one of the two discounts offered (15% or 30%), the control group received no discounts. Additionally, only the treated groups received the reminder calls. Thus, we created an exogenous variation in both price and information, and we used it to establish the relevance of these barriers to adoption and usage. We measure outcomes from different dimensions of mobile money using administrative records of the service provider, and we also carried out a post-treatment survey to gauge knowledge of and attitudes towards mobile money.

Our results indicate that treated individuals were substantially more aware about the uses of mobile wallets and about the meaningful discounts of 15% and 30% they were offered as compared to the control group. However, only a small fraction of treated individuals increased their use of mobile wallets, and the difference was not statistically significant. Perceptions of safety, trust in the platform, and service reliability were not significantly different between treated and controls. On the other hand, treated individuals were more likely to perceive the service charges to be expensive. We interpret these as indicative that our population of interest was uninformed about the platform at large. While our treatment increased

individuals' awareness of the platform's uses, it also made more salient to individuals the relatively high fees involved. Both a lack of information and high prices need to be addressed to foster the adoption and usage of mobile money in contexts like this one.

Our paper contributes to a broader literature that examines how the pricing and design of financial products affects their use in developing countries. Literature on pricing of other products could also be considered relevant here. For example, works by by Cohen et al. (2010) in Kenya and Ashraf et al. (2010) in Zambia examine demand or usage responsiveness to price or "cost sharing" of health-related products like bednets and chlorine. These field experimental studies provide rigorous evidence on how pricing affects demand and usage. Similarly, in the financial inclusion literature, there has been a mounting number of studies in recent years that seek to understand the consequences of the pricing of financial products. Studies by Banerjee and Duflo (2006), Mills et al. (2008), and Grinstein-Weiss et al. (2013) initiated this growing literature with analyses that looked at the impact of matching contributions on retirement savings and individual development accounts in the United States. Recently, an increasing number of studies have asked similar questions in the context of developing countries as well. After a ground-breaking study by Jack and Suri (2011) which outlined the basic workings of M-Pesa in Kenya, Jack and Suri (2014) studied the effect of this mobile money platform on risk sharing, and found that consumption did not fall after shocks in user households, compared to reductions of 7% for non-users. Jack et al. (2013), in turn, focused on transaction networks and the density of agents in Kenya, while Mbiti and Weil (2015) examined the wider impact of M-Pesa on savings and on the price of other platforms, among other issues. Suri and Jack (2016) took a closer look at the long term effects of this platform. Other studies have concentrated on savings – Schaner (2015) in Kenya, Kast et al. (2018) in Chile and Karlan and Zinman (2018) in the Philippines all look at the impact of an increase in savings yields on demand and usage of commitment saving accounts. However, despite examining similar financial products, these studies find mixed results on elasticity to yields of saving accounts. In particular, while Schaner (2015) finds a positive effect for saving yields on account usage by well-matched couples, Karlan and Zinman (2018) and Kast et al. (2018) did not find a statistically-significant impact of savings yield on demand and usage of savings accounts. In other words, they find that the price elasticity of the saving accounts studied were not different from zero. In fact, Karlan and Zinman (2018), which unlike previously-mentioned studies used "market-viable rates" in their experiment, found even the upper bound of elasticity estimates to be less than 0.5. and Bastian et al. (2018), in turn, study the impact of mobile savings accounts among women micro-entrepreneurs in Tanzania, and while they find no impact on savings nor investments, the combined effect with business training results in business expansion and higher empow-

erment and subjective well-being. There is a recent set of RCTs on mobile money in Africa. In a study of Malawi, Aggarwal et al. (2019) offered free mobile money wallets to about 480 entrepreneurs and subsidized withdrawal charges. They find that access to mobile money can lead to increased usage of formal financial services; more than 75% of the participants randomly offered the wallets made use of the product, making at least one cash-in with the wallets during the experimental period. The authors also found sizeable effects on business and household outcomes, revealing that access to finance services via mobile phones can increase usage of formal financial services and, in the medium to long term, also enhance welfare. Wieser et al. (2019), in turn, study a randomized roll out of mobile money agents in rural Uganda. There results show an increase in use of the platform in the treatment areas, which led to reduced costs for households, a doubling of the non-farm self-employment rate, and a fall in households reporting low food security. Unlike our study of difficult-to-access potential users, the evidence for the general population of rural households in Uganda shows that mobile money has the potential to increase welfare for remote populations. Given these conclusions, the emerging evidence on the pricing and use of digital payment is mixed. Our study adds to the recent literature by contributing to evidence on barriers of access to digital payment services and illustrating whether discounting prices and providing more information can reduce these obstacles. Although in terms of the magnitude of effects our results that are not entirely in line with some of the findings from this literature, the difference could be due to the fact we are not considering the same kind of financial instruments or the same channels, and that we are trying to reach a selected group of the population, namely those who opened mobile money wallets but did not use them. For instance, Aggarwal et al. (2019) study transaction costs for entrepreneurs, and Wieser et al. (2019) study impacts on the rural population in general. Our study complements these results by studying information and service charges for a wider population.

The rest of the paper is organized as follows. Section 2 presents the context of the study and our experimental design. Section 3 describes the data sources, whereas section 4 presents the experimental results. Section 5 discusses the results and presents some conclusions.

# 2 Context and Experimental Design

## 2.1 Context of the Experiment

In The Gambia, there are currently two GSM operators providing mobile money services, Qcell with QMoney and Africell with Africellmoney. Due to questions of service reliability and outreach at the start of our study, we partnered with QMoney mobile money for the

experiment. The QMoney platform offers all the basic services associated with a standard financial account, including a basic savings account with a commercial bank. In particular, it enables users to deposit and withdraw funds from their account and use the account to send or receive transfers from others, including to make bill payments. Like any electronic wallet, the QMoney mobile money account provides access to electronic money that is exchangeable (at a rate of one to one) to physical money at any time. It does not cost anything to exchange cash into e-money (i.e. cash-ins) but there are costs when exchanging e-money into cash (be it cash-out or bill payments). Among the fundamental features of the product are cash-ins and cash-outs; hence, the pricing of these features should also affect the desirability and usage of the technology.

In this experiment, we focus on cash-out charges for two reasons: first, for QMoney users it is currently the most expensive aspect of the product; thus, it has direct impacts on usage – our main outcome of interest. Second, cash-outs also affect the attractiveness of the entire product as it affects liquidity. Specifically, high cash-out fees mean higher prices for liquidity; this might limit usage for users that care about this feature of the product. Therefore, when withdrawal fees are subsidized we expect beneficiaries to increase use of their accounts. The idea that prices can inhibit usage is not far fetched. In The Gambia, the fees on mobile money services are not exorbitant, but they can be still expensive for users. For instance, with QMoney, cash-out fees ranges from GMD 6 for GMD 10-25 cash-outs to GMD 450 for GMD 22501-25000 cash-outs. For an individual at the national extreme poverty line, which according to the 2015/16 household survey is about GMD 983, a cash-out fee of about GMD 40 would be about four percent of the individual's monthly income. Forty-eight percent of the population live in extreme poverty. A service fee for each withdrawal that is four percent of an individual's monthly income is indeed significant. Hence, understanding whether these factors affect adoption and usage of digital financial services is certainly important for policy; among other things, it will highlight whether discounting withdrawal fees could be a useful mechanism that can lead to more DFS access and use in The Gambia.

