Empowering Consumers: The Impact of Legal Aid on Mobile Money Disputes

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Mobile phones have transformed access to financial services for millions globally, facilitating financial inclusion. However, the rapid growth of digital financial products has introduced significant challenges for consumers, leaving many uncertain about how to resolve disputes that arise. This uncertainty undermines trust in the system and hampers its adoption. This study examines the impact of a pioneering legal aid initiative designed to protect consumer rights in the face of resistance from major mobile network operators (MNOs). The initiative succeeded in resolving several disputes, enhancing trust and promoting greater use of mobile financial services. The key to the intervention's success was not the threat of legal action—whose credibility was undermined by the courts and regulatory bodies' refusal to engage—but rather the support provided by the legal team in guiding consumers through the informal dispute resolution processes provided by MNOs. This intervention helped sustain consumer engagement with the system, improving both trust and the overall benefits of mobile money in terms of risk sharing and financial inclusion.

I. Introduction

Mobile money is generally considered the next financial revolution in developing countries.[1] Anyone with a basic cell phone and text messaging capabilities can send and receive money, access loans

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[1] https://www.nytimes.com/2014/01/21/opinion/kenyas-banking-revolution-lights-a-fire.html

and savings opportunities, all without the necessity of owning a smartphone or having internet connectivity—an expense beyond the means of many in developing regions. By harnessing the power of mobile money, consumers can effectively manage their finances, smooth consumption patterns in response to unforeseen circumstances, reduce their transaction costs, and access credit (Aker et al., 2016; Riley, 2018; Suri and Jack, 2016). This revolution doesn't merely touch a few; it extends its reach to millions previously excluded from the formal banking system. It presents an opportunity for developing nations to bypass the conventional banking infrastructure, ushering in a new era of financial inclusion and empowerment.

Despite its promise, users are grappling with numerous issues within the mobile money system worldwide.[2] For example in Uganda, 49 percent of mobile money users report a recent "big challenge" (Mazer and Bird, 2021): the money is sent but not received, utility bills aren't paid, people have difficulties dealing with customer care centers of poor quality. In well functioning markets, customers could switch (or at least threaten to switch) to another Mobile Network Operator (MNO), which would discipline them. Yet, markets are far from perfect, with usually few large firms holding significant market power, such that the threat of leaving is less credible (think of the extreme case of a monopoly) and there are few incentives to treat customers right. For example, in Uganda, the market is a duopoly, with two very large MNOs holding significant market power. There are few redress mechanism in case of disputes: only 20 percent of those with a challenge resolved it (Mazer and Bird, 2021). Those with an unresolved challenge have lower trust in Mobile Money and stop using the system. In a recent survey of the literature, Garz et al. (2021) identify the need for additional access to complaint and support systems for conflicts with MNOs, and demand more rigorous evidence on the effectiveness of addressing disputes.

To address the power imbalance between consumers and MNOs, we test the impact of lawyers to protect consumer rights and therefore encourage the use and benefits of mobile money. The intervention consists in offering legal aid to people involved in a dispute with an MNO (Mobile Network Operator). We assemble a sample of individuals affected by mobile money disputes by visiting people door-to-door in Kampala, Uganda. We then forward half of the disputes affecting individuals (selected randomly) to the newly created Center of Technology Disputes Resolution - Uganda (CTDR-U). To keep costs low with a vision towards sustainability, CTDR-U employs law students, supervised by a lawyer. CTDR-U is using an innovative legal strategy specifically designed for mobile money disputes. This includes meeting with the respondent to get facts on the case. The lawyer and/or law students then accompany the participants to customer care centers

[2] https://poverty-action.org/consumer-protection-digital-finance-surveys

with the proper documents. If this is unsuccessful, CTDR-U engages in three principal actions to be taken, with each action representing a progressively more severe response from the lawyers towards the service providers. The first step is to simply call the providers and try to resolve the dispute over the phone. The second step is to write an initial letter to the providers, where CTDR-U provides information on the case and states that attempting to call the service provider was futile. If the service provider doesn't respond to this letter and/or doesn't take action to resolve the dispute, CTDR-U proceeds to the third step of sending a final warning letter, stating that CTDR-U will take up measures with regulators and/or begin consumer protection litigation against the service provider if they don't take heed of this notice within seven working days. If there is still no compliance after these three steps, CTDR-U escalates the matter to the regulators. During this project, the regulators passed a new law mandating that MNOs resolve matters in 24 hours if a proper complaint has been received by the regulators. We collect a baseline survey in 2022 and an endline survey in 2023 to measure whether cases have been resolved, and whether usage and trust of the system has improved.

We find positive effects of this legal strategy on dispute resolution, usage and trust of the system. Compared to the control group, cases resolved increase by 23 percent in the treatment group. Usage and trust in the system increase as well. These results are robust to multiple hypothesis testing corrections, randomization inference tests, and corrections for attrition. These outcomes were specified in our pre-analysis plan.[3]

As a result, we find more of the positive economic effects usually associated with mobile money. Risk sharing improves in the treatment group: more remittances are received by mobile money users in case of negative shocks received by the household. Moreover, access to credit improves, which is important since most respondents are small business owners and the key constraint to start and operate a business is shortage of capital. By increasing the use of mobile money, the intervention alleviates the key constraint to business operations.

Why did the intervention work? The original hypothesis for this project was that the threat of legal action—either through courts or regulatory bodies—would drive resolution. However, this turned out to be largely ineffective. Despite the introduction of new consumer protection laws requiring regulators to resolve cases within 24 hours, the regulators failed to respond to our inquiries. Instead, they advised CTDR-U to pursue court action. However, courts also declined to handle the cases, claiming they were not the appropriate forum. In practice, the primary route to resolving disputes was through CTDR-U's support in navigating the informal resolution

[3] https://www.socialscienceregistry.org/trials/9146

mechanisms of the MNOs, known as customer care centers. CTDR-U staff helped consumers gather necessary documentation, guided them on how to engage with the centers, accompanied them during visits, and supported them through multiple follow-ups. Based on these findings, we hypothesize that, rather than relying on lawyers and law students, having a knowledgeable individual who is comfortable with bureaucracy—someone who can assist with paperwork, make calls, and accompany clients—may also lead to successful outcomes. This insight has important implications for the cost-effectiveness of the intervention. With the current reliance on legal professionals, the intervention is not cost-beneficial. However, our simulations suggest that using a knowledgeable, bureaucratically-savvy individual could have made the intervention more cost-effective.

This paper adds to the expanding body of literature on mobile money, with a particular focus on consumer protection issues. While existing research has explored the economic impacts of mobile money—such as its role in consumption smoothing—there is less attention given to unethical and fraudulent practices by mobile network operators (MNOs), and even less to effective strategies for addressing these issues. Garz et al. (2021) provide a systematic review of the key consumer protection concerns in digital financial services, covering topics such as hidden fees, post-contract exploitation, and fraud. Regarding hidden fees, they highlight consumer education as a promising solution, supported by strong evidence showing the impact of information dissemination (Annan, 2023; Brailovskaya, Dupas and Robinson, 2024). Our intervention does not provide information about high or hidden fees, it focuses on post-contract exploitation and fraud—areas where Garz et al. (2021) call for enhanced access to complaint and support systems, as well as more robust evidence on the effectiveness of these mechanisms. In response to this call, our paper evaluates the impact of a new initiative aimed at protecting consumer rights. We find that providing support for individuals using informal conflict resolution mechanisms offered by MNOs is essential for empowering consumers and mitigating exploitation.

This paper also contributes to the literature on the effects of access to lawyers, and more generally access to legal institutions, on economic development (Acemoglu and Robinson, 2013; North, 1990). There is convincing new evidence that legal institutions matter, through contract enforcement, the security of property rights, access to credit, which all increase the incentives to invest (Mehmood, 2022; Kondylis and Stein, 2021; Rao, 2022; Boehm and Oberfield, 2020; Amirapu, 2021; Aberra and Chemin, 2021; Chemin, 2020). In particular, our findings align with those of Aberra and Chemin (2021), who identify positive causal effects of access to lawyers, in the context of small-scale farmers engaged in land disputes. Like Aberra and Chemin (2021), we observe that the impact of legal access does not primarily stem from the threat of formal litigation, as few cases reach the courts.

Instead, its effects are mediated through alternative mechanisms such as arbitration, mediation, negotiation, and persistence. In our study, we contribute to this literature by proposing a novel causal pathway through which access to dispute resolution mechanisms matters for the process of economic development, specifically for the case of mobile money: improved access enhances both the usage and trust in mobile money systems, which, in turn, promotes positive outcomes such as risk-sharing and expanded access to credit.

The rest of the paper is organized as follows. Section II provides background on the promise of mobile money as well as issues faced by consumers. Section III describes the intervention, with the successes and setbacks encountered in practice. Section IV proposes a conceptual framework to understand the likely effects of the intervention. Section V presents the original data collected. Section VI presents the experimental design and Section VII explains the empirical specification. Section VIII discusses the effects of the intervention on disputes, use and trust of the system, risk sharing and access to credit. Section IX concludes.

II. Background

Mobile money has been hailed as an innovative way to increase inclusion in the financial sector (Aker et al., 2016; Riley, 2018; Suri and Jack, 2016). With this inclusion comes a number of potential benefits that consumers can utilize, including a greater ability to smooth consumption in response to unexpected events, a reduction in transaction costs, and additional access to credit. A body of literature examining the long-term economic effects of having access to mobile money has already been established. For example, Jack and Suri (2014) find that users of mobile money in Kenya experience no loss in consumption in the event of an adverse shock, while nonusers see their consumption drop by 7 percent. In a subsequent paper, the same authors estimate that access to the mobile money system in Kenya has helped lift over 2 percent of all Kenyan households out of extreme poverty (Suri and Jack, 2016). Riley (2018) finds similar results in Tanzania, noting that mobile money users were able to maintain prior consumption levels after a village-level shock, while non-users experienced reductions in consumption.

However, this new financial technology is not without its problems. 49 percent of mobile money users in Uganda report disputes with the company that facilitates the mobile money transactions, according to a recent IPA survey (Mazer and Bird, 2021). Of those, only 20 percent have had their issue resolved, typically by contacting their mobile money agent or by contacting the provider. While the potential benefits of mobile money appear numerous, there is already a clear issue of taking advantage of consumers who use mobile money products (at least in the Ugandan context).

Resolving these problems so that consumers in Uganda can benefit from this new technology in ways similar to those documented in Kenya is of prime interest.

A striking finding from the IPA database is that not one respondent in the survey tried to contact a lawyer to resolve his or her dispute through the legal system.

We ask: what role can lawyers play in addressing consumer protection issues that stem from mobile money transactions? The goal of our project is to test in a field experiment how access to lawyers may resolve these disputes and unlock the benefits of mobile money, in a unique collaboration with the Centre for Technology Disputes Resolution – Uganda (CTDRU) founded by lawyer Silver Kayondo, partner at Ortus Africa, a leading law firm in Uganda.

Until now, there is little evidence on how free access to lawyers can help maintain ethical behavior among mobile money agents and mobile network operators (MNO's). In fact, few have attempted to test the impact of having free access to lawyers on consumer protection of any kind, at least when using rigorous microeconomic techniques like randomized controlled trials (RCT). One exception is Aberra and Chemin (2021), who explore the impacts of small-scale farmers gaining free access to lawyers in Kenya through an RCT. Indeed, they document positive effects for these farmers, including a 20 percentage-point increase in the probability that a case gets resolved and a 17 percent increase in days worked on the land for the treatment group (Aberra and Chemin, 2021). Of course, this does not mean that similar magnitudes will necessarily be found in Uganda, especially if one is looking at the link between access to lawyers and fintech consumer protection as opposed to small-scale farming. Other studies have demonstrated direct positive effects of access to the legal system on legal outcomes, such as winning a court case, but these results do not necessarily hold for more indirect outcomes, like long-term consumer protection and future economic development (Greiner and Pattanayak, 2011; Stapleton and Teitelbaum, 1972).

In the case of digital financial services, Garz et al. (2021) highlight three potential issues with consumer protection: hidden fees, post-contract exploitation, and fraud. In the case of hidden fees, Annan (2019) finds that informing consumers of typical fees involved with mobile money not only impacted their decision making but also helped reduce fraudulent behavior by agents. Brailovskaya, Dupas and Robinson (2024) highlight a potential misconduct by an MNO where the posted digital loan terms differ from the terms applied in practice, thus concealing the rates. They find that providing information on the product actually increases the demand for it.

While strong evidence exists for cases of high and hidden fees, there is no evidence that lawyers may have positive effects on cases of post-contract exploitation and fraud. In order to better understand the facets through which access to lawyers can facilitate consumer protection, more

evidence is needed.

III. The Intervention

The intervention involves offering free legal aid to a randomly selected group of individuals who have unresolved disputes concerning mobile money transactions. The target population is therefore those who use mobile money technology to complete transactions, such as paying utility or rent bills. In order to construct a representative sample of mobile money users, we visit a random sample of villages,[4] in Kampala, Uganda, and then visit mobile money users via a door-to-door survey and ask them if they have had a challenge in the last 90 days. We collect a summary of their biggest challenge and then randomize half of the cases to receive the intervention.

A. The intervention

The lawyers and law students at CTDR-U[5] implement the following legal strategy. They start by recording several pieces of information concerning the date and nature of the complaint as well as the source of the complaint. The cases are about accounts blocked by MNOs, money sent but never received, money sent to the wrong number, or fraud.

The law students encourage the participants to persist and keep visiting customer care centers to resolve the issue, and advise which document to bring and what to say.

If this is unsuccessful, CTDR-U engages in the first of three principal actions to be taken, with each action representing a progressively more severe response from the lawyers towards the service providers. The first step is to simply call the providers and try to resolve the dispute over the phone.

Step two is to write an initial letter to the providers, where CTDR-U states the bill payment number, the date of the transaction, the amount involved in the transaction, and/or the number of the agent responsible for the transaction. They also state that the complainant has not yet received the utility they paid for (i.e., electricity or power tokens) and that attempting to call the service provider was futile.

If the service provider doesn't respond to this letter and/or doesn't take action to resolve the dispute, CTDR-U proceeds to the third step of sending a final warning letter. This letter begins by repeating the facts that were mentioned about the dispute in the prior letter and goes on to state

[4] A village is the most disaggregated geographic level in Uganda. Uganda is divided into 112 administrative districts, each districts is sub-divided into subdistricts, and each sub-district into parish, and each parish into villages.

[5] The team consisted of lawyer and founder Silver Kayondo and law students: Shibah Aryampwera, Ivy Mapfaira, Daudi Mwesigwa, Sheila Okonga and Henry Twinomujuni.

that CTDR-U will take up measures with regulators and/or begin consumer protection litigation against the service provider if they don't take heed of this notice within seven working days.

If there is still no compliance after these three steps, CTDR-U escalates the matter to the regulators (Uganda Communications Commission, UCC, and the Bank of Uganda, BoU). Client consent is sought to undertake this procedure. The regulators passed a series of recent laws mandating MNOs to address complaints in very short times. For example, the Bank of Uganda, which is the regulator of National Payments Systems and therefore the regulator of mobile money, passed on October 2022 the National Payments System Consumer protection act, which provides a dispute resolution mechanism whereby upon receipt of a complaint by a consumer, BoU can ask the MNOs to resolve the case in 24 hours. Yet very few people know about this and few lodge a formal complaint with the Bank of Uganda.