While previous studies of mobile money have mostly focused on the general population, our experiment purposely targets a harder-to-reach group: clients of a mobile money provider in Gambia who do not actively use their mobile money wallets.

## 2.2 Experimental Design and Description of the Intervention

To implement the experiment we first identified inactive wallets on the QMoney mobile wallet platform; inactive clients are clients that have not used their wallet for any transaction three months before the start of the project, i.e. between June 1st and August 31st 2018. After we

identified these wallets, they were assigned to one of three experimental arms: a control arm consisting of participants that did not receive any of withdrawal discounts, and two treatment arms where participants received one of two withdrawal fee discounts– of 15% or 30%. The withdrawal fee discounts were offered for just six months, a time limit communicated to all the participants. The randomization of participants to each arm was done at the individual wallet level. Hence, after the inactive wallets on the QMoney platform were determined, a random number of the wallets were selected for inclusion in the study. Then, a calling exercise was undertaken to determine the addresses of the wallet holders and their willingness to participate. Upon conclusion of the calling exercise, a list of successful calls was made and an interview with these participants followed. Therefore, the number of all successful interviews became the experimental sample, which was used to randomly assign wallets into treatment and control groups. Specifically, 42% of participants in the experimental sample were assigned to the control arm and the rest to treatment arms at the rate of 1/2 to each arm.

Before the participants were randomly assigned to their respective experimental arms, a baseline survey of the eligible participants was conducted (see section 3.1 below). The baseline survey allows for the collection of information on the experimental sample that can be used to check for balance of observed characteristics before the start of our intervention. In this regard, our baseline survey collected information on the clients' socio-economic characteristics, including basic information about their financial behaviour such as whether they own other financial products like credit or savings accounts with a commercial bank, and their savings habits. Additionally, a module on hypothetical time, discounting for time preferences elicitation was also included. Given that the participants that were not reachable or interested were not available for interview, no information was collected on this group in the baseline. After the completion of the baseline survey and the assignment of wallets into treatment and control group, holders of the wallets selected to be in the treatment group received SMSs from QMoney about their selection, which is followed by a call from the researchers inviting them to sign-up for the new offers received. Upon acceptance of the offer, i.e. revealing their willingness to participate, the discounted withdrawals on their accounts were applied immediately. The discounts were payable at the end of every month and by QMoney. Furthermore, a follow-up survey was done at the end of the intervention to collect information on usage, awareness of mobile money services, and perception about trust, safety and service reliability of mobile money services.

By randomly assigning eligible participants or clients to experimental groups, we generated an exogenous variation in withdrawal or cash-out fees and access to more information that we use to identify how adoption and usage respond to information and a subsidized

withdrawal fee.

## 2.3 Randomization Units and Selection of Sample

We target inactive clients on the QMoney platform. Inactivity is determined by whether a client uses an account regularly or not. We specifically focus on clients that have not used their wallet to make any transactions in the three months prior to our intervention. This definition of inactivity is based on QMoney's own terminology. Therefore, in our case, the target sample consist of all wallets that were inactive between June and August 2018. The experiment thus targets individuals that have opened a mobile money account, used the wallet, and then stopped using it. By definition, this is a group that is difficult to access. To find the evaluation sample of inactive accounts on the QMoney platform, QMoney supplied a list of all inactive users. We used this list to target 2,625 reachable wallets for inclusion in the evaluation sample. Given that there may be number recycling (when an unused number is passed to a new person), the aim was to call all the numbers of the inactive wallet holders and then randomly select 2,625 for evaluation. A team of 14 enumerators called the inactive wallets and requested interviews. The process took about two weeks. Only 1,018 wallet holders were reachable and willing to participate in the experiment. They served as the evaluation sample. Two wallets were found to be active in the treatment period and were consequently dropped from the study. Five more observations were lost in the data cleaning, leaving us with 1,011 observations.

The required experimental sample size was determined before the baseline survey using power calculations and pre-intervention data on the same outcome indicators for the inactive users before they became inactive (i.e. three months before the intervention). The focus was on two main measures of outcome: (1) average monthly cash-ins and (2) average monthly net balance. Further, we assumed a minimum detectable effect (MDE) size of 0.135 standard deviation on net account balance; this is in line with the evidence in the literature, such as Dupas et al. (2018) and Karlan and Zinman (2018) who find similar effect size in the account balances for commitment savings technologies. Furthermore, we assume a 5% level of significance and 80% level of power. With these assumptions, the power calculation produced a sample size of 1,798 wallets as the minimum sample size for detecting the assumed MDE. Using the evidence in the literature on take-up rates, we adjusted this sample size for take-ups and arrived at 2625 wallets as the desired sample size. Take-up rates in the literature range from 8.7% in Karlan and Zinman (2018) in to about 54.7% in Kast et al. (2018). Thus, our assumption is based on the upper bound of the range found in the literature; this is motivated by the fact that the intervention targets existing clients. Given this, the

incentives for participation are indeed strong. However, due to low participation interest in the population and a large number of unreachable wallets, only 1,018 (about 13 percent) of wallet holders were available for interview. With this sample size and assuming a power of 0.8, our minimum detectable effect size on account balance became a 0.20 standard deviation. All of the reachable and eligible wallet holders agreed to participate and were interviewed at the baseline, but about seven observations were lost in the data cleaning.

# 3 Data Sources

## 3.1 Baseline Survey

The survey targeted registered inactive wallets on the QMoney platform. Since QMoney services are available nationwide and respondents were selected via a random sample from the population of inactive wallets on the QMoney platform, the survey was nationwide. Around half of the selected wallet-holders are residents of urban areas (i.e. the Greater Banjul area-Banjul, Kanifing Municipal Council and some part of West Coast region) and the other half reside in rural areas (i.e. North Bank Region, Central River Region, Lower River Region and Upper River Region, and some part of West Coast Region).

In the baseline survey, information on individual and household characteristics, mobile money, financial access and literacy, time preferences (two modules to capture time inconsistency and present bias), risk and savings behavior was gathered. The individual and household characteristics module contains 32 questions covering demographic, income, and some basic household characteristics. The module on mobile money has 20 questions covering the services used, as well as their frequency of usage; the main services considered are bill payments, transfers, and buying air time. The financial access and literacy component is comprised of 22 questions covering both access to finance and the level of financial literacy of the wallet holder. In collecting information on access to finance, we focus on access to credit and savings. The financial literacy module collected information on the the wallet holder's understanding of basic financial concepts like inflation, ability to do basic numeracy skills like calculating interest rates, as well as his/her financial attitudes. Both time preferences modules are comprised of three questions used to assess, respectively, time inconsistency and present bias of respondents. Finally, the risk and savings behaviour module consists of five questions of which two assess the risk attitude of the respondent and three assess the respondents' savings behaviour. The risk attitude questions collected information on respondents' general perception of risk and their understanding of risk diversification. The question regarding the general perception of risk asked the respondents to rate themselves on

their willingness to take risk. The question regarding risk diversification asked respondents to make choice between investing in one business or investing in multiple businesses.

## 3.2 Endline Survey

An endline survey was also conducted between June and July 2019. Before the endline survey, we had received about five months of administrative data, which revealed that many of the treated participants were still not using their wallets. Therefore, in the endline survey, the focus was on collecting data that will lead to a better understanding of why the wallet holders did not use their wallets, despite receiving discounts on withdrawal and monthly reminders about the discount. To this end, in the endline we collected information on the usage of mobile wallets, awareness about the withdrawal subsidy and about the services offered on the mobile money platform, as well as on perceptions of safety, trust, and service reliability.

## 3.3 Administrative Data

The administrative data was provided by QMoney on a monthly basis for the six months of the intervention. The data contains the outcome variables capturing the following transactions: cash-outs, cash-ins, bill payment and merchant payment. We acquired information on all transactions made by the wallet in the evaluation in relation to aforementioned items monthly. The data is used to generate outcome indicators reported here in two forms: total amount of the transaction and number of times the wallet is used for that transaction. In additions to these variables, we also generated three other variables from the administrative data, namely; (1) an indicator variable of whether a wallet was active or not, which takes a value of 1 if the wallet has been used for any of the highlighted transactions once in the last two months (note that the definition of activeness in the baseline data was three months) and 0 otherwise; (b) a turnover variable to capture transaction volume, which is the sum of all transactions conducted with the wallet; (c) A variable for the total number of transaction. We received six waves of post treatment data (i.e. Jan-July) and two waves of pre-treatment (i.e. August and October) data. The pre-treatment data was used to check whether the wallets became active when the calling exercise started and prior to the intervention. We found that two wallets had been active in this period and they were dropped. Then the administrative data was merged with the baseline data.

# 4 Experimental Results

## 4.1 Baseline Data

The baseline data comes from the baseline survey conducted between November 26, 2018 and January 23, 2019. A total of 1,018 inactive wallet holders were successfully interviewed during the baseline survey. Fifty-eight percent of the evaluation sample was assigned to receive withdrawal discounts and the remaining 42 percent did not.

Data on the observed characteristics of the inactive wallets collected during the baseline survey was used to check for balance in the observed covariates in the three groups at baseline. The results are reported in table 1. On the left panel are the statistics for the complete sample and on the right panel are the statistics for the endline sample, this is without the attritors. Also shown in the table is the mean and standard deviation of each covariate for each group. The results show that, with the exception of the share of wallet holders that attended school and the share that own a formal bank account, which are, respectively, lower and higher for the treatment group and significant at the 10% level, the evidence indicates that the respondents in the two groups are similar in their observable characteristics. Thus, as expected, randomization succeeded in making the two groups similar in their characteristics at baseline. Table 1 also illustrates the F-test for a joint significance of the covariates in predicting the probability of receiving treatment. The results imply that the covariates are jointly insignificant in predicting treatment status. Table 1 shows that balance across treatments is also attained.

Considering the endline sample, the results show that the inactive wallet holders are composed of mainly young people: the average age in the sample is 34 years. Only 17 percent of the inactive wallet holders in the evaluation sample are women; thus, there is a substantial gender difference in the sample, which could extend to the overall population of mobile money users in The Gambia. Many of the inactive wallet holders are not heads of their households; however, the difference between the control and pooled treatment on this indicator is not substantial. The inactive wallet holders are living in households with an average of 11 members, which is large but in line with the national average from household surveys.A vast majority of the inactive users have been to school, with about 90 percent reporting that they are educated. Hence, the low usage of wallets does not seem to be correlated with a lack of education. Also, just a small proportion of the clients live in a household where the floor is mostly made of sand or vinyl. A very low proportion (about 17 percent) of the target group reported that they are poor relative to most households in their community. Therefore, put together, poverty does not seem to be a factor in why the inactive clients are not using their accounts.

A substantial amount of the inactive clients have access to a bank account: only about 36% of the respondents reported not having a bank account. For inactive wallet holders with bank accounts, the primary usage of the accounts is for savings; about 96 percent reported that they use their bank accounts mainly for savings. Regarding preference for risk, the results indicate that most of the inactive wallet holders are risk averse, but a substantial proportion do prefer taking risk.[1].

## 4.2 Treatment Effectiveness: Awareness of Discount Offer and Mobile Money Services

Our treatment consisted in offers of 15% and 30% discount on withdrawal fees. Our team called treated individuals once a month for a period of six months, making mention of the discount offer and the mobile money platform. With such an intensive information campaign, we can expect individuals in our treatment groups to be well aware of the discounts. This is verified in table 2, which presents the average treatment effects on awareness about the treatment using indicators that were collected in the endline survey. So, regarding both awareness of the discount offer and the reception of reminders, the results indicate that participants that received the treatment were substantially more aware than those who did not. In particular, 42.1 percent of treated participants (pooled) are aware of the discounts, whereas this figure is nearly zero for those in the control group (difference significant at the 1% level). For reminders, awareness is much higher for those treated than for controls: participants in the pooled treatment are 44.5 percent more aware of the reminders than those in the control, with a statistically significant difference at the 1% level.

Results indicate that the group that received the 30% discount had more awareness about the existence of the discount, and that the group that received the 15% discount had more awareness about the reminder. Specifically, respondents that received the 15% discount reported about 20 percent more awareness about the discount as compared to control respondents. Respondents that received the 30% discount offer were 63.4 percent more aware of the discount than the participants in the control group. Therefore, the participants that received the higher discount were paying more attention to the treatment than those that received the lesser discount. Respondents in the 15% group were 86 percent more aware of the reminders than the respondents in the control group. Participants that received the 30% discount were about 4.2 percent more attentive to the call reminders, but the impact is not significant even at the 90 percent level. The group that received the lesser discount was

[1]The measure of risk aversion is computed using the risk question, which asked respondent to rate their willingness to take risk using a scale of 0 to 10. Using this scale, those who rated themselves below 5, at 5, and above 5 are regarded as risk averse, neutral, and a risk taker, respectively,

paying more attention to the reminders. In sum, the treatment was effective in generating awareness: those who received treatment were more aware about it.

Treated individuals are not only more aware of the treatment they received, they were also substantially more knowledgeable about the mobile money platform in general. Table 2 also indicates the impact of our intervention on awareness of the platform's services. The results show that the treatments had positive impacts on awareness that the wallets can be used for merchants payments as well as for remittances or P2P payments. For instance, the share of participants that reported that they became more aware of the platform's uses for merchant payment is about 33.6 percent higher in the treated group as compared to the control group. Moreover, participants that received the 15% discount were about 30 percent more aware that the platform can be used for merchant payment as compared to the control and this is also highly-statistically significant ( 1% level of significance). For control vs. T30%, the results indicate that participants were about 37.1 percent (also significant at the 1% level) more aware that the platform can be used for merchant payment. Thus, treatment effects regarding awareness of merchant pay capabilities are higher for the group that received the larger discount. The treatment increased awareness that the platform can be used for P2P transfers among respondents in the pooled treatment by 19.7 percent as compared to the control group, a result that is also highly significant. For the sub-treatments, the treatment increased awareness that the platform can be used for transfers by 17.4 percent in the T15% group and by 21.9 percent for T30% as compared to the control. Even though the effects on awareness of services like using the wallets to buy airtime or to make savings are negative and not significant, the impact on overall awareness (i.e. awareness of at least one service offered on the platform) is positive and highly-statistically-significant, albeit small in terms of economic significance. Taken together, the results show that the treatment was effective in generating awareness.