B. Successes

Persistence and help with the customer care centers turned out to be critical in this project. For example, in one case, Moses[6] got deductions of 200 Uganda Shillings every time he was depositing money in his account. Moses did not understand these deductions and did not know how to stop them. He stopped using this MTN line and used instead Airtel. This was an issue because of the lower connectivity offered by Airtel in the location of his business. Moses sells rosaries to nuns. Clients pay him with mobile money. He also pays school fees and receives loans from a bank on his phone. The fact that he could not use MTN was therefore an issue for him. Moses called MTN customer care to try to resolve his issue. There was such a long wait time that he stopped calling. CTDR-U intervened at that time. The law student called MTN who said the deductions can be for repayment on a loan or for a subscription to a service. There is a way to check for such subscriptions with a short code by SMS, provided by MTN to the law student. The law student then checked and discovered that Moses subscribed to a service called "caller tunes": when callers call, they get a music instead of the usual ring. Moses never wanted this service in the first place and immediately stopped that subscription. The deductions immediately stopped. Moses started using his MTN phone line more often, which is important for his business. Moses did not know about this system of subscriptions before and how to check for them, CTDR-U was important here to resolve that issue.

In the case of Rehema, she experienced a blocked account for an entire year, which had funds she could not access. This predicament arose from her acquisition of a SIM card through an agent

[6] All names are changed to respect confidentiality.

rather than at an official Airtel service center. She had not validated the account with a valid national identification number. She then entered 4 times the pin, and got her account blocked. Rehema went to Airtel customer care center. She had her national identification number, but not the physical ID card with her. They turned her down, asking her to come back with the person who had sold her the sim card, but that person was gone. As a result, she could not use her phone for one year. At that point, CTDR-U intervened. A law student accompanied Rehema to the customer care center, bringing with them the valid physical ID card she had since obtained. Following their arrival, Airtel promptly unblocked her number, and the funds were still there. In subsequent interviews, Rehema expressed her frustration with Airtel; however, she is now using her phone frequently.

The two cases above were resolved through sheer persistence with the customer care centers, and help on what documents to provide and what tho say. In other cases, the problem was harder to resolve, with accounts blocked by MNOs, money sent but never received, money sent to the wrong number, or fraud. Table A1 in Appendix A shows examples of such cases with their resolution.

C. Roadblocks

Despite this legal strategy and the successes described above, not all cases were resolved in the timeline of the intervention. In some cases, the money was sent and never received. CTDR-U contacted the MNOs, yet they were difficult to deal with in these cases. CTDR-U's initial plan was to secure a Memorandum of Understanding (MOU) with the MNOs to facilitate dispute resolution. One MNO signed the MOU, but did not resolve any cases through that mechanism. The other MNO never signed the MOU. In private meetings with one MNO, their lawyer said: "in 99.99 percent of the cases (sic), the system works. The rest of the time, it's customer's fault." The solution suggested by the MNO is to give more digital information to consumers, not necessarily to resolve disputes that may arise. The situation is compounded by the duopoly nature of the Uganda mobile money market, with few incentives to treat customers right.

CTDR-U also encountered some issues with the regulators. In Uganda, the two regulators are the Uganda Communications Commission (UCC) and the Bank of Uganda (BoU). In a very positive move, during the course of the intervention, BoU drafted new regulations to resolve cases in 24 hours.[7] However, when CTDR-U forwarded cases to one regulator, they never responded. A request for an interview with one regulator was denied. A similar request was granted by the other regulator who asked CTDR-U to forward them cases. When we said we had already done so and

[7] https://ulii.org/akn/ug/act/si/2022/103/eng@2022-09-09

never gotten a response, they said we should probably go to court.

The issue is that the MNO contract stipulates that in case of a dispute, the litigant cannot go to court but instead should go to arbitration, which is unaffordable for most people. For example, one of the arbitrators in Uganda offers their arbitration services for 750 USD for the smallest disputes possible (less than 50,000 USD)[8], which is much more than the disputes in this project (on average 25 USD PPP). These arbitration services are designed for large businesses, not for small claims.

CTDR-U then went to small claims court for these unresolved cases. Small claims courts would have been ideal since they concern small disputes (the case in this study), and are simpler and faster than regular courts. People do not need legal representation, which is appropriate in this study since law students cannot represent clients in court.

The issue is that the small claims court CTDR-U visited said this was not the right forum since small claims court is for cases between individuals, not between an individual and a company as in these cases. This is not true: section 8.1. of the Uganda Small Claims Procedure Rules states that: "Only a natural person may institute an action in court, but a body corporate may become a party to an action in a court as a defendant."[9]. When CTDR-U explained this, they were recommended to go to the high court to file a case. However, the high court said these cases were too small. Indeed, small claims court are a better forum since there is an upper limit to cases that can go to small claims court, of Ugx. 10 Million (approximately 8,000 USD PPP), which corresponds well to the cases in this project. The small claims courts did not agree to CTDR-U filing a case.

Table B1 in Appendix B shows other examples of unresolved cases. Overall, the MNOs, the regulators as well as the court system opposed significant resistance to the resolution of these cases. In the section below, we provide a conceptual framework summarizing the potential effects of the intervention despite this resistance.

IV. Conceptual framework

In Appendix C, we develop a model of disputes in customer care centers between consumers and MNOs. A customer engages in some economic activity and deposits money on his MM account. A fraction of these deposits is expropriated by the MNO. This can take the form of outright deductions as in the case of Moses (recall that 200 Ugx was deducted every time he was depositing money) or blocking an account with money on it, as in the case of Rehema. Consider the effects on incentives: if a fraction of deposits is expropriated every time and it is hard to switch to another provider, we show in the appendix that this reduces the effort level of the entrepreneur, and therefore economic

[8] https://icamek.org/wp-content/uploads/2022/01/ICAMEK-ARBITRATION-RULES-2018.pdf
[9] https://ulii.org/akn/ug/act/si/2011/25/eng%402011-05-27

development.

Three types of sanctions can nonetheless discipline the MNOs. First, the MNO can suffer a loss of future earnings from this particular customer since the customer can threaten to abandon the services of the MNO. This is not entirely credible if the MNO holds significant market power. Think of the extreme case of a monopoly where the customer must transact with the MNO if he wishes to access any MM services. The case of Uganda is a duopoly with two large firms sharing the market. Each MNO benefits from the decision of the customer to leave the other MNO. If the two MNOs collude, the threat of switching is ineffective.

The second type of sanction would be a reputational loss, yet once again any reputational loss by one firm directly benefits the other firm, which can lead to a low-level equilibrium of low reputation for both firms and no effect of any further reputational loss.

The third type of sanction is to engage in conflict resolution mechanisms, which is costly for the MNOs. As explained above, the lawyer and law students at CTDR-U follow multiple strategies, they: 1) accompany the client at customer care centers, 2) send a letter, 3) escalate to regulators, and 4) litigate in court. In this project, option 1 turned out to be more important since the threat of using the courts was not credible. In these customer care centers, the customer resolves the dispute with a certain probability after a certain time and incurs some costs (time and stress). We show in Appendix C that a decrease in these costs for the customer, as is the case with the treatment in this paper, increases the incentives for the customer to complain in the customer care centers. This has a direct consequence for the MNOs: they incur some costs of addressing the complaint (which consists in running the customer care centers) and might have to repay the customer in the end. These costs can be so large as to deter misbehavior in the first place, which will encourage customers to deposit money and engage in economic activity.

We now turn to the data and the randomized experiment to measure whether the intervention was overall successful or not in resolving cases.

V. Data

The target population consists of those with an unresolved mobile money disputes. We restrict our sample to Kampala, the capital. In order to construct a representative sample of Kampala, we randomly sampled a list of "villages", the most disaggregated geographical unit in Kampala. Access to legal solutions to resolve mobile money disputes may have strong economic repercussions on owners of informal businesses using their mobile money services for their businesses. To make sure we visit villages with informal business owners, we stratified the data by informal business

ownership to ensure that we survey some villages with a high proportion of business owners. We also stratify the sample by education levels to ensure we reach low education, disadvantaged sections of society. Appendix D gives detailed information on how this was done.

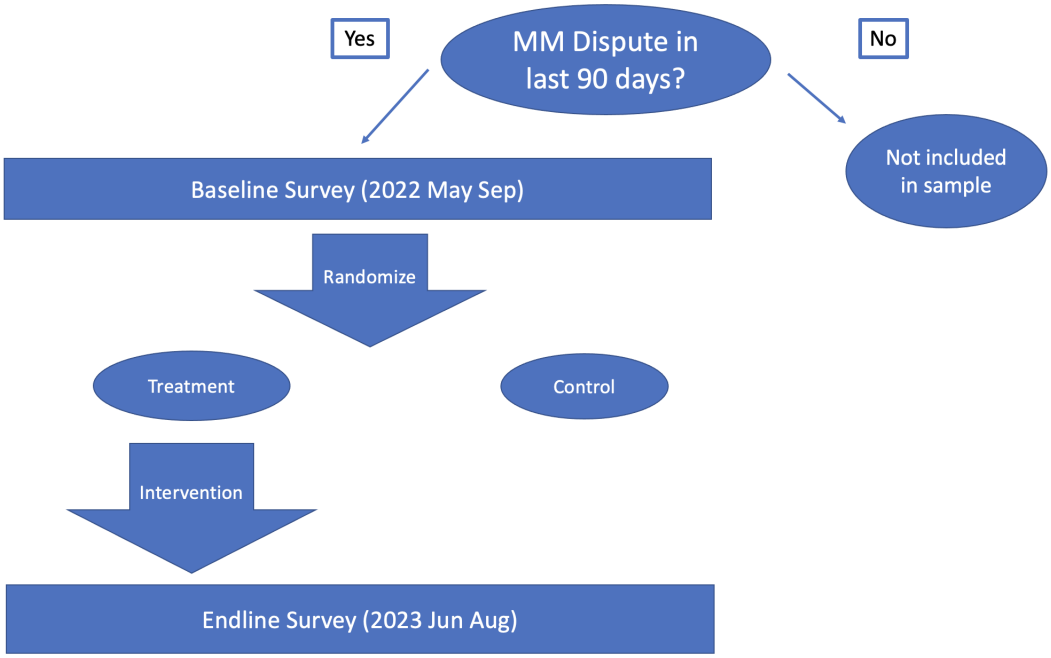
Our recruitment strategy is to visit these villages to first introduce ourselves to Village Health Team (VHT) and Chairman Local Council (LC1) leaders. VHTs are volunteer community health workers who deliver predominantly health education and preventive services in communities. They have a good knowledge of the communities they serve. They act as a referral for households in their communities which have encountered a mobile money issue. Chairman Local Council (LC1) also need to be informed of any research going on in their village, they act as a source of referral after getting their consent.

We first collected a "screening" questionnaire to verify the eligibility for this study. We asked whether people had a mobile money dispute in the last 90 days, such that the dispute was still fresh in their minds. The fieldworkers determine eligibility of the cases in the field, using a list of eligible cases determined by CTDR-U. We asked whether people already had a lawyer on the case, since we did not want to displace existing lawyers. Finally we asked whether the person was interested in getting legal aid. All those people answering positively to all three questions became eligible for the study.

We then collect a baseline survey on the cases deemed eligible in May to September 2022. The study design is summarized in Figure 1.

We collect surveys on 817 participants. This sample size was calculated after the following statistical power calculation. The effect size depends on the complexity of the problem that mobile money app users are facing. To illustrate two different levels of complexity, consider the following examples. If there is direct fraud where the recipient didn't receive the money because the mobile money company decided to keep it, it will take days for the MNO to investigate. The team at CTDRU assumed that about a quarter of these complex issues get resolved. On the other hand, other types of problems were deemed easier to detect and thus easier to resolve. One example of this is when money gets stuck on aggregators or third parties, especially when electrical power is down, and transactions are impossible to complete. These aggregators can end up being debited money even though no account is credited. These cases were considered easier to identify and resolve. The CTDR-U team assumed a 40 percent chance of resolution. Furthermore, they assumed that these problems would be about equally prevalent. Therefore, in the treatment group the expected resolution rate is 0.5 * 25% + 0.5 * 40%. This gives us an overall expected resolution success rate of 32.5 percent. For the control group, we assumed a resolution rate of 20 percent, since in the IPA

FIGURE 1. STUDY DESIGN



survey data 20 percent of those who had disputes were able to successfully resolve their case. In order to calculate the sample size necessary to detect a difference in resolution rates between the control and treatment group (20 percent and 32.5 percent respectively), with an alpha of 0.05 and a power level of 80 percent, we needed a sample of 792 respondents.

We now provide some summary statistics on the data. People use mobile money for a variety of reasons, such as sending and receiving money, as well as saving, as shown in Table 1 below.

In our sample, 31 percent of the sample uses MTN, 54 percent use Airtel and 15 percent use both MTN and Airtel, as shown in Table 2 below. The three numbers sum to 100, which shows that there are essentially only two companies in Uganda.

The duopolistic nature of the market may explain the challenges experienced by customers, who frequently complain about poor customer care. Table 3 below shows what type of challenges people have encountered. The most frequent challenge is with customer care: 42 percent of the sample say they could not figure out how to reach it, and 32 percent say it is of poor quality. The intervention can be useful here, informing people how to reach customer care and telling people to keep the pressure on.

The second most frequent challenge is "unexpected or unclear fees". The intervention can also be useful here, in clarifying these fees.

Our data collection strategy delivers a representative sample of Kampala. In Appendix E, we

Table 1—Mobile Money Use

	Percent of respondents
Send money to friends/family	92
Receive money	94
Buy Airtime	87
Save or Keep Money	51
Pay bills/purchase items	33
Make payments for business	7
Receive payments for business	6
Buy internet data bundles	3
Receive Salary	3
Gambling	2

Note: Answers to the question "What do you use mobile money for?". Multiple answers are possible.

Table 2—MNOs

	Percent of respondents
MTN used in last 90 days	31
Airtel used in last 90 days	54
Both used in last 90 days	15

compare our dataset to the Uganda National Panel Survey 2018-2019 (UNPS), the Kampala Informal Sector Survey (ISS) 2016, and the random digit dialing IPA survey conducted in Uganda in 2020 (Mazer and Bird, 2021). Looking at the normalized differences, we find the same pattern of business ownership, number of employees in the business, the same difficulties when starting a business (shortage of capital being the most prevalent), consumption, borrowing, prevalence of negative shocks, the likelihood to recommend the MNO or mobile loan provider, the proportion of the sample using MTN, Airtel, or both, and the uses of mobile money. Our sample is poorer than Kampala (USD PPP 5 per day per capita versus 9 in Kampala), which is logical since we made an effort to survey villages with low education levels by stratifying the sample by education level, to ensure that we surveyed low education places and not only high education villages (the full procedure is explained in Appendix D). Our sample is poorer than the Kampala average, and actually very similar to the Ugandan average.

The basic descriptive statistics of our sample of mobile money users with active challenges are similar to these three datasets because the criteria to be eligible in the study are not too constrain-

Table 3—Challenges

	Percent of respondents
Could not figure out how to reach customer care when I needed it	42
Unexpected or unclear charges or fees	42
Agent charged you extra to complete a transaction	35
Blocked MM account	34
Poor quality of customer care	32
Fraudster tricked me into sending them money	31
Money was missing or taken without your permission from your account	26
Sent money to wrong number by mistake	24
Difficulty using short code menu or smartphone app	23
Agent did not keep your information safe or private	3

Note: This is answers to the question: "I am going to list a number of challenges some consumers like you have experienced when using the products. Please tell me if you experienced any issues."

ing: 97 percent have a cell phone in Kampala (individual or shared within the household, according to the to the Uganda National Panel Survey 2018-2019, a figure which may have increased since then) and numerous people are experiencing challenges with mobile money (Mazer and Bird, 2021).