## 4.3 Effects on Mobile Money Use

Given that the intervention was effective in generating awareness of the QMoney platform, we must examine whether it had any impacts on use of the wallets, which is the ultimate outcome of interest. To this end, we analyze both administrative data and the results of the endline survey. The results on wallet use are reported in tables 3 and 4 for the endline and administrative data, respectively.

Table 3 presents the treatment effect estimate on activeness, which measures whether the wallet was used for any transaction in the intervention period, and shows that the discounts increased activity by about 1 percentage point in the pooled treatment than in the control.

However, the effect is not statistically significant.[2] Furthermore, the results show that the two discount levels did not have substantially different effects on activity.

Results of the endline survey, which collected self-reported information on ownership and usage of mobile money wallets, are reported also in table 3. Findings indicate that the discounts had no effect on the use of the mobile money wallets. In particular, it had no effect on whether the respondents ever used mobile money wallets. For instance, the impact of the treatment on this indicator is -1.09 percent, 0.20 percent, and -2.4 percent, respectively, for the pooled treatment, the group that received the 15% discount, and the group that received the 30% discount. This is to say, there is a small negative difference for the group with the higher discount. However, none of these effects are significant at the 5% level.

Additional evidence that the intervention had no discernible effect on usage is seen in the results from the administrative data reported in table 4. All estimates were made using a Piosson regression, but to facilitate the interpretation of the results, they are described below in levels. The administrative data results indicate that the discounts had a positive impact on transaction volume. With an effect size of about 0.15 standard deviation, the difference is positive for the pooled treatment but not statistically relevant. The average treatment effect on turnover is higher for the 30% group, with around GMD 15430 (or 309 USD) more as compared to the control. However, it is still not significant at standard levels. Column 4 of table 4 shows that the increase in turnover in the latter group may be due to an increase in merchant payments, which is also around GMD 16300 (or 326 USD) higher for this group as compared to the control. The effect on overall number of times the wallet was used is negative, but like most effects in the table it is also not statistically significant. Both the average total cash-outs and number of cash-outs are impacted positively, which is expected given that it is the outcome directly affected by the discounts; total cash-out increased by GMD 2300 (45 USD) in the pooled treatment as compared to the control, and increased about GMD 4100 (80 USD) and about GMD 100 (2 dollars), respectively, for the group that receive the 15% and 30% discount. However, in all cases, the effects are not statistically significant. Finally, the discounts had a negative and statistical significant impact on use of the account for bill pay. This is probably a statistical anomaly since there is no clear rationale for this result. Therefore, based on the administrative data, the discounts had no discernible effects on mobile money use, which corroborates the results from the endline survey presented in table 3.

[2]Note that activity in table 3 is compiled from the administrative data. It is presented in this table to facilitate comparison with self-reported measures.

## 4.4 Potential Barriers to Usage

Thus far we have established that the treatment was effective in that participants reported that they had indeed received the treatment, and were more aware of mobile money uses and services than those in a control group. Given these results, the lack of effect of the treatments on mobile money use is puzzling. In this section, we discuss potential barriers to adoption and usage.

### 4.4.1 Trust, Safety, and Ease of Use Factors

Our endline survey inquired as to why wallet holders did not use mobile money services, drawing hypotheses from standard factors discussed in the literature and from our communication with QMoney staff and potential users. Given that the indicators here were collected using a Likert scale, which is between 1 (strongly disagree) and 5 (strongly agree), the results here will be analyzed using the distribution of the responses on the Likert scale and the treatment effect will be computed by converting the Likert scales into a dummy that is 100 if the response is 3, 4, or 5 on the Likert scale and 0 otherwise. In this way, the dummy distinguishes between agree and disagree responses. These results are presented, respectively, in figure 3, 4, 5. The figures show that a substantial number of the wallet holders strongly agree that the platform is safe. A majority strongly agrees that the agents can be trusted and also reported feeling comfortable using the platform. Furthermore, most participants strongly agreed that they have never experienced any fraud on the platform and agreed that the platform is easy to use. Overall, then, there are more positive perceptions than negative perceptions about safety, trust, ease of use, and comfort with the platform. At the same time, "neither agree nor disagree" was the second-most reported answer regarding perceptions of the indicators.

The results indicate that a lack of safety is not a reason for the low usage of the wallets observed. The treatment effect estimates reported in table 5 indicate that treatment had no discernible impact on this indicator: pooled treated respondents exhibit a 0.56 percentage higher rate of agreement as compared to the controls. However, this measurement is not significant at the the conventional level of 5%. In terms of standard deviation, the effect size is about 0.011 standard deviation, which is indeed very small.

A lack of trust in QMoney agents also does not seem to be the reason why participants did not make use of the wallets. Although 1.39 percent (about 0.04 standard deviation) more respondents in the pooled treatment agree that the agents can be trusted as compared to the control, the difference is not significant. Also, the positive effect on the perceived trust of agents is higher for participants in the 15% than 30% treatment; in fact, for the latter the

effect is negative.

Furthermore, experience of fraud was also discounted as a possible reason for non-use. Column (a) of figure 4 shows that the majority of the respondents strongly agree that they experienced no fraud on the platform. From row (3) of table 5, we see that the treatment effect on perception about fraud is positive and statistically significant at the 10 percent level. Specifically, participants in the pooled sample are 4.2 percent (about 0.121 standard deviation) more likely than those in the control to agree that the platform is free of fraud.

Comfort and ease of use was also eliminated as a factor. For instance, column (a) of figure 5 illustrates that most of the participants strongly agree that the platform is easy to use, and this result is higher in the control than in the pooled treatment or the sub-treatments. For instance, row (5) of table 5 indicates that the impact of the treatment on perception of ease of use of the platform is about 2.4 percentage points higher for participants in the pooled treatment than in the control. In terms of effect size, this is the equivalent of 0.07 standard deviations.

### 4.4.2 Awareness about Service Prices

In the preceding section, we have seen that trust, safety, and ease of use do not seem to be the barriers to use of mobile money services in our population of interest. A salient finding from our endline survey is that the treatments did have a statistically significant effect on the perception that the service fees are expensive. The results reported on row (6) of table 5 indicate that the impact of the treatment on the perception about service prices is positive and statistically significant. In particular, agreement that the service prices are expensive is about 10 percentage points (about 0.20 standard deviation) higher for pooled treated participants than controls. This impact on perception about the service charges is even higher for participants that received the lower discount than those that receive the higher discount, which in itself is interesting.

Further evidence regarding the perception about the expensiveness of the service charges are provided in column (b) of figure 5. Specifically, the figures show that the perception that services charges are expensive is higher for participants in the pooled treatment as a higher proportion of the respondents in this group agree that it is expensive. Similar results are found when we compare the control with the first treatment and the control with the second treatment.

Hence, it seems the awareness campaign also increased the perception that the service charges are expensive. Moreover, the effect is stronger for respondents receiving the higher discount. Respondents that received the higher discount agreed to a greater degree than those in the control group or those with the lower discount that the service charges are still

expensive. Therefore, it is likely that while our treatment increased awareness about mobile money services among uninformed potential users, it also made salient the relatively high fees incurred by its use, which may explain why take-up and usage did not increase among our treated experimental subjects. The fact that the perception regarding the expensiveness of the services charges is higher for individuals in the lower discount compared to the higher discount group is also suggestive that this mechanism might have been at play. It implies that respondents that received the high discount faced lower service charges. As a result, it is normal for them to perceive the services to be less expensive.

# 5 Discussion and Conclusion

Access to digital financial services has important implications for broader financial inclusion in developing countries and thus continues to be an issue of great relevance. Among the factors that inhibit the use of such services are a lack of information and high service charges. In this study, we aimed to provide evidence on whether providing information about the service and offering a discount on the price of withdrawals could encourage adoption and usage of mobile money wallets. To this end, we partnered with a private mobile money provider in The Gambia to pilot this experiment, which involves discounting cash-out fees for a random number of hard-to-reach wallet holders so as to study if there was any effect in their use of the e-wallet platform.

Our results indicate that the intervention was indeed effective as treated individual reported to be aware about discounts and reminders of these discounts. They also reported higher levels of awareness about the platform and its uses. Lack of attention to our treatment or lack of information about the platform is thus probably not the reason why the treated individuals did not use their wallets despite the discounts.

Furthermore, it appears that the platform has a good reputation. A majority of the respondents indicate a high level of trust of the platform. Almost none reported an experience of fraud on the platform and the majority responded that they found the platform easy to use. The weak development of consumer protection laws in developing countries have raised concern that many people might fail to use DFS because of lack of trust and confidence (see Malady, 2016). However, our study reveals that the majority of respondents trust the platform and its intermediaries.

Despite our intervention's success in raising awareness and the platform's positive reputation among participants, the meaningful price discounts failed to increase usage. Specifically, using results from administrative and endline data, we find that the discounts had no discernible effect on usage. The discounts did not succeed in catalyzing usage, and our evidence

reported in the preceding paragraphs indicate that this was neither explained by a lack of awareness about the discount nor by lack of trust, safety, or convenience. Our findings indicate, however, that the population perceived that the service charges of the platform were high. Moreover, perceptions of high prices were significantly elevated for the treatment group as compared to the control group, indicating that our intervention increased awareness not only about platform uses, but also about its high costs. Therefore, by increasing awareness about mobile money services, we also increased awareness about the service charges, which motivated the null increase in usage of the accounts for our treated individuals. Aside from increasing awareness about price, the discounts also increased awareness about services such as P2P transfers and merchant payment. However, few users engage P2P transfers or merchant payments because not many merchants accept payments through mobile money wallets. For many small businesses in rural and urban areas, accepting e-money is associated with a high cost (Ozili, 2018).

Therefore, although a lack of trust of agents or the platform, or perceptions of convenience and confidence might be constraints to digital financial services use in other cases, our results indicate that they were probably not the main barriers to usage of e-wallets in our context. The main barriers to usage in our context were limited information or awareness about services, coupled with high perceived service prices. Meaningful price discounts did not seem to offset the price barrier. What this means is that an intervention that aims at promoting mobile money services should work jointly on creating more information and awareness about the services, but also on designing pricing schemes that work for users. Even though respondents in our experiment are relatively well-off, they still complained about prices. Given this, it is likely that such barriers would be even more substantial for the poor.