VI. Experimental Design

To test whether legal aid provided by CTDR-U helps resolve disputes, increases trust and usage of mobile money, we implement the following experiment:

1) Treatment group: this group received legal aid from CTDR-U

2) Control group: this group continues business as usual

We then randomized at the individual level, using a paired randomization design (with Mahalanobis matching), following Bruhn and McKenzie (2009). To build pairs, we match on the baseline outcomes of interest (proportion of disputes resolved, trust in mobile money operators and use of mobile money), geographic indicators (village), and basic demographics (gender, age, income).

This paired matching randomization design improves the balance between the treatment and control groups. Moreover, it allows us to address the differential attrition that may occur between the treatment and control groups. The control group may drop out of the study if they do not see the point of the study. Conversely, the treatment group might drop out out of the intervention if they deem their disputes too small financially, or when they have to travel to CTDR-U's offices to sign a consent form for legal services. We provide a robustness test in this paper where we drop out the entire pair if one observation of the pair drops out. This ensures that attrition occurs at the same rate in the treatment and control groups. We find that the results remain very similar when we do this.

In Appendix F, we test for balance of all the variables used in the paper. We find no significant differences between the treatment and control groups for: baseline trust in MNOs, the type of disputes (whether they are caused by the MNO, due to fraud or money missing from account), the financial amount of the disputes, all the demographic variables used as controls such as being the household head, access to information (newspaper, radio, TV), income, marital status, and reliance on agriculture for consumption. We also find good balance for the risk sharing variables, i.e., consumption levels and the prevalence of negative shocks and credit and savings.

We then collect an endline survey, from June to August 2023, approximately a year after the baseline. We managed to survey 656 of the 817 baseline participants. We were unable to reach the rest of the participants since some of them had moved out of the area. We control for this attrition with our paired randomization strategy explained above. We also do not find any evidence of differential attrition across treatment and control groups. When we use the standard corrections for attrition (Lee bounds), we find similar results.

We obtained ethical approval for this project,[10] and filed a pre-analysis plan.[11]

VII. Empirical Specification

The research questions is: does access to legal aid help resolve mobile money disputes, and increase trust and usage of mobile money. All of these outcomes were specified in our pre-analysis plan. To answer this question, we estimate the following specification:

$$Y_i = \beta_0 + \beta_1 Y_{i0} + \beta_2 Treatment_i + \beta_4 X_{i0} + \epsilon_i$$

Y_i is the outcome of interest in the endline survey (resolution of mobile money disputes, increase in trust and usage of mobile money). The subscript i corresponds to individual i. The variable $Treatment_i$ takes on a value of 1 if the individual is treated, 0 otherwise. Y_{i0} is the value of the outcome at baseline, such that this is an ancova specification (McKenzie, 2012).

X_{i0} is a vector of controls measured at baseline which can include: the relationship with household head, how often the individuals reads a newspaper, hours of radio per day, hours of TV per day, income, marital status, whether the household relies on agriculture for consumption.

ϵ_i is a stochastic error term. Standard errors are robust.

To address the issue of multiple hypothesis testing, we use the Sharpened False Discovery Rate (FDR) adjusted q-values (Anderson, 2008). Intuitively, this method adjusts the p-values by dividing the significance level by the number of hypotheses tested in a family of outcomes, taking into account the rank of the variable according to its p-value within the family.

We also use the exact Fisher test (Young, 2019). This permutation test is an exact test regardless of sample size or distribution of error term, as opposed to conventional t-tests which depend on the assumption of large samples (to use asymptotic results), a condition that may be violated in our sample. To implement this procedure, we obtain the observed t-stat for the outcome in question, permute the observations randomly between the treatment and control groups, obtain a t-test, repeat this 1,000 times, and record the proportion of times a t-stat is above the observed t-stat, which is the Fisher p-value.

[10] Uganda National Council for Science and Technology (UNCST) SS1255ES; Mildmay Uganda REC, MUREC-2021-87; IPA IRB Protocol #: 16011

[11] AEARCTR-0009146. In our pre-analysis plan, we had planned for another treatment arm that consisted in creating a web page where the different letter formats are posted, as well as the contact information of the complaints department for the different institutions, such that clients would be empowered to complain on their own. Due to budget considerations and lack of statistical power, we did not implement this treatment in the end. It remains an avenue for future research.

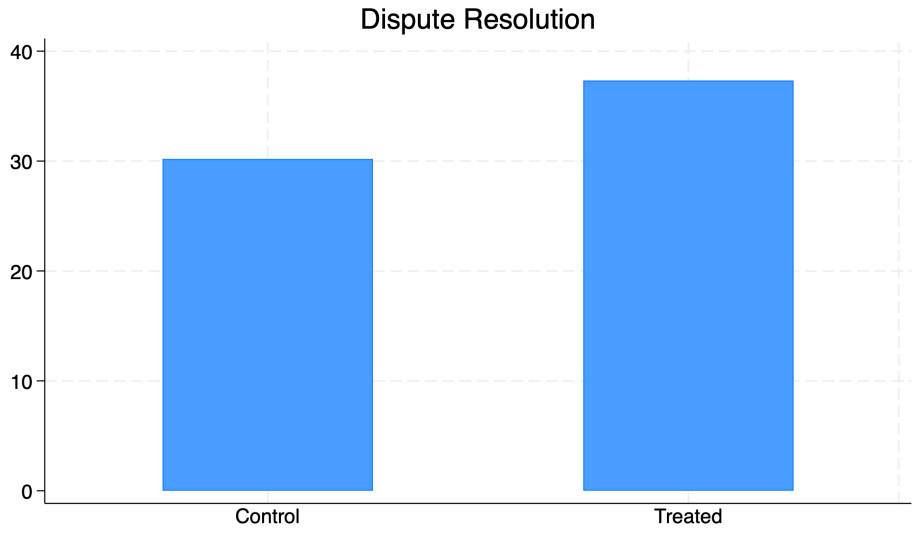
VIII. Results

A. *Effects on Mobile Money Disputes, Use and Trust of the System*

The pre-analysis plan specified as primary outcomes: the proportion of disputes resolved by CTDR-U, use and trust of the system.

Before turning to regression results, we show the raw data on the resolution of mobile money disputes in Figure 2. While the resolution rate is 30 percent in the control group, it increases to 37 percent in the treatment group. This represents a (7/30=) 23 percent increase in the resolution rate. The regressions below find the difference to be statistically significant.

Figure 2. Effects on Resolution of Mobile Money Disputes



Note: The question is: "Did you resolve the issue?" (0=No, 1=Yes). Participants were asked to remember the case that we discussed in the baseline survey. To help people remember, the fieldworkers recounted the summary of the case. The summary of the case was displayed on the tablets used for data collection.

The resolution rate is not 0 in the control group. People have other means to resolve their disputes outside of CTDR-U. When asked how they resolve their disputes, people answer that they contact their providers (48 percent), their agents (17 percent) or a friend (9 percent), as shown in Table 4. The striking finding of this table is that 34 percent take no action, and no individual contact a lawyer. The treatment attempts to change this by providing legal support to resolve these disputes.

The resolution rate is also not 100 percent in the treatment group. Recall that CTDR-U encountered numerous roadblocks from MNOs, regulatory bodies and courts. Some cases are left unresolved even after the intervention.

Despite these roadblocks, there is still a statistically significant difference between the treatment

Table 4—Method of resolution at Baseline

	Percent of respondents
Contacted provider	48
No action taken	34
Contacted agent	17
Asked a friend to help	9
Contacted police	2
Stopped using this account	1
Went to different agent	1
Contacted person who received money	1
Contacted a lawyer	0
Contacted regulatory authority	0

Note: The question is "How did you try to resolve this issue?". Multiple answers are possible. The data is from the baseline survey.

and control groups. This is also visible when we ask about the satisfaction with the resolution of the disputes, displayed in Figure 3 below. CTDR-U not only improves the resolution, but also the satisfaction with this resolution.

Table 5 shows the regression results. There is a statistically significant increase in disputes resolved (Column 1), the satisfaction with disputes resolved (Column 2), use (Column 3) and trust in the system (column 4).

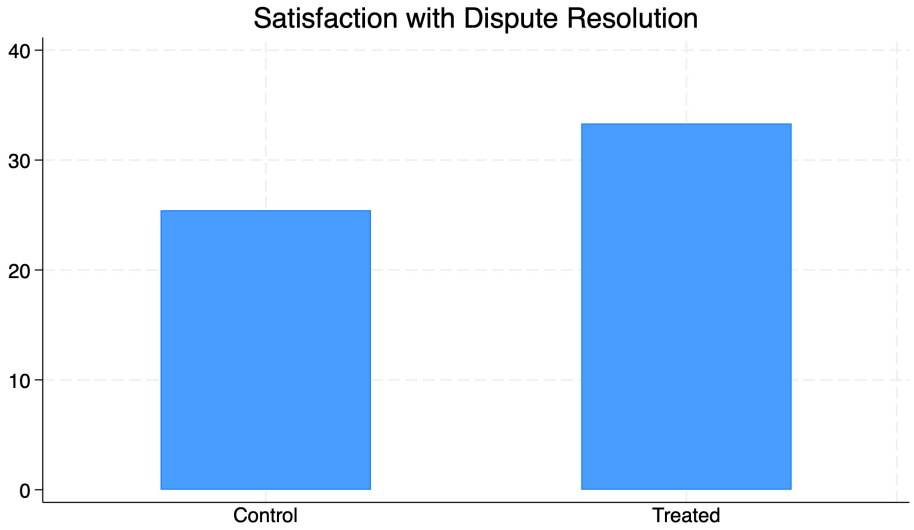
Columns (1) and (2) show similar results as in Figures 2 and 3.

In Column (3), the question is "How did this experience affect use of this service?". The answers are coded on a 3 point scale with 3=Did not affect usage, 2=Reduced usage, 1=Stopped.[12] The results are the same when we use a dummy 1=Did not affect usage, and 0=Reduced or Stopped, however we show the result for the 3-point scale since "Reduced usage" is not the same as "Stopped". Column (3) shows that usage increases by 0.11 from a baseline level in the control group of 2.47. This corresponds to a (0.11/2.47=) 5 percent increase. This is exactly what we find when we consider the dichotomous variable equal to 1=Did not affect usage, and 0=Reduced or Stopped, with a 5 percent increase.

In Appendix G, we show the results at the extensive margin (1=Did not affect usage versus 0=Stopped) and at the intensive margin (1=Did not affect usage versus 0=Reduced). Both margins are affected, the results are slightly larger at the extensive margin. In other words, respondents in

[12]Other options are: switched providers (2.7 percent of the sample) and switched agents (0.8 percent). However, these options are so rare that we abstract from them and focus on the 3 options explained in the main text. To avoid losing data, we recode the few cases of "switched provider" and "switched agents" as 3=Did not affect usage, since switching providers and agents does not necessarily mean a reduced usage. Dropping these few cases does not make a difference to the results.

Figure 3. Effects on Satisfaction with Resolution



Note: The question is "Were you satisfied with the resolution of your issue?" (1=Yes, 0=No).

the control group drop the service rather than scale down usage.

Overall, we find that the treatment increased the likelihood that people continue using the system and not reduce or even stop their usage. In the next section, we use another measure of the use of mobile money with remittances to confirm that use of the system has increased in the treatment group.

In Column (4), the variable is measuring trust in the system of mobile money. It is composed of two variables capturing the ecosystem of both mobile providers and agents. The average trust in the control group is 57.7 percent as shown in Column (4), which can be understood as a 57.7 percent approval rating. This figure increases by 4.5 percentage points in the treatment group, hence a (4.5/57.7=) 8 percent increase in trust.

In Appendix H, we experiment with this trust measure by adding 8 other variables measuring the likelihood of MNOs to cheat, their propensity to share information, the likelihood of agents to cheat, or trust with mobile loan providers. We find very similar results no matter what the trust variable is.

The results remain the same when we control for all the demographic variables measured at baseline: being the household head, how often the individuals reads a newspaper, hours of radio per day, hours of TV per day, income, marital status, whether the household relies on agriculture for consumption. Appendix I shows the results. The results are also exactly the same if we include the control variables one by one instead of all together.

Table 5—Effect on Resolution of Mobile Money Disputes

	(1)	(2)	(3)	(4)
	Dispute Resolved	Satisfied with Resolution	Use	Trust
Treated	0.071*	0.079**	0.11*	4.49***
	(0.037)	(0.036)	(0.056)	(1.66)
Robustness:				
FDR q-val	0.046**	0.046**	0.046**	0.029**
Fisher p-val	0.047**	0.03**	0.04**	0.009***
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	643	634	630	654

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. Participants were asked to remember the case that we discussed in the baseline survey. To help people remember, the fieldworkers recounted the summary of the case. The summary of the case was displayed on the tablets used for data collection. The variable "Treatment" takes on a value of 1 if the individual is treated, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the trust measure is composed of two questions designed to capture trust in the mobile money ecosystem. The first question is: "How likely is it that you would recommend your preferred mobile provider to a friend or colleague?" (measured on a 10 point scale where 0 means you are not at all likely to recommend and 10 means you are extremely likely to recommend. The second question is: "How much do you trust mobile money agents to act in your best interests?" (1=Completely, 2=Mostly, 3=Somewhat and 4=Not at all). We rescale both variables on a 0-100 scale where more means more trust.

The results remain significant when using the FDR q-values accounting for multiple hypothesis testing. Intuitively, for this family of 4 outcomes in Table 5, the best ranked p-value (i.e., Trust in Column (4)) is 0.007, below 10 percent/4 outcomes*1 (first-rank)=0.025, hence still significant at 10 percent. In fact, the adjusted p-value is 0.029. All the other variables are also significant.

The difference between treatment and control groups is also statistically significant when using the Fisher test as shown in Table 5. In fact, the results are even more significant, highlighting the fact that randomization inference is more appropriate than standard t-tests which assume large samples.

In Appendix J, we find no differential attrition between the treatment and control groups. In Appendix K, we find similar results when we use our paired randomization design to eliminate all pairs that have attrited.

We find some evidence of positive spillovers in Appendix L. We use the GPS data collected on all participants to measure the number of treated households living in the vicinity of each household in the control group. We find that satisfaction with the resolution and trust in the system increase for control households with the number of treated households living nearby. This is logical since

part of the intervention consisted in giving information about mobile money, and telling people to persist with customer care centers. This information may have reached the control group living nearby. The intervention thus has indirect positive effects on the control group. The estimates found in the main analysis are thus a lower bound on the true effects of the intervention. It could also be the case that the intervention led MNOs to improve customer care service for everyone living nearby more intensively treated zones.

For the sub group analysis, the pre-analysis plan included subgroup analyses by:

- Socio-economic background of respondent: lower income respondents may have less access to formal legal institutions and benefit more from the intervention
- Type of dispute: some disputes may be easier to resolve than others
- Financial amount of the dispute: smaller disputes may see a quicker resolution on the part of the mobile money operators

Appendix M shows the results. We find no heterogenous effects with income. We conclude that all sections of society benefit equally from the intervention, not only the wealthy or the poor.

For the sub group analysis with respect to the type of dispute, we look at the actual dispute and classify them into three types. First, we identify cases where the MNO is at fault. Such cases may be easier to resolve since there is only one counter-party. Other cases involve fraud. Such cases are criminal in nature, and involve the police that must find the fraudster. These cases may be harder to resolve. Other cases are those where the money is missing in the account. Those cases may also be harder to resolve since there can be a lack of evidence in some cases. Even though the respondent says money is missing, it can be difficult to provide evidence that the money is missing. MNOs might be less responsive to those cases. We are able to classify most cases into these three different groups.