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Figure 1: Evaluation Design

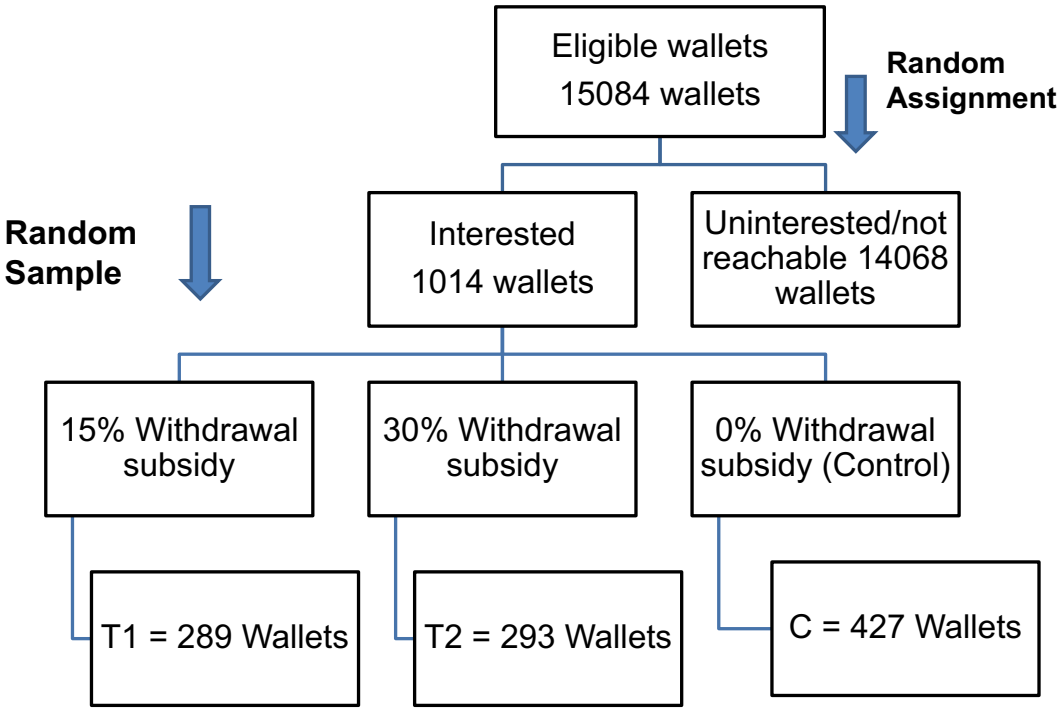


Table 1: Baseline Survey Balance Test

| | Complete Sample | | | | Endline Sample | | | |
|---|---|---|---|---|---|---|---|---|
| | Levels for Control group (1) | Levels for Pooled T. (2) | Levels for T15% (3) | Levels for T30% (4) | Levels for Control group (5) | Levels for Pooled T. (6) | Levels for T15% (7) | Levels for T30% (8) |
| Age | 34.59 | 33.46 | 33.64 | 33.28 | 34.94 | 33.58 | 33.68 | 33.49 |
| | (12.31) | (11.32) | (12.01) | (10.61) | (12.41) | (11.03) | (11.41) | (10.67) |
| Female | 18.41 | 18.56 | 21.80 | 15.36 | 17.20 | 17.06 | 20.32 | 13.90 |
| | (38.81) | (38.91) | (41.36) | (36.12) | (37.79) | (37.65) | (40.32) | (34.66) |
| Married | 58.97 | 57.39 | 56.06 | 58.70 | 60.22 | 58.43 | 56.97 | 59.85 |
| | (49.25) | (49.49) | (49.72) | (49.32) | (49.01) | (49.33) | (49.61) | (49.12) |
| Educated | 89.02 | 92.27 | 91.00 | 93.52** | 88.41 | 91.96 | 91.24 | 92.66 |
| | (31.30) | (26.73) | (28.66) | (24.67) | (32.05) | (27.22) | (28.33) | (26.12) |
| Household Head | 47.43 | 42.86 | 43.75 | 41.98 | 49.06 | 44.20 | 44.80 | 43.63 |
| | (49.99) | (49.53) | (49.69) | (49.44) | (50.06) | (49.71) | (49.83) | (49.69) |
| Household size | 10.70 | 10.40 | 10.27 | 10.53 | 10.88 | 10.51 | 10.40 | 10.62 |
| | (9.05) | (8.71) | (8.67) | (8.77) | (9.39) | (8.87) | (8.66) | (9.08) |
| Poor | 15.38 | 19.59 | 20.42 | 18.77 | 14.78 | 19.22 | 19.52 | 18.92 |
| | (36.12) | (39.72) | (40.38) | (39.12) | (35.54) | (39.44) | (39.72) | (39.24) |
| Sand or Vinyl | 10.02 | 7.73 | 9.34 | 6.14** | 10.75 | 8.24 | 9.96 | 6.56** |
| | (30.07) | (26.73) | (29.15) | (24.05) | (31.02) | (27.52) | (30.01) | (24.81) |
| Asset Ownership | 7.60 | 7.51 | 7.16** | 7.84 | 7.65 | 7.56 | 7.24** | 7.87 |
| | (3.40) | (3.43) | (3.27) | (3.54) | (3.37) | (3.37) | (3.21) | (3.50) |
| Wage Employment | 42.02 | 40.42 | 36.84 | 43.94 | 42.43 | 39.64 | 36.84 | 42.35 |
| | (49.42) | (49.12) | (48.32) | (49.72) | (49.49) | (48.96) | (48.34) | (49.51) |
| Bank Account | 62.62 | 65.40 | 63.19 | 67.58 | 63.34 | 64.83 | 64.00 | 65.64 |
| | (48.44) | (47.61) | (48.31) | (46.89) | (48.25) | (47.80) | (48.10) | (47.58) |
| Savings | 94.78 | 95.00 | 93.41 | 96.46 | 95.74 | 95.45 | 93.75 | 97.06 |
| | (22.29) | (21.82) | (24.89) | (18.51) | (20.23) | (20.86) | (24.28) | (16.95) |
| Risk Averse | 56.06 | 49.16** | 49.38 | 48.95 | 55.23 | 49.01 | 48.45 | 49.56 |
| | (49.57) | (49.85) | (49.84) | (49.93) | (49.67) | (49.85) | (49.84) | (49.96) |
| Attrited from endline | | | | | 13.29 | 12.37 | 13.15 | 11.60 |
| | | | | | (33.98) | (32.95) | (33.85) | (32.08) |
| Observations | 429 | 1,011 | 1,011 | 1,011 | 372 | 882 | 882 | 882 |
| F-test p-value | | 0.04 | 0.15 | 0.01 | | 0.04 | 0.21 | 0.02 |

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. All the variables except Age and asset ownership are measured in percentages. Assets ownership is total number of assets owned by the wallet holder.

Table 2: Treatment Effects: Awarness of Treatment (Endline Survey)

| Variable | (1) Levels for Control Group | (2) Control vs. Pooled T. | (3) Control vs. T15% | (4) Control vs. T30% |
|---|---|---|---|---|
| Received Discount | 0.27 | 42.08*** | 20.05*** | 63.44*** |
| | (5.18) | (2.21) | (2.56) | (3.00) |
| Received Reminder | 13.98 | 44.45*** | 86.02*** | 4.17 |
| | (34.72) | (2.83) | (1.80) | (3.00) |
| Aware for Merchant Pay | 25.81 | 33.61*** | 29.97*** | 37.13*** |
| | (43.82) | (3.15) | (3.88) | (3.77) |
| Aware for Transfer | 59.14 | 19.68*** | 17.35*** | 21.94*** |
| | (49.22) | (3.13) | (3.70) | (3.53) |
| Aware for Airtime | 74.46 | -0.74 | -5.54 | 3.92 |
| | (43.67) | (2.99) | (3.70) | (3.42) |
| Aware for Savings | 65.05 | -2.50 | -2.50 | -2.51 |
| | (47.74) | (3.28) | (3.94) | (3.90) |
| Overall Awareness | 89.52 | 5.19*** | 4.91** | 5.46*** |
| | (30.68) | (1.87) | (2.15) | (2.09) |
| Observations | 372 | 882 | 623 | 631 |

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. For all variables, the values are expressed in percentages and are based on self-reporting from the endline surver.

Table 3: Treatment Effects: Usage of Mobile money (Endline Survey)

| Variable | (1) Levels for Control Group | (2) Control vs. Pooled T. | (3) Control vs. T15% | (4) Control vs. T30% |
|---|---|---|---|---|
| Active | 8.60 | 1.01 | 1.36 | 0.66 |
| | (28.08) | (1.96) | (2.39) | (2.32) |
| Has MM | 77.15 | -1.66 | -1.05 | -2.25 |
| | (42.04) | (2.90) | (3.47) | (3.47) |
| Ever had MM | 81.98 | -2.91 | 1.15 | -6.70 |
| | (38.61) | (4.81) | (5.52) | (5.88) |
| Has/had MM | 94.62 | -1.09 | 0.20 | -2.35 |
| | (22.59) | (1.60) | (1.83) | (2.03) |
| Has/Had/Ever used MM | 69.89 | -6.17* | -9.73** | -2.71 |
| | (45.93) | (3.20) | (3.91) | (3.77) |
| Open but not used MM | 1.34 | -0.17 | -0.15 | -0.19 |
| | (11.53) | (0.77) | (0.91) | (0.90) |
| Observations | 372 | 882 | 623 | 631 |

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. For all variables, the values are expressed in percentages and are based on self-reporting from the endline survey.

Table 4: Treatment Effects: Usage of Mobile money (Administrative Records)

| Variable | Levels for Control Group | Control vs. Pooled T. | Control vs. T15% | Control vs. T30% |
|---|---|---|---|---|
| Active | 8.60*** | 1.01 | 1.36 | 0.66 |
| | (1.46) | (1.96) | (2.39) | (2.32) |
| Turnover | 53.71*** | 0.33 | 0.41 | 15.43 |
| | (10.84) | (0.26) | (0.30) | (18.88) |
| Overall Number of Use | 2.56* | -0.05 | -0.25 | 0.28 |
| | (1.34) | (0.61) | (0.66) | (1.85) |
| Total Cashin | 0.67* | 0.27 | 0.21 | 0.33 |
| | (0.40) | (0.69) | (0.80) | (0.76) |
| Number of Cashin | 0.69 | 0.13 | 0.30 | -0.08 |
| | (0.46) | (0.74) | (0.82) | (0.79) |
| Total Cashout | 0.42* | 0.23 | 0.41 | 0.01 |
| | (0.23) | (0.69) | (0.81) | (0.78) |
| Number of Cashout | 0.23** | 0.29 | 0.11 | 0.44 |
| | (0.11) | (0.62) | (0.68) | (0.72) |
| Total Bill Pay | 0.44* | -1.48** | -1.94*** | -1.18* |
| | (0.23) | (0.64) | (0.68) | (0.71) |
| Number of Bill Pay | 1.62 | -0.20 | -0.70 | 0.12 |
| | (1.08) | (0.76) | (0.79) | (0.82) |
| Total Mpay | 0.02 | -0.18 | -0.72 | 0.16 |
| | (0.01) | (0.96) | (1.22) | (1.09) |
| Number of Mpay | 0.02 | -0.32 | -0.86 | 0.03 |
| | (0.01) | (0.99) | (1.24) | (1.11) |
| Observations | 372 | 882 | 251 | 259 |

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0$. All variables measured in terms of amounts in the local currency (i.e. the "Total" variables) are estimated using Poisson regression. Furthermore, all such variables are divided by 1000, as in the Transaction Volume. The "Number" variables capture the number of times the wallet was used for a particular transaction.

Table 5: Treatment Effects: Why not used (Endline Survey)

| Variable | (1) Levels for Control Group | (2) Control vs. Pooled T. | (3) Control vs. T15% | (4) Control vs. T30% |
|---|---|---|---|---|
| Think is safe | 89.25 | 0.56 | 1.19 | -0.06 |
| | (31.02) | (2.09) | (2.46) | (2.51) |
| Trust agent | 87.63 | 1.39 | 3.20 | -0.38 |
| | (32.96) | (2.20) | (2.50) | (2.69) |
| Experienced no Fraud | 85.22 | 4.20* | 3.63 | 4.75* |
| | (35.54) | (2.29) | (2.71) | (2.63) |
| Conformtable to use MM | 88.71 | -0.08 | -1.06 | 0.87 |
| | (31.69) | (2.16) | (2.65) | (2.51) |
| Easy to use MM | 81.72 | 2.40 | 2.34 | 2.45 |
| | (38.70) | (2.58) | (3.06) | (3.03) |
| Think MM is expensive | 41.13 | 10.05*** | 11.86*** | 8.29** |
| | (49.27) | (3.38) | (4.06) | (4.03) |
| Observations | 372 | 882 | 623 | 631 |

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0$. All the variables are measured in percentages. Except for perception of safety of the platform, all the other indicators are dummies generated from a Likert scale of 1 to 5 (1 means strongly disagree and 5 means strongly agree); in particular, 100 if Likert scales are 3,4,5 and 0 otherwise.

Figure 2: Timeline of Intervention

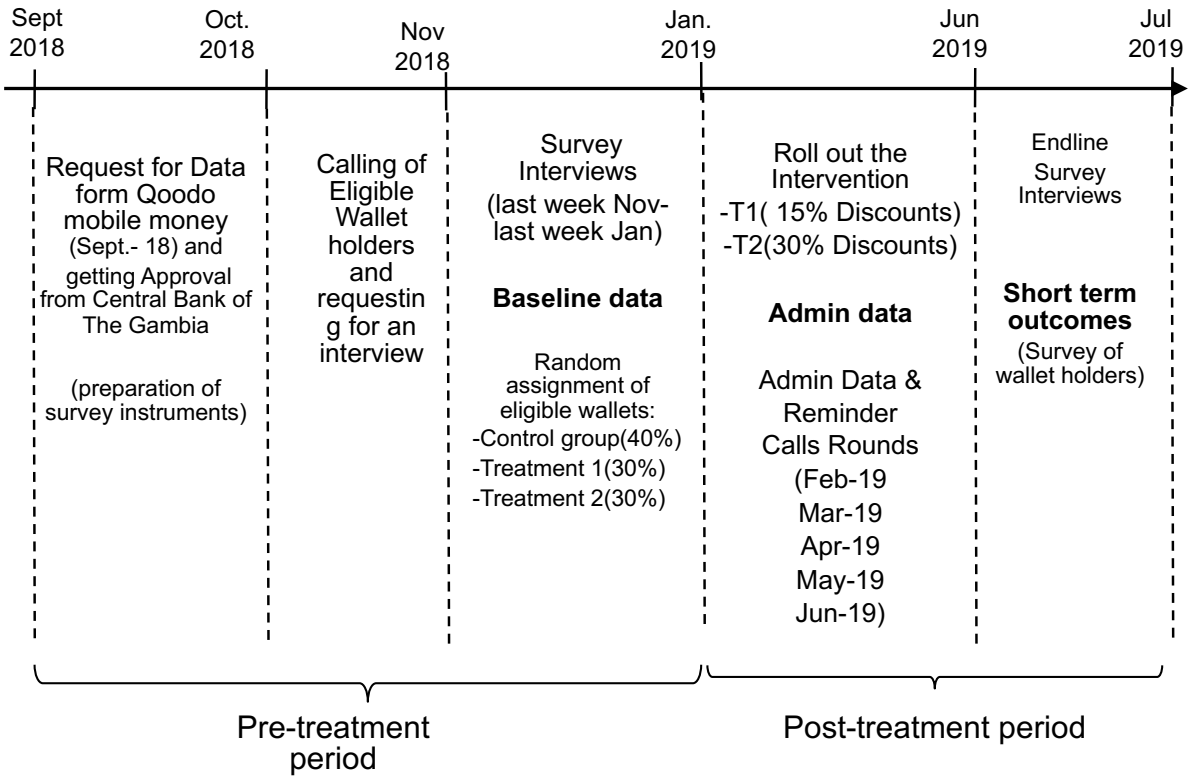
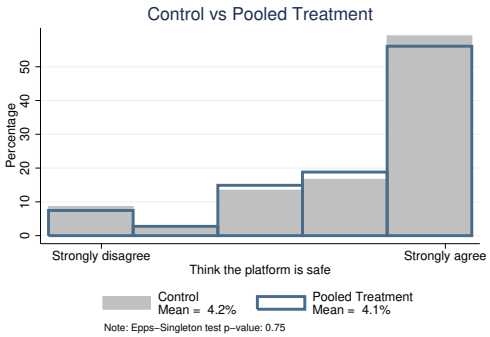
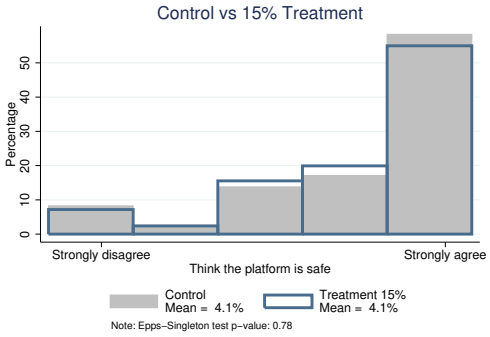
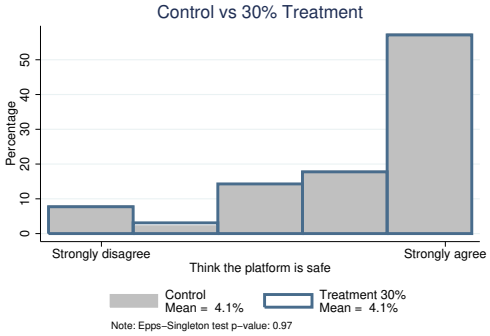


Figure 3: MM perceptions (Post-Treatment)
(I)