We find clear evidence of success of the intervention for cases where the MNO is at fault (for example, money sent but not received, with clear evidence that the money was sent). There is a smaller effect for cases of fraud, although the coefficient on dispute resolution is close to the main coefficient. The treatment does not increase trust in mobile money like in the other cases, probably because the initial problem was not with MNOs but with a fraudster. Cases with "money missing from account" are also harder to resolve, since there can be a lack of evidence in some cases. We notice an increase in trust in the system after the intervention, maybe because such people got convinced by the end of the case that the problem was with them, not with MNOs.

Finally, we find no heterogenous effects with respect to the financial amounts of the disputes: all cases are resolved equally independent of the size of the dispute.

While the pre-analysis plan did not include this sub-group analysis, we present in the Appendix the heterogeneous effects by gender. Table M6 shows that the effects are slightly larger for females than males in Table M7.

B. Effects on Risk-sharing

The pre-analysis plan specified as secondary outcomes the outcomes identified in the existing literature on mobile money as the potential benefits of this new technology: risk sharing and greater access to digital finance (savings and credit).

Concerning risk sharing, the theory is that households receiving negative shocks may be better able to smooth consumption through receiving remittances with mobile money. In the control group, we found that after a MM challenge, people scale down their usage and even stop using MM, such that they are not active in the system. They are thus less likely than the treatment group to receive MM remittances in case of a negative shock. The treatment group uses more mobile money, i.e., sends and receives more. Therefore, one can hypothesize that with the intervention and a negative shock, treated households will receive more through mobile money because they are more active with the system.[13]

Households receive numerous negative shocks, as shown in Table N1 in Appendix N. The most prevalent shock is illness of a household member: fifty-six percent of the sample has experienced such a negative shock in the last 6 months. Other shocks are: death of a household member, theft, or accidental injury.

We define a dichotomous variable equal to 1 if the household experienced a negative shock in the last 6 months, 0 otherwise. We then interact it with the treatment dummy, and look at the effects on consumption[14] in Table 6 below.

Recall that there can be risk-sharing in the control group since people have mobile money in the control group. Use and trust of mobile money increases in the treatment group, therefore there should be more risk-sharing in the treatment group. The control group is not a situation where

[13]The effect is unlikely to come from the sender in the social network being also treated: we did not make an effort to target individuals in the same social network such that it is unlikely that individuals in the treatment group belong to the same social network.

[14]We use the logarithm of total annual household consumption, measured in USD PPP. Consumption is calculated by aggregating consumption on 19 different items: In the last 1 month, how much did this household spend on: Food (including bread, butter, sugar, etc.), Snacks and restaurant meals consumed outside, Tea and/or coffee, Tobacco, cigarettes, cigars, Beer and other alcoholic beverages, Toiletries (e.g. soaps, combs, cosmetics), House rent, Land rent, Transport, Healthcare related costs, Domestic assistant; in the last 3 months how much did this household spend on: Clothing and shoes, Household items: ex radio, plates, cups, etc; in the last 1 year how much did this household spend on: Household items (other), School expenses: tuition, exam, textbooks, School expenses: tutoring, Funeral expenses, Brideprice expenses (for own and other's), Religious tithes/offertories. All categories are converted into annual amounts.

there would be no risk-sharing while the treatment would fully engage households in risk-sharing. The difference between the control and treatment group is more a matter of degree.

In Column (1), we see that the impact of a negative shock is not significantly different from zero negative in the control group. This is evidence of some risk-sharing in the control group. Recall that there can be risk-sharing in the control group since people have mobile money in the control group. The control group is not a situation where there would be no risk-sharing while the treatment would fully engage households in risk-sharing. The difference between the control and treatment group is more a matter of degree. Use and trust of mobile money increases in the treatment group, therefore there should be more risk-sharing in the treatment group.

This is what we find in Column (1): the coefficient of "Treated * Negative Shock" is positive. Our interpretation is that the treatment group is able to collect resources to weather these negative shocks and pay for the added expenses.

The positive effect on consumption in the treatment group is understandable when one thinks about the nature of shocks. Most negative shocks are due to the illness of a household member. In this case, households must spend more on healthcare expenses, which is one category of the consumption variable. In Column (2), we restrict the negative shocks to only illnesses in the household. We find the same result, which confirms that these shocks drive the result. Illness means added expenses, in terms of healthcare costs. The treatment group is better able to collect additional resources to pay for those.

Results remain the same when we use the financial amount of the shock in Column (3).[15] Here we see that for a shock of 1000 USD (which is approximately 10 percent of income), then consumption increases by 1 percent for those with a shock (which is evidence of risk-sharing in the control group). The result is much larger for the treatment group: an increase of 10 percent in consumption. Therefore, a shock of 10 percent of income is matched by a 10 percent in consumption: households are able to pay for the added health expenses.

The result is even more significant when we restrict our attention to large negative shocks in Column (4). We define a large negative shock as a negative shock of strength 4 or 5 on a 5-points scale. Therefore the treatment increases the weathering of strong shocks.

These results were defined for multiple shocks received in the household. The result remains the same in Column (5) if we focus on the first shock mentioned by the household, presumably the most important one.

Focusing on the first shock allows us to study whether that shock was an idiosyncratic shock or

[15]All financial amounts in this paper are converted to USD PPP, at the conversion rate of Ugx. 1,221.99 (source: The world bank development indicators, PPP conversion factor, private consumption (LCU per international $).

Table 6—Effect on Consumption

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Log Consumption				Remittance received?
Treated	-0.18	-0.11	-0.078	-0.10	-0.18	-0.13	-0.16**
	(0.11)	(0.083)	(0.054)	(0.075)	(0.11)	(0.091)	(0.075)
Negative Shock	0.024						0.078
	(0.071)						(0.060)
Treated * Negative Shock	0.24*						0.19**
	(0.13)						(0.087)
Illness		0.050					
		(0.070)					
Treated * Illness		0.19*					
		(0.10)					
Amount of Negative Shock (In 1000 USD PPP)			0.0098***				
			(0.0012)				
Treated * Amount of Negative Shock			0.099***				
			(0.025)				
Large Negative Shock				0.066			
				(0.065)			
Treated * Large Negative Shock				0.20**			
				(0.10)			
First Shock Negative					-0.020		
					(0.071)		
Treated * First Shock Negative					0.24*		
					(0.12)		
Negative Idiosyncratic Shock						-0.037	
						(0.068)	
Treated * Negative Idiosyncratic Shock						0.20*	
						(0.11)	
Negative Common Shock						-0.15	
						(0.19)	
Treated * Negative Common Shock						0.025	
						(0.27)	
Control Group mean	8.85	8.85	8.85	8.85	8.85	8.85	0.54
SD	0.74	0.74	0.74	0.74	0.74	0.74	0.50
Observations	645	645	645	645	645	645	654

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Columns (1) to (6), the dependent variable is the logarithm of total annual household consumption, measured in USD PPP. In Column (1), "Negative Shock" is a dichotomous variable equal to 1 if the household experienced any negative shock in the last 6 months, 0 otherwise. "Treated * Negative Shock" is an interaction term between Treated and this "Negative Shock" variable. In Column (2), "Illness" is a dichotomous equal to 1 if the household has experienced an illness of an HH member in the last 6 months, 0 otherwise. In Column (3), the explanatory variable is the amount of the negative shock (In 1000 USD PPP). In Column (4), the variable "Large Negative Shock" is equal to 1 if the shock is negative and of strength 4 or 5 on a 5-points scale. In Column (5), "First Shock Negative" is equal to 1 if the first shock mentioned by the household is a negative one, 0 otherwise. In Column (6), the variable "Negative Idiosyncratic Shock" is equal to 1 if the individual answers that this shock only affected just this household, 0 otherwise. The variable "Negative Common Shock" is equal to 1 if the shock affected other households in the area (to be precise several households in this village, all households in this village, or several villages in this area). In Column (7), the dependent variable is equal to 1 if the household has received a remittance in the last 6 months, 0 otherwise.

a common shock. Intuitively, only idiosyncratic shocks are insurable by mobile money. If other households also experience the shock, they will not be able to send remittances. We find this is the case here. In Column (6), we define a shock as idiosyncratic if the individual answers that this shock only affected just this household. Similarly, we define a shock as a common shock if it affected other households in the area (to be precise several households in this village, all households in this village, or several villages in this area). Column (6) shows that risk-sharing is more possible for idiosyncratic versus common shocks in line with the prediction from theory. This confirms that mobile money can be especially useful to weather idiosyncratic shocks.

In Column (7), we confirm that the mechanism for risk-sharing goes through mobile money. A majority of the sample (56 percent) has received a remittance in the last 6 months. The overwhelming majority of these remittances are sent by Mobile Money: 88 percent, versus only 6 percent for hand delivery. In Column (7), we find that treated households that receive a negative shock receive more of these remittances, which are coming from Mobile Money. This confirms the mechanism: households suffering a negative shock receive more mobile money remittances to weather these shocks.

We also find that the coefficient of the variable "Treated", i.e., treated households that do not receive a negative shocks, is negative. It is negative as well in all other columns, although not significant. This is the opposite side of risk-sharing: absent a negative shock, households send money to other households receiving negative shocks. Thus, they receive less remittances, instead they send more which reduces their consumption.

C. *Effects on Access to Credit*

Aside from the ability to send and receive money, mobile money promises to improve access to digital finance. Table 7 shows improved access to credit. In Column (1), the proportion of households that have borrowed last year increases by 9.3 percentage points. This represents a (9.3/50=) 18.6 percent increase in access to loans. This increased borrowing comes from mobile money and friends/family, sums of money likely to be sent through mobile money. In contrast, we see no increases in the borrowing from banks, the workplace or the government in Column (3), less likely to come from mobile money.

The result remain the same when we look at the amounts borrowed in Columns (4) and (5).

Table 7—Access to Credit

	(1) Borrowed	(2) Borrowed MM friends family	(3) Borrowed Bank Gov Workplace	(4) Amount MM friends family	(5) Amount Bank Gov Workplace
Treated	0.093**	0.099***	-0.0060	86.5**	11.0
	(0.037)	(0.037)	(0.027)	(39.1)	(115.8)
Control Group mean	0.50	0.46	0.12	142.8	140.7
SD	0.50	0.50	0.32	980.1	793.9
Observations	656	656	656	817	817

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from any sources in the last year, 0 otherwise. In Column (2), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from Mobile Money, friends or family in the last year, 0 otherwise. In Column (2), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from bank, workplace, or government in the last year, 0 otherwise. In Column (4), the dependent variable is the amount borrowed last year from Mobile Money, friends or family. In Column (5), the dependent variable is the amount borrowed last year from bank, workplace, or government.

This is important since most of the respondents own a small business and the main problem faced by business is access to capital.

Table 8 shows that 64 percent of respondents own a business. The nature of businesses are very varied, and include small shops, bars and restaurants, or transport businesses.

We ask business owners the main difficulties in operating a business. The main obstacle is access to finance, as shown in Table 9.

Therefore, the treatment alleviates this number one constraint by improving access to loans.

In our pre-analysis plan, we had also specified savings as an outcome. We do not find any evidence of an increase in savings in Table O1 in Appendix O.

Table 8—Businesses

	Percent of respondents
Does the Household run a business?	64
Food/other goods stalls	10
Shop selling goods	9
Bar/Restaurant	6
Tailoring/Clothes	5
Other business	5
Selling and buying agri products	4
Transport (Boda Boda/Taxi)	4
Welding and Metal works	3
Salon	3
Mechanics/Spare parts	1
Clinic/Drug shop	1
Carpentry (sell crafts)	1
Mobile Money business	1
Construction and building	1

Note: To know the nature of business, we ask what the business is, in an open-ended question. We then read the description of the business and classify them into its main categories.

D. Cost Benefit Analysis

In Appendix P, we calculate the costs and compare them to the benefits of the project. The costs are kept low through the hiring of law students in this project (expenditures of USD 2.7k per month to run CTDR-U).

We measure the benefits in terms of financial amount recovered in the dispute. This is an understatement of the true benefits, since that does not include the beneficial effects observed on risk-sharing, the improved access to credit that alleviates the key constraint of business operations, or the positive spillovers observed on the control group.

Based on a 37 percent resolution rate, we find that the project is not cost-beneficial (see Appendix P for calculations).

We offer a suggestion to improve the cost-benefit ratio of this project. The successful cases were resolved by assisting the respondent with their visits to customer care centers, helping them assemble the documents needed, training them on what to say and sometimes visiting the customer care centers with the consumers. This does not require formal legal training. We hypothesize that a knowledgeable person comfortable with bureaucracy who accompanies the client or makes a phone call on their behalf may achieve the same results. In Appendix P, we calculate that the project could be cost beneficial under some reasonable assumptions with such a person. Of course, more

Table 9—Problems with business

	Percent of respondents
Shortage of Capital / Credit Constraint	35
Taxes too high	6
Low customer turn up	3
Competition	3
Theft	2
Lack of Info on Opportunities	2
Distance to customers	1
Problem of getting licenses	1
Non-availability of labour	1
Debtors/Money lenders	1
Poor infrastructure roads	0

research is needed to verify this.

IX. Conclusion

In this paper, we implement the first randomized experiment giving consumers access to legal aid to defend their rights when facing large mobile network operators. The disputes are small and simple in nature: money is sent but not received, money is missing from the account, or money was sent to the wrong number by mistake. The intervention is simple: the law students assist the respondent with their visits to customer care centers and communicate with MNOs to find a resolution. Cases of fraud are sent to the police. Unresolved cases are escalated to the regulators.

We find that, with this legal aid, more people resolve their disputes, not through the court system which turned out to be inaccessible but through sheer persistence in the customer care centers. Satisfaction with the resolution of disputes increased. Usage and trust in the system improves as well.

This unlocks the positive effects usually associated with mobile money. As more people use mobile money more intensively, we find an increase in risk-sharing: households that receive a negative shock, for the most part an illness of a household member, are able to increase their heath care expenses thanks to remittances received through mobile money. Mobile money fulfills its role of facilitation of risk-sharing, even more so when people receive assistance from CTDR-U which increases their trust and use of mobile money.

Moreover, we find an effect on borrowing: people borrow more from mobile money sources after the treatment. This is important since most people are small-scale entrepreneurs in this context and they state that the most important obstacle to business is access to finance. Therefore, mobile money alleviates the main obstacle to business, but only when people are protected by a sound legal aid support.

This paper thus provides a new microeconomic foundation for the effects of access to conflict resolution mechanisms on the process of economic development: improved access increase trust and usage of risky new technologies, which presents challenges but also tremendous opportunities for growth.

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ONLINE APPENDIX (Not For Publication)

Appendix A: Examples of Success Stories

Table A1—Examples of Success Stories

Summary of Case	Resolution
Account blocked	
Mr. Kalemba repeatedly entered an incorrect pin, his Airtel mobile money account was disabled as a result. The client was called on September 14, 2022. A different individual answered the phone and requested that we call the complainant again the following day. On September 15, 2022, the client received a follow-up call and was instructed to visit the Airtel service center with his National ID. He instead went to an Airtel mobile money agent shop in Kasubi that same evening, thinking it was a service center where he could get assistance.	He contacted CTDR-U because he had been told to reach out to CTDR-U if he ran into any problems. All service centers were closed because it was after 6:00 p.m. The next morning a law student at CTDR-U met up with Mr. Kalemba at the Airtel service center where his account was unblocked.
Sending money to the wrong number	
The Client reported that he lost Ugx.125,000, after sending money to the wrong number. He immediately contacted Airtel call center to block the transaction, which they did. However, the money was never reserved.	CTDR-U assisted the client in contacting Airtel mobile Commerce customer care desk which replied that the money would be returned after one or two days but that didn't happen immediately. CTDRU forwarded the matter to Airtel mobile commerce in order to have the money returned to the client. The matter was resolved. The client reported that the transaction was reversed, and a refund of the money was credited to the client's mobile money account.
The consumer mistakenly sent UGX 50,000 to the wrong number. Despite reaching out to customer care multiple times, they were ignored and received no assistance.	CTDR-U made follow-up calls to both the person who received the money and the responsible Mobile Network Operator (MNO). Eventually, the consumer's money was successfully retrieved
Fraud	
An unknown person withdrew UGX 1.5 Million from the consumer's mobile money account without their knowledge.	CTDR-U collaborated with the consumer and approached the responsible Mobile Network Operator (MNO) to retrieve the transaction details. These details were crucial in enabling the Uganda Police Force to apprehend the thief and recover the stolen money.