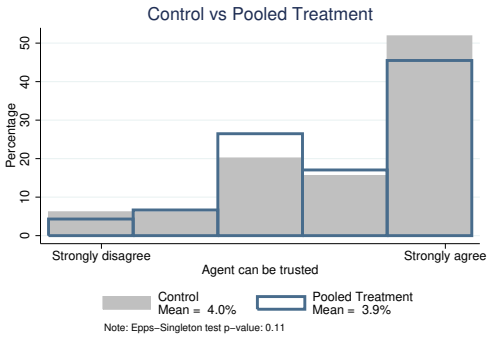
(a) Using MM is safe

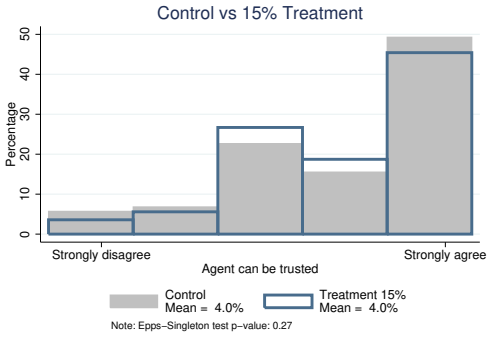



(b) Trust agent



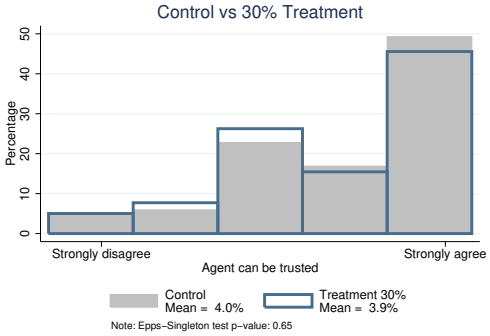
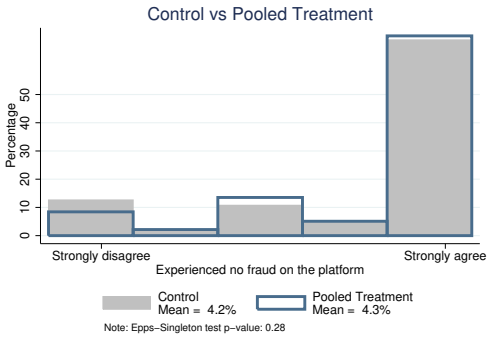
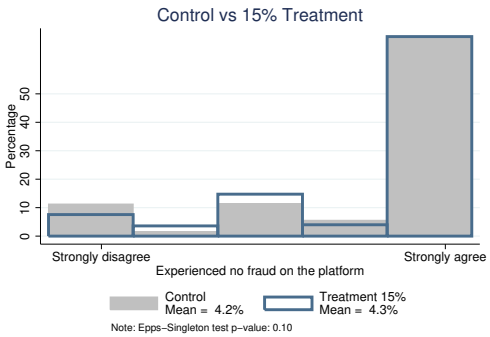
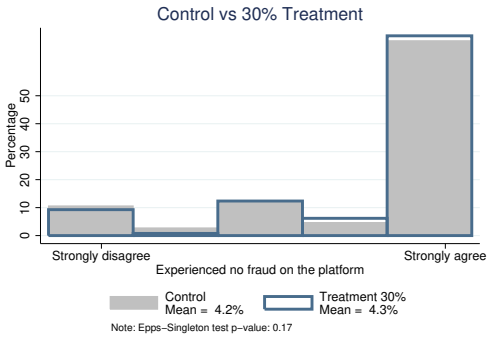



Figure 4: MM perceptions (Post-Treatment)
(II)

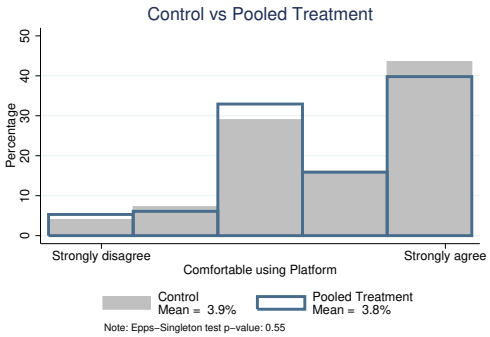
(a) Experienced no Fraud

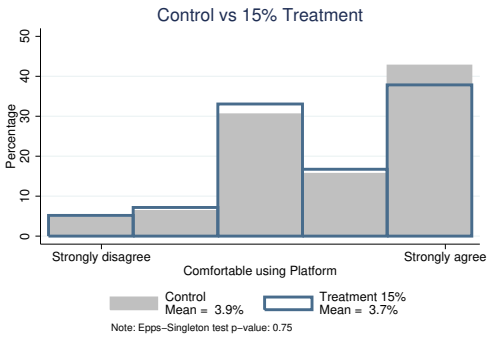



(b) Comfortable to use MM



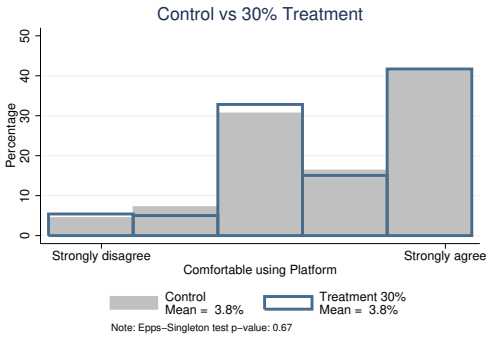
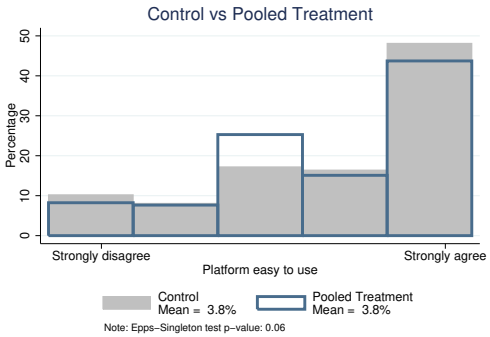
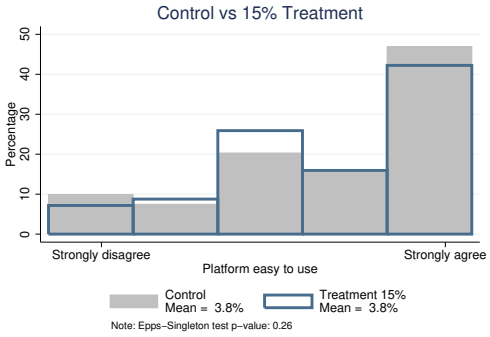
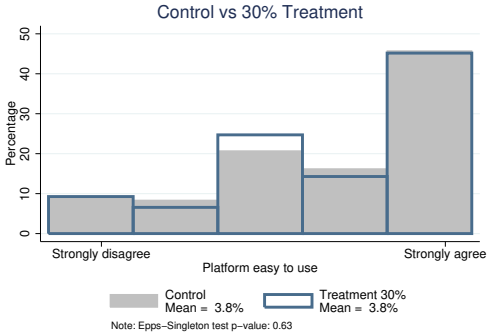



Figure 5: MM perceptions (Post-Treatment)
(III)

(a) Easy to use MM




(b) Think is expensive