Table A2—Examples of Success Stories - Continued

Summary of Case	Resolution
Money disappearing from account	
The consumer reported the loss of Ugx.25000. She sent a friend money in Congo, but the friend never received it. She tried contacting Airtel customer care on several occasions but did not receive any help.	CTDR-U intervened and sent a warning letter to Airtel Mobile Money Limited, in order to retrieve the money. The matter was resolved. 25,000Ugx was refunded to the client's mobile money account.
The client reported that she lost Ugx.18, 000 which was in her mobile money account after her phone was stolen. Upon sim card replacement, the money was not in her account.	The matter was forwarded by CTDR-U to Airtel Mobile commerce. The matter was resolved. The client reported that 18,000 was reversed to her mobile money account upon CTDRU's intervention.
The client reported that she lost her line and replaced it but Ugx.40,000 that was on her account before was not reflected. She has been calling customer service but up to now customer service say they are still working on it.	The matter was forwarded to Airtel Mobile commerce in order to retrieve the money. The matter was resolved. The client reported that her money worth Ugx. 40,000 was reversed to her mobile money account.
The consumer lodged a complaint about an unexpected deduction from her mobile money account. To address the issue, CTDR-U involved both the consumer and the responsible Mobile Network Operator (MNO).	During the investigation, CTDR-U discovered that the deduction was a result of repayment for a mobile money loan that the consumer had previously taken but forgotten about.

Appendix B: Unresolved Cases

Table B1—Unresolved Cases

Summary of Case	Intervention
Money sent, never received	
The client sent Ugx. 48,000 through an Airtel mobile money agent to his brother, however, the brother did not receive the money. He contacted the service Centre but was not helped.	CTDR-U is helping the client obtain the transaction details.
The client was sent Ugx. 20000 from Saudi Arabia. The client never received the money.	The team at the center is in touch with the client to obtain further details about the transaction.
Money disappearing from account	
The client's Mobile Money account had Ugx. 480,000 which was registered in his wife's name. When his wife left for the United Arab Emirates, he misplaced his sim card. When he reported the matter to the Service Centre, he was informed that he couldn't renew his sim card even though he had reported the matter to police. He had a copy of his wife's ID and the wife's communication to Airtel to consent via a phone call. Despite all the above-mentioned efforts Airtel still went forward and gave the number to someone else. The matter is pending response from Airtel.	CTDR-U is acquiring the client's activity report before the sim card swap by Airtel. CTDR-U is in contact with the client and the wife.
The client misplaced his Airtel sim card. After obtaining a police letter he was able to replace the sim card. Upon replacement, 15, 000 Ugx which was in his mobile money account was not there. To this date the money has not been refunded.	CTDR-U is aiding the client with the process of acquiring a mobile money statement.
The client misplaced her phone and the sim card within, and she restored it, but the 40,000 shillings that were previously in her account was not in her mobile money account. She has been contacting customer service, but as of right now, they are still investigating.	The Centre is aiding the client obtain their mobile money statement to ascertain the amounts on her account before the phone was misplaced.

Table B2—Unresolved Cases - Continued

Summary of Case	Intervention
Problems with agents	
An Airtel Mobile Money Agent sent to his mother Ugx. 486,500 using the client's phone. The client had been advised to visit the police station however, the police officers asked for 150,000/- to help her recover the money.	CTDR-U is facilitating/ aiding the client with the process of acquiring a police letter.
Using an Agent, the client deposited Ugx 50, 000 on her account, however the money did not reflect. On several occasions she informed the agent that she had not received the money nor any message indicating the money had been deposited onto her account, but the agent kept insisting that the money had been deposited.	CTDR-U with the help of IPA is locating the mobile money agent, to obtain better details regarding the transaction.

Appendix C: Theoretical model

Suppose an entrepreneur exerts effort $e \in [0,1]$ in his business, of which he has an endowment $\bar{e}$. This yields output A with probability $\sqrt{e}$, and 0 with probability $1-\sqrt{e}$. Thus, output produced is $A\sqrt{e}$. For simplicity, the utility function u of the seller is linear in consumption c and leisure l, $u(c,l) = c + l$, such that there is no risk-aversion effects. The entrepreneur deposits $A\sqrt{e}$ in his Mobile Money (MM) account.

A fraction τ of this deposit is expropriated by the Mobile Network Operator (MNO). This can take the form of outright deductions as in the case of Moses (recall that 200 Ugx was deducted every time he was depositing money). This can take the form of blocking an account with money on it, as in the case of Rehema.

This expropriation reduces the incentives to invest in the business. The entrepreneur only gets to keep $1-\tau$ of his output. Expected consumption is $(1-\tau)A\sqrt{e}$. The entrepreneur chooses e to maximize utility:

$$\begin{aligned} max_e \quad & (1-\tau)A\sqrt{e} + \bar{e} - e \\ s.t. \quad & e \leq \bar{e} \end{aligned}$$

The first-order condition for an interior solution leads to equilibrium effort level $e^* = \left[\frac{(1-\tau)A}{2}\right]^2$.

It is obvious from this expression that if τincreases, the equilibrium effort level e^* decreases.

If $\tau$is announced beforehand and set at a constant level, i.e., if the MNO could somehow commit to a certain level of τ, the situation would be optimal for the entrepreneur. He would maximize profits under this constraint τ.

The fundamental issue is that the MNO can change τat any point, and there are few sanctions for doing so, especially if the MNO holds significant market power and the customer cannot credibly threaten to abandon its services. The simplest way to model power for the MNO is to think of a sequential game:

- Stage 1: the MNO announces a τ
- Stage 2: the entrepreneur decides e^*
- Stage 3: the MNO can change τ

In this game, the MNO is allowed to renegotiate ex-post. In this particular version with no sanctions whatsoever for the MNO, the optimal level $\tau$of expropriation for the MNO is $\tau = 1$. Anticipating this, the entrepreneur exerts level of effort $e = 0$. This is suboptimal since any $\tau > 0$ would benefit both parties: the entrepreneur would exert a level of effort greater than 0, and the MNO would

expropriate an amount greater than 0. Yet, the inability of the MNO to commit to a certain τdue to its bargaining power leads to a situation of full expropriation and no effort provided.

C1. Sanctions

In real life, the MNO may face several sanctions for this behavior.

Loss of future earnings in repeated games

The game was played one-shot, in real life, there are repeated interactions between a customer and the MNO. If the MNO expropriates the entire amount $\tau = 1$, the entrepreneur will not exert effort at the next stage and all future profits are lost for the MNO. In other words, the entrepreneur may announce a grim trigger strategy, exerting e^* if the MNO respects its pre-announced τ and 0 at all future periods (i.e., leave the system) if the MNO ex-post renegotiates and expropriates more than originally announced.

This grim trigger strategy is self-enforcing since the MNO benefits more from respecting the pre-announced τ. With an expropriation rate of τ, the MNO gets $\tau A\sqrt{e} = \tau A\left[\frac{(1-\tau)A}{2}\right] = \frac{\tau(1-\tau)A^2}{2}$. Suppose the MNO discounts the future at a rate β, the discounted sum of the future stream of revenues is: $\sum_{t=0}^{\infty}\beta^t(\frac{\tau(1-\tau)A^2}{2}) = \frac{\tau(1-\tau)}{\beta}\frac{A^2}{2}$. Depending on the specific values of the parameters, this can be more than a one-time big payoff associated with full expropriation and no future revenues. This is the classic result of the Folk theorem, i.e., infinite repetitions increase the incentives to cooperate.

There are two limits to this argument. First, interactions may be finite, not infinite. In this case, the result above collapses since subgame perfect equilibrium dictates that the Nash equilibrium in the last game played leads to full expropriation. By backward induction, all iterations of the game lead to full expropriation. In practice, the life of a customer is finite and therefore finite interactions are probably more realistic than infinite interactions

The other limit to this argument is that this grim trigger strategy is not be entirely credible if the MNO holds significant market power and it is impossible to threaten to switch. In a case of pure and perfect competition, the customer can credibly threaten to leave the system and switch to another provider. In the extreme case of a MNO holding monopoly power, this is simply not credible. The case of Uganda is intermediate, a duopoly with two large firms sharing the market. Each MNO benefits from the decision of the customer to leave the other MNO, therefore the grim trigger strategy described above is not entirely credible since both firms hold significant market power.

Reputational loss

The classic example of a reputational mechanism to sanction ex-post renegotiation is the 11th-century long-distance Mediterranean trade (Greif, 1993). Maghribi traders implemented a "multilateral punishment strategy", i.e., the offended merchant would write a letter to all his trader friends about an offending agent that embezzled precious cargo in this trade. The agent would suffer a reputational loss, which would discipline him in the first place, without requiring the presence of an efficient judicial system.

This seems less applicable in the case of Moses and Rehema against the duopoly of MTN and Airtel. First, there are few avenues for Moses and Rehema to complain against the behavior of these two firms, especially for such small disputes of little monetary value (200 Ugx in the case of Moses). The two large firms MTN and Airtel may also not care about this reputational loss since any reputational loss of one firm directly benefits the other firm. This can lead to a low-level equilibrium of low reputation for the two firms, such that any marginal dispute does not cause any extra reputational losses.

Conflict Resolution Mechanisms

Another type of sanction is the consumer engaging in some form of conflict resolution mechanism. As explained above, the lawyer in CTDR-U follows multiple strategies: 1) visits the customer care centers, 2) sends a letter, 3) escalates to regulators, and 4) litigates in court.

Consider the first action (visits customer care centers) since the other options turned out to be less effective. The consumer persists in customer care centers to resolve the dispute. The consumer resolves the dispute with probability $p < 1$ (the dispute is not automatically resolved), after time T, with cost c (which consists in time and stress). Therefore, the consumer recovers $(p\beta^T - c_p)\tau A\sqrt{e}$ (where β is the discount factor of the customer). The consumer complains in customer care centers only if :

$$p\beta^T - c > 0 \tag{C1}$$

, which we call the complaint constraint (1). A decrease in the costs c, as is the case with the treatment in this paper will increase the likelihood that the litigating constraint holds.

If the complaint constraint holds, the plaintiff complains in customer care centers , and the MNO must pay a sanction of $(p\beta^T + c_{MNO})\tau A\sqrt{e}$ (with c_{MNO} costs for the MNO). The costs c_{MNO} can be large, they consist in the costs of running customer care centers.

C2. Equilibrium

We are now ready to understand the decision of the MNO to expropriate or not. The gain from expropriating is to capture a fraction $\tau$of the output: $\tau A\sqrt{e}$. If the MNO expropriates, it faces three types of sanctions: a loss of future earnings ($\frac{\tau(1-\tau)}{\beta}\frac{A^2}{2}$), a reputational loss (call it R), and a loss due to the complaint in the customer care centers $(p\beta^T + c_{MNO})\tau A\sqrt{e}$.

The MNO does not expropriate if the gain from expropriating is less than its losses:

$$\text{(C2)} \qquad \tau A\sqrt{e} < \frac{\tau(1-\tau)}{\beta}\frac{A^2}{2} + R + (p\beta^T + c_{MNO})\tau A\sqrt{e}$$

We call this the No expropriation constraint (2).

Suppose the loss of future earnings is zero (because of the two limits highlighted above: no infinite interactions and lack of credibility of the threat of switching) and the reputation sanction is also zero (because of limit highlighted above: low importance of reputation for duopolistic firms). Then this condition becomes:

$$1 < p\beta^T + c_{MNO}$$

It is possible that $p\beta^T + c_{MNO}$ is greater than 1, especially if the costs to address complaints c_{MNO} are large. These costs can be large, they consist in the costs of running customer care centers. Therefore, the No expropriation constraint can hold, but this constraint only becomes important if the complaint constraint (1) holds in the first place, i.e., $p\beta^T - c > 0$. If the costs to complain c are too high, the customer does not have incentives to litigate, and therefore the No expropriation constraint (2) is irrelevant.

A decrease in c as in this intervention increases the incentive to persist in customer care centers, which reduces the incentives for MNO to ex-post renegotiate (especially if the costs to address complaints c_{MNO} are large. Therefore, consumers mobilized by the legal profession can discipline MNOs.

The costs for the defendant c_{MNO} would be even larger if CTDR-U could escalate to regulators and litigate in courts, which would further decrease the incentives of MNOs to expropriate.

Turning to economic effects, the decrease in expropriation mechanically increases the incentives to exert effort e on the part of entrepreneurs. People engage in more mobile money transactions, and economic development ensues.

Appendix D: Sampling of Villages in Kampala

The purpose of the sampling methodology is to build a representative sample of Kampala. Our recruitment strategy is to visit villages (called LC1s) to first introduce ourselves to village health leaders, gain authorization to talk to people, before establishing a list of individuals with a mobile money dispute. The goal is thus to establish a list of villages from Kampala to build a representative sample of Kampala.

We obtained a list of all villages in the Kampala area (with 848 villages in total) from the Kampala Capital City Authority (KCCA). This dataset has information on the contact person of the village, but no other information on the village.

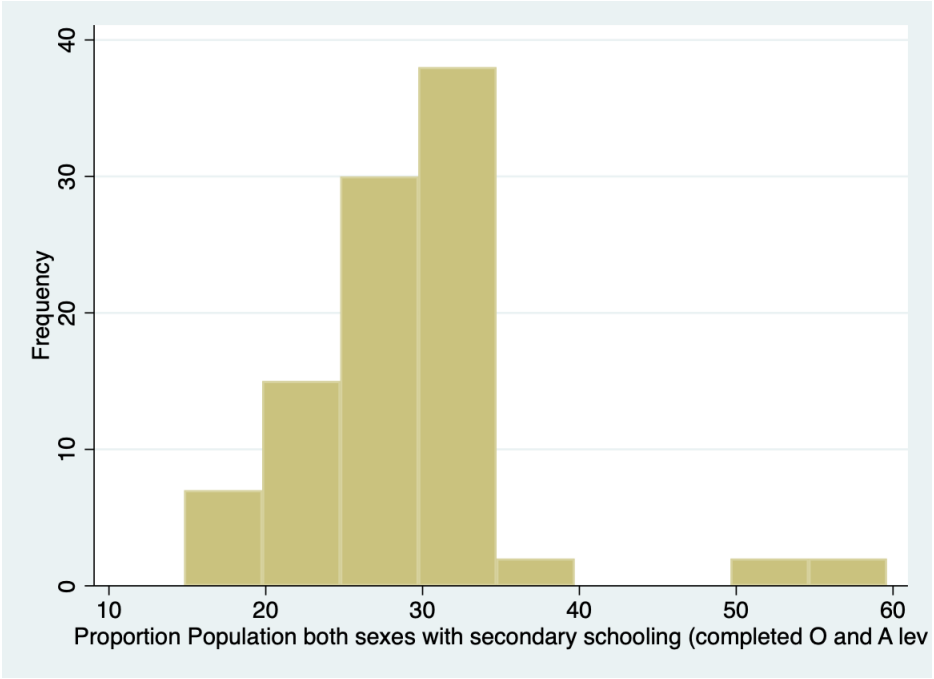
Access to legal solutions may disproportionately favor less educated people, who may have few other recourses outside of this project to act on their mobile money disputes. Moreover, access to legal solutions to resolve mobile money disputes may have strong economic repercussions on owners of informal businesses using their mobile money services for their businesses. To make sure we visit villages with these characteristics (low education, informal business owners), we need data at the village level on education and informal businesses.

There are no datasets available at the village level in Uganda. The Ugandan census (available at https://www.ipums.org/) is at the division level (LC5). The World Bank High-Frequency Phone Survey on COVID-19 2020-2021 has only 86 observations in Kampala. The Uganda National Panel Survey 2018-2019 has only 142 observations in Kampala. Considering the small sample size, these 2 datasets are unusable because they do not have information on all the villages in Kampala.

There is data available at the Parish level, the geographic unit above the village. To measure education, we use the Uganda Bureau of Statistics (UBOS) website,[16] in particular the file called "Central Region - Parish Level Profiles (Census 2014) - Last Updated on 5th April 2019". We calculate at the Parish level the proportion of the population (both sexes) with secondary schooling (who completed O and A level). Figure D1 below shows that education displays important variation at the Parish level.

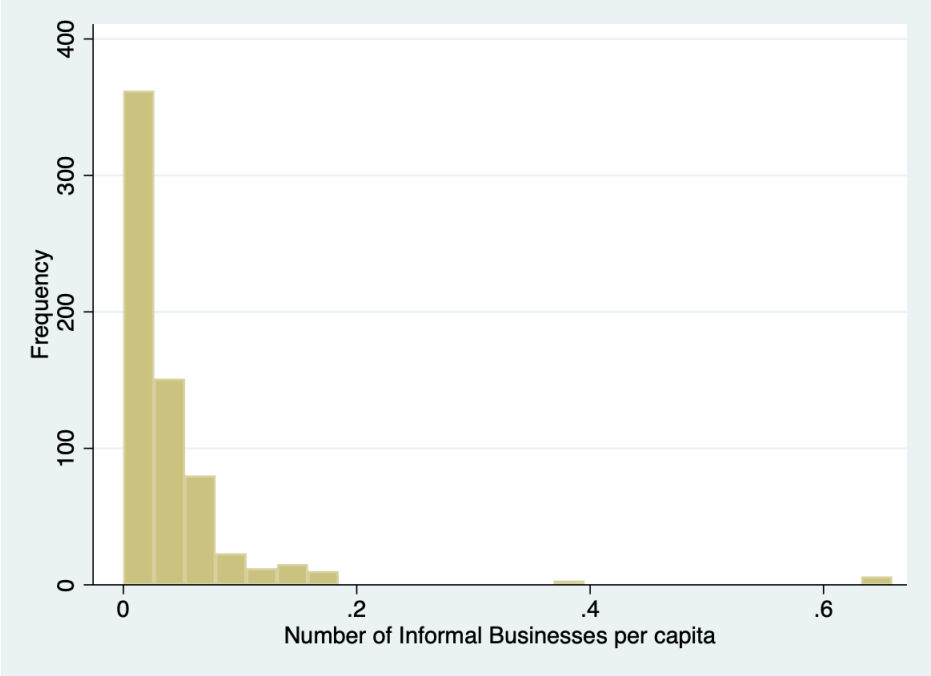
[16] https://www.ubos.org/explore-statistics/20/

Figure D1. Education



To measure informal business ownership, we use the Kampala Informal Sector Survey.[17] This survey was designed to produce representative estimates for the informal sector in Kampala, with 1,464 observations in Kampala alone. We calculate the number of informal businesses at the Parish level, multiply it by the observation weight in the sample, and divide it by Parish population estimates (from UBOS - Central Region - Parish Level Profiles (Census 2014)) to get the number of informal business per capita in a parish. Figure D2 below shows that informal business ownership displays important variation at the Parish level, although with a few outliers.

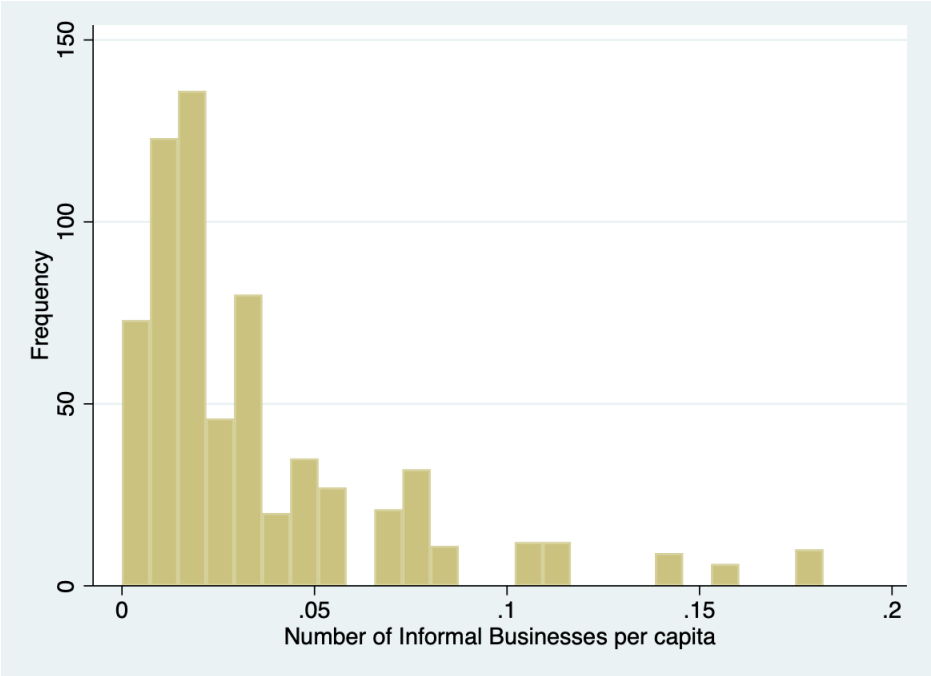
Figure D2. Informal Businesses



[17] https://microdata.worldbank.org/index.php/catalog/3397

Trimming the data at 0.2 (informal businesses per capita) yields Figure D3, which shows interesting variation.

Figure D3. Informal Businesses (Trimmed)



We then match each village in the village list with these two Parish-level variables (secondary school completion and number of informal businesses per capita). We calculate the median of these two variables, and stratify the sample in four cells (low vs high education; high vs low informal businesses). Strata 1 has low education/high number of informal businesses, strata 2 has low education/low number of informal businesses, strata 3 has high education/high number of informal businesses, strata 4 has high education/low number of informal businesses. We then generate a random number within each strata.

The final dataset gives an order of villages to be visited, with one village per strata. Thus, this methodology ensures that we visit one village of each strata sequentially.

Appendix E: Representativeness of Sample

We first compare our sample to the Uganda National Panel Survey 2018-2019 (UNPS).[18] The UNPS is carried out on a nationally representative sample of households.

We present the normalized difference, i.e., the absolute value of the difference in means between both samples divided by the square root of average of the squared standard deviations:

$$NormDiff = abs\left(\frac{MeanSample - MeanUNPS}{\sqrt{\frac{\sigma^2_{Sample}+\sigma^2_{UNPS}}{2}}}\right)$$

This corresponds to an effect size of the difference, to be compared with the usual thresholds of less than 0.2 for a small effect and between 0.2 and 0.5 for a medium-sized effect.

We restrict the sample to Kampala in the Uganda National Panel Survey 2018-2019 (unless otherwise specified) since our sample was only collected in Kampala.

Table E1 shows the normalized differences. In Column (1), the proportion of people owning a business is very similar in both our sample and the UNPS (restricted to Kampala): 64 percent versus 55 percent. The normalized difference is 0.18, a small effect size. Our sample is slightly more entrepreneurial, which is logical since we stratified our sample by informal business ownerships to ensure that we surveyed an equal number of villages more or less entrepreneurial according to the use the Kampala Informal Sector Survey.

Column (2) shows that consumption is lower in our sample than in the UNPS: USD PPP 9k versus 15k in UNPS. 15k per year corresponds to (15,000/365/Average household size of 4.6) = 9 USD PPP per day per capita. In our sample, this figure is USD PPP 5 per day per capita. This is actually much closer to the Ugandan average shown in Column (3). This is again logical since we stratified our sample by education level to ensure that we surveyed an equal number of villages more or less educated according to the Uganda Bureau of Statistics. Thus, our sample is poorer than the Kampala average but similar to the Ugandan average.

Column (4) shows that our sample borrows more than in the UNPS, which is logical if our sample is slightly more entrepreneurial.

Columns (5) to (10) shows a similar use of mobile money in both samples. For example, in Column (5), 92 percent of our sample uses mobile money to send money, versus 73 percent in the UNPS. There is a difference, our sample is using slightly more intensively mobile money, which is logical since a criteria for eligibility in the project was to be a mobile money user and to have had a challenge with it in the last 9 days, which might oversample intensive users. Yet, the difference is

[18] https://microdata.worldbank.org/index.php/catalog/3795

Table E1—Comparison with UNPS dataset

	(1)	(2)	(3)	(4)	(5)	(6)
	Business	Annual hhh consumption (USD PPP)		Borrowed last year	I Use MM to Send money	I Use MM to Receive money
		Kampala	Uganda			
Normalized Difference	0.18	0.46	0.17	0.38	0.50	0.35
UNPS mean	0.55	15101.5	6850.3	0.33	0.73	0.82
SD	0.50	13658.8	12483.3	0.47	0.45	0.38
Sample Mean	0.64	9012.9	9012.9	0.52	0.92	0.94
SD	0.48	12660.0	12660.0	0.50	0.28	0.25
Observations	945	959	4059	956	958	958

	(7)	(8)	(9)	(10)	(11)
	I Use MM to Buy Airtime	I use MM to Pay bills	I use MM to Make payments for business	I use MM to Receive Salary	Shocks: Illness or Accident HH member
Normalized Difference	0.65	0.062	0.11	0.16	0.14
UNPS mean	0.60	0.30	0.11	0.057	0.56
SD	0.49	0.46	0.31	0.23	0.50
Sample Mean	0.87	0.33	0.075	0.026	0.49
SD	0.34	0.47	0.26	0.16	0.50
Observations	958	958	958	958	959

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is whether the household runs a business, 0 otherwise. In Column (2), the dependent variable is annual consumption in USD PPP. In the UNPS, we aggregate together expenditures on food (consumed at home, away, and received), non durables (purchased, at home, and received) and semi-durables (purchased, at home, and received). Column (2) restricts to Kampala, while column (3) is for the entire sample. In Column (4), the dependent variable is whether the respondent borrows last year. In column (5), the dependent variable is a dichotomous variable equal to 1 if the respondent is using mobile money to send money, 0 otherwise. Columns (6) to (10) are defined similarly for other uses of mobile money. In Column (11), the dependent variable is equal to 1 in the UNPS if the household received a shock: "Serious Illness or Accident of Income Earner(s)" and "Serious Illness or Accident of Other Household Member(s)", an equal to 1 in our dataset if the household received a shock "Illness of HH member", "Accidental injury", and "Violent injury".

not very large: a very large fraction of people in Uganda uses mobile money to send money. Notice that the UNPS dates from 2018-2019, the figure may be slightly higher in 2022 when we collected our baseline survey since mobile money extended its reach over the period, especially after COVID. The rest of the columns show a very similar pattern for other uses of mobile money.

Column (11) shows that the prevalence of shocks is similar in both samples. The definition of shocks is slightly different in the UNPS and our dataset. In the UNPS dataset, there are two shocks: "Serious Illness or Accident of Income Earner(s)" and "Serious Illness or Accident of Other Household Member(s)". We aggregate them together since we do not make the distinction in our dataset between the household members affected. In our dataset, we aggregate together: "Illness of HH member", "Accidental injury", and "Violent injury". In Column (11), we see that 49 percent of our sample had such a shock, 56 percent in the UNPS dataset, very similar.

Overall, we find from this table very similar business ownership, consumption, borrowing, use of mobile money and prevalence of negative shocks in the UNPS and in our dataset.

We now use the Kampala Informal Sector Survey (ISS) 2016 to gauge representativity.[19]. The sample for the Uganda informal sector survey is designed to provide indicator such as employment, gross output estimates for the greater Kampala. The survey interviewed 2,243 informal businesses, randomly drawn based on a two-stage stratified sample, with the objective of building a representative sample of Kampala.

We find all the variables that are similar across the two datasets. Table E2 shows the normalized differences. We find very little difference in: the proportion of married individuals, the number of employees in the business, the main difficulties when starting a business (shortage of capital being the most prevalent), and monthly consumption.

Our sample is thus representative of the Kampala region according to the Kampala Informal Sector Survey (ISS) 2016.

Table E2—Comparison with ISS dataset

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Married	Number emp.	Main difficulties starting business: Shortage Capital	Lack Info Opp.	Prob. licenses	Poor infra.	Month cons.
Normalized Difference	0.012	0.058	0.0085	0.082	0.097	0.11	0.032
ISS mean	0.59	0.51	0.57	0.017	0.0082	0.00068	704.7
SD	0.49	1.66	0.49	0.13	0.090	0.026	1758.3
Sample Mean	0.58	0.59	0.57	0.029	0.020	0.0078	751.1
SD	0.49	1.29	0.50	0.17	0.14	0.088	1055.0
Observations	2281	1974	1975	1975	1975	1975	2201

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is whether the individual is married, 0 otherwise. In Column (2), the dependent variable is the number of employees in the business. Columns (3) to (6) show the main difficulties when starting a business, with a dichotomous variable equal to 1 if the individual answered shortage of capital, 0 otherwise in column (3). Columns (4) to (6) are defined similarly. In Column (7), the dependent variable is monthly consumption in USD PPP.

[19]https://microdata.worldbank.org/index.php/catalog/3397/study-description

We now use the IPA survey conducted in Uganda in 2020 (Mazer and Bird, 2021). Researchers at Innovations for Poverty Action partnered with the Uganda Communications Commission (UCC) to conduct a phone-based survey among users of digital financial services (DFS), including mobile money, mobile banking, and mobile loans. Random Digit Dialing was used to generate the sample. The sampling frame consisted of all mobile phone numbers in Uganda, based on national communications authority number allocation plans. A random sample of numbers were then selected.

Table E3 shows the normalized differences. We find very little difference in: the likelihood to recommend the MNO or mobile loan provider, the proportion of the sample using MTN, Airtel, or both' the uses of mobile money and the gender of the respondent.

This is important since the IPA dataset was conducted with a random digit dialing methodology, therefore necessarily representative of the country. Thus, our data collection effort delivers similar estimates to this random digit dialing methodology.

Table E3—Comparison with IPA dataset

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Recommend		Used last 90 days			Use MM to	Use MM to	Male
	MNO	ML	MTN	Airtel	Both	Send money	Receive money	
Normalized Difference	0.082	0.032	0.28	0.39	0.13	0.026	0.055	0.015
ISS mean	75.5	65.3	0.45	0.35	0.20	0.92	0.95	0.62
SD	26.7	32.9	0.50	0.48	0.40	0.27	0.22	0.49
Sample Mean	73.4	66.3	0.31	0.54	0.15	0.92	0.94	0.61
SD	23.4	26.9	0.46	0.50	0.36	0.28	0.25	0.49
Observations	1590	942	1647	1647	1647	1644	1644	1647

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is whether the individual recommends the MNO, on a 10 point scale. In Column (2), the dependent variable is whether the individual recommends his preferred mobile loan provider, on a 10 point scale. In Column (3), the dependent variable is equal to 1 if the individual used MTN in the last 90 days, 0 otherwise. In Column (4), the dependent variable is equal to 1 if the individual used Airtel in the last 90 days, 0 otherwise. In Column (3), the dependent variable is equal to 1 if the individual used both MTN and Airtel in the last 90 days, 0 otherwise. In Column (6), the dependent variable is equal to 1 if the individual uses mobile money to send money, 0 otherwise. In Column (7), the dependent variable is equal to 1 if the individual uses mobile money to receive money, 0 otherwise. In Column (8), the dependent variable is equal to 1 if the individual is a male, 0 otherwise.

Appendix F: Balance test

In Table F1, we test for balance of all the variables used in the paper. We use the following specification:

$$Y_{i0} = \beta_0 + \beta_1 Treatment_i + \epsilon_i$$

Y_{i0} is the dependent variable in the baseline survey. We show the results with all the outcomes used in this study, and all the demographic variables.

ϵ_i is a stochastic error term. Standard errors are robust.

All of the variables are well balanced at baseline.

For example, in Column (1), trust in the mobile money system is 57.7 percent in the control group, and 1.94 percentage points less in the treatment group, a very small difference. This difference is not statistically significant. The normalized difference is 0.1 standard deviation, a very small difference in magnitude.

The other variables of the main result are only measured at endline, and cannot be included in a balance test at baseline (dispute resolved, satisfaction with dispute resolution and how did this challenge affect usage).

Columns (2) to (4) test whether the make up of cases is similar at baseline. In Column (2), the dependent variable is a dummy equal to 1 if the case is where the MNO is at fault, for example money sent but not received or blocked account. This variable is balanced at baseline between the treatment and control groups. Columns (3) and (4) shows that the proportion of cases of fraud and where money is missing from the account is also similar at baseline.

Column (5) shows that the amount of the financial dispute is similar at baseline.

Columns (6) to (12) shows the balance on al the demographic controls we have in the data, which are also used as controls in the main specification. These columns show good balance for whether the respondent is the household head, access to information (newspaper, radio, TV), income, marital status, and reliance on agriculture for consumption.

Table F1—Balance test

	(1)	(2)	(3)	(4)	(5)
	Trust MM	Type Dispute: MNO	Type Dispute: Fraud	Type Dispute: Money Missing	Financial Amount Dispute
Treated	-1.94	0.024	-0.016	-0.022	3.12
	(1.41)	(0.034)	(0.026)	(0.024)	(10.4)
Control Group	57.7	0.60	0.18	0.15	27.8
SD	20.9	0.49	0.38	0.36	125.4
Observations	817	817	817	817	817
Norm. Diff.	0.096	0.049	0.042	0.062	0.021

	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	HH Head	How often read newspaper?	Hours radio per day	Hours TV per day	Income	Marital Status	HH rely on Agric for consumption
Treated	0.034	-0.0017	0.15	-0.0097	-0.033	0.061	0.021
	(0.034)	(0.11)	(0.26)	(0.20)	(0.13)	(0.18)	(0.022)
Control Group	0.59	1.37	3.22	3.21	3.18	3.23	0.10
SD	0.49	1.55	3.64	2.75	1.82	2.52	0.30
Observations	817	813	817	817	817	816	817
Norm. Diff.	0.069	0.0011	0.040	0.0035	0.018	0.024	0.065

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the trust measure is composed of two questions designed to capture trust in the mobile money ecosystem. The first question is: "How likely is it that you would recommend your preferred mobile provider to a friend or colleague?" (measured on a 10 point scale where 0 means you are not at all likely to recommend and 10 means you are extremely likely to recommend. The second question is: "How much do you trust mobile money agents to act in your best interests?" (1=Completely, 2=Mostly, 3=Somewhat and 4=Not at all). We rescale both variables on a 0-100 scale where more means more trust. In Column (2), the dependent variable is a dummy equal to 1 if the case is where the MNO is at fault: Money sent but not received, Blocked Account, Unexpected or unclear charges, Poor quality of customer care, could not figure out how to reach customer care, Poor network, Difficulty using shortcode, Paying for product/Utility but not receive it, Someone took out a loan in your name, Unauthorized deduction of Airtime, Denied access to a new loan. In Column (3), the dependent variable is a dummy equal to 1 if the case is where the "Fraudster tricked me". In Column (4), the dependent variable is a dummy equal to 1 if the case is where the "Money missing from account". In Column (5), the dependent variable is the financial amount of the dispute, in USD PPP. In Column (6), the dependent variable is a dummy equal to 1 if the individual is the household head, 0 otherwise. In Column (7), the dependent variable are the answers to the question: "How often do you read a newspaper?" (1 = At least once a day, 2 = Once a week, 3 = Once a month, 4 = Once a year, 5 = Never). In Column (8), the dependent variable is the number of hours of Radio per day. In Column (9), the dependent variable is the number of hours of TV per day. In Column (10), the dependent variable is the income, measured on a 11 point scale (1 Below 75,000 UGX per month 2 75,000 UGX - 150,000 UGX per month 3 150,001 UGX - 250,000 UGX per month 4 250,001 UGX - 500,000 UGX per month 5 500,001 UGX - 750,000 UGX per month 6 750,001 UGX - 1,000,000UGX per month 7 1,000,001 UGX - 1,500,000 UGX per month 8 1,500,001 UGX - 2,000,000 UGX per month 9 2,000,001 UGX - 2,500,000 UGX per month 10 2,500,001 UGX - 3,000,000 UGX per month 11 Above 3,000,000 UGX per month). In Column (11), the dependent variable is the marital status (1 Married (monogamy) 2 Married (polygamy) 3 Co-habiting/ living together 4 Divorced 5 Separated 6 Widowed 7 Never married). In Column (12), the dependent variable is whether the household relies on agriculture (1=Yes, 0=No).

Table F2 shows the balance tests for the risk sharing variables. In Column (1), consumption levels are similar across the treatment and control groups. Columns (2) to (6) shows that the prevalence of negative shocks is also balanced at baseline. Columns (7) to (18) shows that the nature of shocks is also well balanced at baseline.

Table F2—Balance test Risk Sharing

	(1) Log Consumption	(2) Negative Shock	(3) Illness	(4) Amount Negative Shock	(5) Large Negative Shock	(6) First Shock Negative
Treated	-0.040	0.00057	0.012	0.099	0.0065	-0.0032
	(0.053)	(0.031)	(0.035)	(0.073)	(0.035)	(0.032)
Control Group mean	8.85	0.72	0.46	0.24	0.46	0.70
SD	0.74	0.45	0.50	0.55	0.50	0.46
Observations	809	817	817	817	817	817
Normalized Difference	0.054	0.0013	0.024	0.098	0.013	0.0070

	(7) Illness HH member	(8) Death HH Member	(9) Theft/robbery burglary/assault	(10) Accidental injury	(11) Failure/loss of business	(12) Birth in HH
Treated	0.012	-0.0063	-0.022	-0.013	0.023	0.011
	(0.035)	(0.025)	(0.020)	(0.012)	(0.017)	(0.014)
Control Group mean	0.46	0.15	0.098	0.039	0.048	0.037
SD	0.50	0.36	0.30	0.19	0.21	0.19
Observations	817	817	817	817	817	817
Normalized Difference	0.024	0.018	0.078	0.071	0.097	0.054

	(13) Loss of employment	(14) Crop disease/pets Animals dying	(15) Livestock died	(16) Drought floods	(17) Violent injury	(18) Fire/house destroyed
Treated	-0.0054	-0.0039	0.0066	-0.0042	-0.0016	0.00034
	(0.012)	(0.0059)	(0.0079)	(0.0048)	(0.0054)	(0.0035)
Control Group mean	0.034	0.0092	0.0092	0.0069	0.0069	0.0023
SD	0.18	0.095	0.095	0.083	0.083	0.048
Observations	817	817	817	817	817	817
Normalized Difference	0.031	0.046	0.060	0.062	0.021	0.0069

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is the logarithm of total annual household consumption, measured in USD PPP. In Column (2), "Negative Shock" is a dichotomous variable equal to 1 if the household experienced any negative shock in the last 6 months, 0 otherwise. In Column (3), "Illness" is a dichotomous equal to 1 if the household has experienced an illness of an HH member in the last 6 months, 0 otherwise. In Column (4), the explanatory variable is the amount of the negative shock (In 1000 USD PPP). In Column (5), the variable "Large Negative Shock" is equal to 1 if the shock is negative and of strength 4 or 5 on a 5-points scale. In Column (6), "First Shock Negative" is equal to 1 if the first shock mentioned by the household is a negative one, 0 otherwise. Columns (7) to (18) shows the balance tests for individual shocks, with a dichotomous variable equal to 1 if the household has experienced this shock in the last 6 months, 0 otherwise.

Table F3 shows the balance tests for the credit variables. There is balance at baseline for the propensity to borrow (column (1)), for the sources of borrowing (columns (2) and (3)) and for the amount borrowed (columns (4) and (5)). There is also good balance for the savings variables.

Table F3—Balance test Credit

	(1) Borrowed	(2) Borrowed MM friends family	(3) Borrowed Bank Gov Workplace	(4) Amount MM friends family	(5) Amount Bank Gov Workplace
Treated	0.030	0.012	0.0070	-7.54	-49.6
	(0.035)	(0.035)	(0.023)	(52.5)	(42.4)
Control Group mean	0.50	0.46	0.12	142.8	140.7
SD	0.50	0.50	0.32	980.1	793.9
Observations	817	817	817	817	817
Normalized Difference	0.061	0.024	0.021	0.0099	0.080

	(6) Total Savings	(7) Loans given out	(8) Net Savings
Treated	-30.3	-33.1	2.83
	(59.0)	(37.9)	(58.5)
Control Group mean	347.0	157.2	189.7
SD	924.2	618.5	936.6
Observations	817	817	817
Normalized Difference	0.036	0.061	0.0034

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from any sources in the last year, 0 otherwise. In Column (2), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from Mobile Money, friends or family in the last year, 0 otherwise. In Column (2), the dependent variable is a dichotomous variable equal to 1 if the household borrowed from bank, workplace, or government in the last year, 0 otherwise. In Column (4), the dependent variable is the amount borrowed last year from Mobile Money, friends or family. In Column (5), the dependent variable is the amount borrowed last year from bank, workplace, or government. In Column (6), the variable is the total amount of savings in: a formal financial institution (NSSF, bank, SACCO, post office, etc.); bonds, shares (stocks), or securities; ROSCA/Merry-Go-Round savings; an account (i.e. in cash); Mobile Money; friend, relative, partner or parents. In Column (7), the dependent variable is the amount of loans given out. In Column (8), the dependent variable is the difference of total savings and these loans given out.

Appendix G: Extensive vs Intensive Use

In Table G1, we look at extensive use (1=Did not affect usage, 0=Stopped) versus intensive use (1=Did not affect usage, 0=Reduced). Results are larger at the extensive margin, such that people drop the service in the control group rather than scale down usage (although the two effects are not significantly different from each other).

Table G1—Effect on Extensive vs Intensive Use

	(1) Extensive Use	(2) Intensive Use
Treated	0.069**	0.049
	(0.033)	(0.038)
Control Group mean	0.81	0.68
SD	0.39	0.47
Observations	483	578

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the respondent answers 1=Did not affect usage, 0=Stopped. In Column (2), the dependent variable is a dichotomous variable equal to 1 if the respondent answers 1=Did not affect usage, 0=Reduced.

Appendix H: Trust in Mobile Money

In Table H1, we experiment with various measures of trust in Mobile Money. Column (1) presents our preferred estimate with two questions: one on mobile network operators and one on mobile money agents.

In Column (2), we add to this measure the new variable: "I am confident in the quality of services provided by my MNO" (answers on a 4 point scale: 1 Strongly agree, 2 Somewhat agree, 3 Somewhat disagree, 4 Strongly Disagree). We invert and rescale this variable on a 0-100 scale and add it to the index of trust of Column (2).

We do the same in the next columns. In Column (3), we consider the new variable: "It is likely that my MNO would cheat or deceive me". In Column (4), the variable is: "I believe that the MNO shares the information I need with me. (e.g., changes in plans/fees, etc.)". In Column (5), we use the variable: "I believe that the MNO will use my information only for what I give them permission for". In Column (6), the variable is: "I think the MNO understands my needs". In Column (7), the question is about the MM agent: "How likely do you think it is that a mobile money agent would cheat/deceive you?".

All of these variables are on a 4 point scale: 1 Strongly agree, 2 Somewhat agree, 3 Somewhat disagree, 4 Strongly Disagree. We invert these variables when needed, such that more means more trust. We rescale these variables on a 0-100 scale. We add them one by one to the index of trust of Column (2).

In Column (8), we add the mobile loan provider. The question is: "How likely is it that you would recommend your preferred mobile loan provider to a friend or colleague? You can choose a number between 0 and 10. Zero means you are not at all likely to recommend and 10 means you are extremely likely to recommend".

Finally, in Column (9), we add all these 10 variables together into a single index.

We find the same results no matter what the index is.

Table H1—Trust in Mobile Money

	(1) Trust in MNO and MM Agent	(2) Confident in quality services MNO	(3) MNO would not cheat me	(4) MNO shares info with me	(5) MNO uses my info with my permission
Treated	4.49***	3.47**	3.25**	3.84***	3.34**
	(1.66)	(1.35)	(1.61)	(1.43)	(1.51)
Control Group mean	57.7	64.6	52.6	63.1	61.5
SD	20.9	17.9	19.7	17.2	19.4
Observations	654	654	654	654	654

	(6) MNO understands my needs	(7) Agent will not cheat me	(8) Refer ML provider to friend	(9) All together
Treated	3.47**	3.68**	3.94**	2.46*
	(1.66)	(1.65)	(1.65)	(1.32)
Control Group mean	57.5	49.1	60.7	60.3
SD	19.4	20.3	19.6	15.1
Observations	654	654	654	654

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the variable is the average of two variables. The first question is: "How likely is it that you would recommend your preferred mobile provider to a friend or college?" (measured on a 10 point scale where 0 means you are not at all likely to recommend and 10 means you are extremely likely to recommend. The second question is: "How much do you trust mobile money agents to act in your best interests?" (1=Completely, 2=Mostly, 3=Somewhat and 4=Not at all). We rescale both variables on a 0-100 scale where more means more trust. In Column (3), we add a new variable to this index: "It is likely that my MNO would cheat or deceive me". In Column (4), the new variable is: "I believe that the MNO shares the information I need with me. (e.g., changes in plans/fees, etc.)". In Column (5), the new variable: "I believe that the MNO will use my information only for what I give them permission for". In Column (6), the variable is: "I think the MNO understands my needs". In Column (7), the question is about the MM agent: "How likely do you think it is that a mobile money agent would cheat/deceive you?". All of these variables are on a 4 point scale: 1 Strongly agree, 2 Somewhat agree, 3 Somewhat disagree, 4 Strongly Disagree. We invert these variables when needed, such that more means more trust. We rescale these variables on a 0-100 scale. We add them one by one to the index of trust of Column (2). In Column (8), we add the mobile loan provider. The question is: "How likely is it that you would recommend your preferred mobile loan provider to a friend or colleague? You can choose a number between 0 and 10. Zero means you are not at all likely to recommend and 10 means you are extremely likely to recommend". In Column (9), we add all these 10 variables together into a single index.

Appendix I: Control Variables

In Table I1, we include various control variables measured at baseline in the specification. None of the results are affected. The results are also exactly the same if we include the control variables one by one instead of all together.

Table I1—Control Variables

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Use	(4) Trust
Treated	0.065*	0.079**	0.10*	4.34***
	(0.038)	(0.037)	(0.056)	(1.67)
Household Head	0.033	0.0056	0.060	1.75
	(0.042)	(0.041)	(0.063)	(1.84)
How often read newspaper?	-0.0073	-0.015	0.039**	-0.097
	(0.012)	(0.012)	(0.018)	(0.55)
Hours radio per day	-0.0063	-0.0071*	0.0046	-0.043
	(0.0043)	(0.0040)	(0.0069)	(0.22)
Hours tv per day	-0.0030	-0.0036	-0.012	-0.35
	(0.0067)	(0.0063)	(0.011)	(0.30)
Income	-0.0025	-0.0047	-0.017	-0.45
	(0.011)	(0.010)	(0.016)	(0.45)
Marital status	-0.00097	0.0025	0.010	-0.60*
	(0.0080)	(0.0076)	(0.012)	(0.35)
Household rely on Agri. for consumption	0.042	-0.048	0.13	2.59
	(0.064)	(0.056)	(0.086)	(2.52)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	639	631	626	650

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

Appendix J: Attrition

In Table J1, we define a dichotomous variable equal to 1 if the individual attrited at endline, 0 otherwise. When regress this attrition dummy on the treated variable in Column (1), we find no differential attrition between the treatment and control groups. Columns (2) to (5) present the Lee bounds test. The lower bounds are not all significant, but remain very close to the main estimates.

Table J1—Corrections for Attrition

	(1) Attrition	(2) Dispute Resolved	(3) Satisfied with Resolution	(4) Use	(5) Trust
Treated	0.035				
	(0.029)				
Lower		0.058	0.068*	0.051	2.50
		(0.040)	(0.038)	(0.082)	(2.13)
Upper		0.10**	0.11**	0.13**	6.23***
		(0.047)	(0.047)	(0.061)	(2.19)
Control Group mean					
SD					
Observations	817	817	817	817	817

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the individual attrited at endline, 0 otherwise.
Columns (2) to (5) present the Lee Bounds test.

Appendix K: Paired Randomization

In Table K1, we restrict the sample to those pairs that have not attrited from the study. If one of the pair dropped out, the entire pair is dropped from the analysis. The sample is smaller than with the full sample (which had N=643 for the outcome "Dispute Resolved").

The results remain very similar. The coefficient of Use in Column (3) is slightly smaller, but not significantly different from the main result (which was 0.11, SD=0.056)

Table K1—Results with Paired Randomization

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Use	(4) Trust
Treated	0.077*	0.076*	0.075	4.04**
	(0.043)	(0.041)	(0.064)	(1.94)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	484	478	474	484

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In this table, we restrict the sample to those pairs that have not attrited from the study. The sample is smaller than with the full sample due to this correction. In Column (1), the variable is the total amount of savings in: a formal financial institution (NSSF, bank, SACCO, post office, etc.); bonds, shares (stocks), or securities; ROSCA/Merry-Go-Round savings; an account (i.e. in cash); Mobile Money; friend, relative, partner or parents. There is no significant effect there. In Column (2), the dependent variable is the amount of loans given out. In Column (3), the dependent variable is the difference of total savings and these loans given out.

Appendix L: Spillovers

In Table L1, we test for the presence of spillovers. To do so, we focus on the control group. We use the GPS data collected on all participants. For each individual in the control group, we calculate the number of treated households in a radius of 500 meters. We then regress the outcomes considered in this study on this variable. The intuition is that the more treated individuals nearby, the more likely an individual in the control group might benefit by learning more about mobile money and the ways to resolve disputes.

We find some evidence of this in the data. In Column (1), we find a positive effect of more treated households in the vicinity on the proportion of disputes resolved, albeit not significant. In Column (2), we repeat the analysis with the number of treated households in a radius of 1km as a robustness check and we find the same results.

Satisfaction with the resolution (in Column (3)) and trust in the system (in Column (7)) increase significantly.

Overall, we find some evidence of positive spillovers with this intervention.

Table L1—Spillovers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dispute Resolved		Satisfied with Resolution		Use		Trust	
Number Treated in 500m radius	0.010		0.017**		-0.0056		0.82**	
	(0.0083)		(0.0081)		(0.013)		(0.37)	
Number Treated in 1km radius		0.0023		0.0059*		-0.0042		0.36**
		(0.0036)		(0.0035)		(0.0059)		(0.15)
Control Group mean	0.30	0.30	0.25	0.25	2.47	2.47	57.7	57.7
SD	0.46	0.46	0.44	0.44	0.74	0.74	20.9	20.9
Observations	351	351	346	346	343	343	357	357

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Columns (1) and (2), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (1), the explanatory variable is the number of treated households in a 500 meter radius. In Column (2), the explanatory variable is the number of treated households in a 1 km radius. In Columns (3) and (4), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Columns (5) and (6), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Columns (7) and (8), the trust measure is composed of two questions designed to capture trust in the mobile money ecosystem. The first question is: "How likely is it that you would recommend your preferred mobile provider to a friend or colleague?" (measured on a 10 point scale where 0 means you are not at all likely to recommend and 10 means you are extremely likely to recommend. The second question is: "How much do you trust mobile money agents to act in your best interests?" (1=Completely, 2=Mostly, 3=Somewhat and 4=Not at all). We rescale both variables on a 0-100 scale where more means more trust.

Appendix M: Sub Group Analysis

For the sub group analysis, the pre-analysis plan included subgroup analyses by:

- Socio-economic background of respondent: lower income respondents may have less access to formal legal institutions and benefit more from the intervention
- Type of dispute (some disputes may be easier to resolve than others)
- Financial amount of the dispute (smaller disputes may see a quicker resolution on the part of the mobile money operators)

In Table M1, we start by presenting the sub-group analysis by income levels. We include income in level terms and include an interaction term between the treated dummy and income. We find no heterogenous effects with income: the level term of "Treated" is roughly similar to the main results of the study. Moreover, the interaction term is not significantly different from zero in most cases.

We conclude that all sections of society benefit equally from the intervention, not only the wealthy.

Table M1—Heterogeneous Effects by Income

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Use	(4) Trust
Treated	0.077	0.14**	0.29***	4.74
	(0.075)	(0.072)	(0.11)	(3.10)
Income	0.0012	0.0034	0.017	-0.15
	(0.013)	(0.012)	(0.019)	(0.53)
Treated * Income	-0.0017	-0.020	-0.057*	-0.080
	(0.020)	(0.019)	(0.030)	(0.84)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	643	634	630	654

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. Income is measured on a 10 point scale. "Treated * Income" is an interaction term between the treated dummy and income. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

For the sub group analysis with respect to the type of dispute, we separate disputes into three types: those where the MNO is directly at fault, those that involve fraud, and those where the money is missing in the account. The reasoning is that cases involving the MNO alone may be easier to resolve since there is only one counter-party. In contrast, cases where a fraudster tricked

the respondent are criminal in nature, and involve the police that must find the fraudster. These cases may be harder to resolve. Cases with "money missing from account" may also be harder to resolve, since there can be a lack of evidence in some cases. It is difficult in some cases to provide evidence that the money is missing. MNOs might be less responsive to those cases.

In Table M2, we restrict the sample to cases where the MNO is at fault (for example, money sent but not received, with clear evidence that the money was sent). The success of the intervention for such cases is clear from the table.

Table M2—Heterogeneous Effects by Type of Dispute: MNO

	(1) Resolution	(2) Satisfaction	(3) Use	(4) Trust
Treated	0.090*	0.096*	0.10	6.01***
	(0.050)	(0.049)	(0.072)	(2.14)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	397	390	388	399

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The sample is restricted to cases where the MNO is at fault: Money sent but not received, Blocked Account, Unexpected or unclear charges, Poor quality of customer care, could not figure out how to reach customer care, Poor network, Difficulty using shortcode, Paying for product/Utility but not receive it, Someone took out a loan in your name, Unauthorized deduction of Airtime, Denied access to a new loan. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

There is a smaller effect for cases of fraud, as shown in Table M3, although the coefficient on dispute resolution is close to the main coefficient. The treatment does not increase trust in mobile money like in the other cases, probably because the initial problem was not with MNOs but with a fraudster.

Table M4 shows that cases with "money missing from account" are also harder to resolve, since there can be a lack of evidence in some cases. It is hard to provide evidence that money is missing, MNOs are less responsive to those cases. We notice an increase in trust in the system after the intervention, maybe because such people got convinced by the end of the case that the problem was with them, not with MNOs.

In Table M5, we present the sub-group analysis by the financial amount of the dispute. We include the financial amount of the dispute in level terms and include an interaction term with the treated dummy. We find no heterogenous effects: the level term of "Treated" is similar to the main results of the study. Moreover, the interaction term is not significantly different from zero in most

Table M3—Heterogeneous Effects by Type of Dispute: Fraud

	(1) Resolution	(2) Satisfaction	(3) Use	(4) Trust
Treated	0.057	0.073	0.039	-4.59
	(0.048)	(0.046)	(0.12)	(4.08)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	108	108	107	111

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The sample is restricted to cases where the "Fraudster tricked me". In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

Table M4—Heterogeneous Effects by Type of Dispute: Money Missing

	(1) Resolution	(2) Satisfaction	(3) Use	(4) Trust
Treated	-0.021	-0.053	0.078	10.7**
	(0.085)	(0.081)	(0.18)	(4.35)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	86	86	86	89

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The sample is restricted to cases where the "Money missing from account". In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

cases.

We conclude that all cases are resolved equally independent of the size of the dispute.

Table M5—Heterogeneous Effects by Financial Amount Dispute

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Use	(4) Trust
Treated	0.074*	0.083**	0.12**	4.45***
	(0.038)	(0.037)	(0.056)	(1.70)
Financial Amount Dispute	-0.000069	0.0000051	-0.00027	0.0038
	(0.00017)	(0.00017)	(0.00035)	(0.0071)
Treated * Financial Amount Dispute	-0.000077	-0.00011	-0.00025	0.00051
	(0.00021)	(0.00021)	(0.00042)	(0.0082)
Control Group mean	0.30	0.25	2.47	57.7
SD	0.46	0.44	0.74	20.9
Observations	643	634	630	654

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. The financial amount of the dispute is in USD PPP. "Treated * Financial Amount Dispute" is an interaction term between the treated dummy and the financial amount of the dispute. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure. Income is measured on a 10 point scale.

In Table M6, we present the sub-group analysis by gender. The sample is restricted to females. The effects are very similar to the main effects. In fact, they are slightly larger than for the males.

Table M6—Heterogeneous Effects by Gender - Female

	(1) Resolution	(2) Satisfaction	(3) Use	(4) Trust
Treated	0.065	0.078*	0.097	5.82***
	(0.047)	(0.047)	(0.072)	(2.04)
Control Group mean	0.31	0.29	2.42	57.6
SD	0.46	0.45	0.76	20.2
Observations	408	400	399	414

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The sample is restricted to females. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

Table M7 shows the results for males, with slightly smaller effects.

Table M7—Heterogeneous Effects by Gender - Male

	(1) Resolution	(2) Satisfaction	(3) Use	(4) Trust
Treated	0.082	0.084	0.12	2.31
	(0.062)	(0.056)	(0.087)	(2.82)
Control Group mean	0.29	0.20	2.55	57.7
SD	0.46	0.40	0.69	22.1
Observations	235	234	231	240

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The sample is restricted to males. In Column (1), the dependent variable is a dichotomous variable equal to 1 if the mobile money dispute has been resolved, 0 otherwise. In Column (2), the dependent variable is equal to 1 if the participant answers yes to the question "Were you satisfied with the resolution of your issue?", 0 otherwise. In Column (3), the question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (4), the dependent variable is the trust measure.

Appendix N: Prevalence of Negative Shocks

Table N1 shows the prevalence of shocks in the sample.

Table N1—Negative Shocks in last 6 months

	Prevalence of shocks
Illness of HH member	56
Death of a HH Member	17
Theft/robbery/burglary/assault	8
Accidental injury	6
Failure/loss of business	5
Birth in the HH	5
Loss of employment	5
Crop disease/pets/Animals dying	4
Livestock died	4
Drought/floods	1
Violent injury	1
Fire/house destroyed/damaged	0

Note: The questions is: "Which of the following unexpected events has this household experienced in the last six months?". Multiple shocks are possible.

Appendix O: Savings

In Table O1, we look at the impact on savings.

In Column (1), the dependent variable is the total amount of savings in: a formal financial institution (NSSF, bank, SACCO, post office, etc.); bonds, shares (stocks), or securities; ROSCA/Merry-Go-Round savings; an account (i.e. in cash); Mobile Money; friend, relative, partner or parents. There is no significant effect there.

In Column (2), we also ask how much loans are given out. There is a significant decrease there. When we difference total savings and these loans given out to get a net position of the household, there is no significant effect in Column (3).

Table O1—Effects on Savings

	(1) Total Savings	(2) Loans given out	(3) Net Savings
Treated	-10.2	-156.8**	138.0
	(244.0)	(70.9)	(241.4)
Control Group mean	347.0	157.2	189.7
SD	924.2	618.5	936.6
Observations	656	656	656

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Column (1), the variable is the total amount of savings in: a formal financial institution (NSSF, bank, SACCO, post office, etc.); bonds, shares (stocks), or securities; ROSCA/Merry-Go-Round savings; an account (i.e. in cash); Mobile Money; friend, relative, partner or parents. In Column (2), the dependent variable is the amount of loans given out. In Column (3), the dependent variable is the difference of total savings and these loans given out.

Appendix P:Cost Benefit Analysis

In this section, we compare the costs of the intervention to its benefits. Table P1 below shows the costs per month or running the CTDR-U. Costs were kept low through the hiring of law students in this project.

Table P1—Costs of Project

	Monthly cost
Salaries	
Law Student 1	338
Law Student 2	338
Law Student 3	338
Law Student 4	338
Finance Administrator	422
Rental Space	
Monthly shared rental space at the Innovation Village	700
Transportation	
Monthly transport for delivery of complaints to MNOs and other stakeholders	82
Office Supplies	80
Airtime for communication with clients, MNOs and other stakeholders	22
lnternet for communication with clients, MNOs and other stakeholders	51
Total	2,709

Note: All expenses are in USD.

To quantify the benefits, we aggregate the financial value of the cases. It equal to USD PPP 11.8k in the treatment group. With a resolution rate of 37 percent, this amounts to USD 4.4k recovered. In the control group, the financial value of cases is USD 12.1k. With a resolution rate of 30 percent, this amounts to USD 3.6k recovered. The difference between the treatment and control group is only USD 703, such that the project is not cost beneficial based on these figures.

Recall that the channel through which the intervention worked was helping to persist in customer care centers, rather than the threat of going to court with turned out to be not credible. We hypothesize that a knowledgeable person comfortable with bureaucracy who accompanies the client or makes a phone call on their behalf may achieve the same results. Suppose a single person was hired full time (the law students were hired part-time since they were studying at the same time). Under reasonable assumptions, the total costs would be 568 per month.[20] This is less than the

[20]We assume a salary of 333 USD per month for this person, a reasonable rate for a a knowledgeable person comfortable with bureaucracy in this context. This salary represents 4 times the GDP per capita in Uganda. We also assume no need for a financial administrator or a space at the Innovation Village for this single individual. We keep constant all the other costs (transport and communications). This would sum to 333+82+80+22+51=568USD

benefits of USD 703, making the project cost-beneficial under this form.

Notice that the benefits measured are an understatement of the true benefits. They are only measured with the resolution rate of the disputes. They do not include the beneficial effects observed on risk-sharing, the improved access to credit that alleviates the key constraint of business operations, or the positive spillovers observed on the control group. This cost benefit analysis is thus an understatement of the true beneficial effects of the intervention.