The Causal Effect of Dispute Resolution Mechanisms on Economic Development: Evidence from a Randomized Experiment

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Unbiased Dispute Resolution Mechanisms (DRMs) protect ordinary citizens from abuses by more powerful actors, and thereby promote broad-based economic growth. We test this theory in a randomized experiment that created an entirely new DRM for mobile money users in Uganda, a setting where customers have limited recourse against a duopoly of Mobile Network Operators (MNOs). The DRM leverages new regulations requiring MNOs to address and resolve consumer complaints. We find that the intervention substantially increased dispute resolution rates, improved satisfaction with case outcomes, and enhanced trust in mobile money among treated individuals. These institutional improvements unlock the economic potential of mobile money: households in the treatment group engage in greater risk-sharing and have better access to credit. Our results underscore the central role of DRMs in enabling inclusive economic development.

When ordinary citizens are protected by unbiased Dispute Resolution Mechanisms (DRMs) against more powerful individuals, firms, or predatory governments, dynamic and motivated entrepreneurs have incentives to invest, innovate, and take risks, secure in the knowledge that the returns to their efforts will accrue to them (North, 1990; Acemoglu and Robinson, 2013). Broad-based economic growth can follow. In contrast, where such protection is absent, citizens underin-

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vest, and poverty and inequality deepen. Unbiased DRMs are therefore central to the mechanisms through which innovation, investment, and economic development emerge.

Despite the centrality of this idea in economic theory, there is surprisingly little causal evidence. Cross-country data show a strong positive correlation between unbiased DRMs and GDP (Figure A1 in Online Appendix A), but this relationship may not be causal. More fundamental political factors, such as the presence of predatory governments, may jointly determine the quality of DRMs and the level of development (omitted variable bias). Alternatively, unbiased DRMs may be a consequence rather than a cause of development (reverse causality). The ideal empirical design would introduce a new DRM in a context where none previously existed and identify the causal effects by randomly allocating access to that DRM. Implementing such a design is notoriously difficult, particularly in environments where predatory governments undermine unbiased dispute resolution.

This paper implements exactly such a design. We conduct a randomized experiment that offers an entirely new DRM to a treatment group and compares outcomes to a control group. The context is mobile money disputes in Uganda, a setting characterized by a near-complete vacuum of effective DRMs. Although mobile money has well-documented positive economic impacts (Suri and Jack, 2016; Aker et al., 2016; Riley, 2018), users increasingly report serious disputes: transfers that fail to arrive, frozen accounts, and unexplained deductions. In Uganda, 49 percent of users report a recent "big challenge" with mobile money, and unresolved disputes sharply reduce trust and usage (Mazer and Bird, 2021). Yet only 20 percent of disputes are resolved. Courts do not handle such small-value cases, and mobile network operators (MNOs), a duopoly in Uganda, have limited incentives to treat customers fairly. Existing "customer care centers" are widely viewed as low-quality and biased (Mazer and Bird, 2021), since MNOs act simultaneously as judge and party. Garz et al. (2021) call for additional access to complaint and support systems for conflicts with MNOs, and demand more rigorous evidence on the effectiveness of addressing disputes.

We partner with the newly created Center of Technology Disputes Resolution–Uganda (CTDR-U), which provides an entirely new DRM. The innovation leverages recently enacted regulations by the Bank of Uganda (BoU) and the Uganda Communications Commission (UCC) requiring MNOs to resolve complaints within 24 hours. CTDR-U operationalizes this framework by forwarding unresolved disputes to the regulators, who possess, and have previously exercised, a robust set of sanctions against noncompliant MNOs.

We assemble a sample of 817 mobile money users in Kampala with recent disputes, focusing on disadvantaged areas. Half of the sample is randomly assigned to receive the CTDR-U intervention,

while the control group continues business as usual. One year after the baseline, we collect an endline survey measuring dispute resolution, satisfaction, trust in mobile money, usage patterns, risk-sharing, and access to credit. The study received ethical approval and was pre-registered.

The intervention improves dispute resolution. Cases resolved increase by 23 percent relative to the control group, with parallel increases in satisfaction with outcomes and trust in mobile money. Results are robust to multiple-testing adjustments, randomization inference, and corrections for attrition. To probe mechanisms, we show that treatment effects are largest in cases where the MNO is directly at fault (e.g., money sent but not received), consistent with a regulatory-pressure channel. In contrast, effects are weaker in fraud cases, where the MNO bears little responsibility and cannot easily be pressured.

We then examine the economic consequences of improved dispute resolution. Treated individuals use mobile money more actively: after negative shocks, they receive more remittances, consistent with strengthened risk-sharing. Treated households also show a greater ability to finance health expenditures during illness episodes. In addition, they obtain more loans from mobile-money sources, alleviating the primary constraint to starting and operating a business in this setting.

This is the first randomized experiment to show that creating a DRM causally increases economic development. Existing research has largely focused on judicial reforms aimed at improving the functioning of formal courts (Mehmood, 2022; Rao, 2022; Amirapu, 2021; Boehm and Oberfield, 2020; Lichand and Soares, 2014; Ponticelli and Alencar, 2016; Visaria, 2009; Chemin, 2020). The issue with judicial reforms is that they are costly (Chemin (2020) documents USD 5.4 billion in global expenditures on judicial reform efforts), difficult to implement in environments where strong executives may resist institutional change, and econometrically challenging because reform adoption is often endogenous. One experimental exception is Aberra and Chemin (2021), who provide free lawyers to access courts, though this approach remains expensive and hard to scale. Two studies provide experimental evidence outside the court system: paralegal assistance (Sandefur and Siddiqi, 2013) and training in Alternative Dispute Resolution (Blattman, Hartman and Blair, 2014). Our intervention introduces a new idea: leveraging the existing regulatory system rather than courts. We provide the first experimental evidence of a new causal pathway linking DRMs to economic development, namely, that improved access to dispute resolution increases trust and usage of a key financial technology, which in turn strengthens risk-sharing and expands access to credit.

Our findings also contribute to the growing literature on mobile money, particularly on consumer protection. While recent work Annan (2023); Brailovskaya, Dupas and Robinson (2024) studies the effects of improving consumer information, we focus instead on mechanisms that defend consumers.

I. Mobile Money Disputes and the Absence of Effective Dispute Resolution Mechanisms

Mobile money is widely viewed as the next financial revolution in developing countries, enabling anyone with a basic mobile phone to send and receive money, save, and access credit without needing a smartphone or internet (Suri and Jack, 2016; Aker et al., 2016; Riley, 2018).

Despite its transformative potential, mobile money users face widespread problems globally.[1] In Uganda, 49 percent of users report a recent "big challenge," including money sent but not received, failed utility payments, and extremely poor customer care (Mazer and Bird, 2021). In well-functioning markets, dissatisfied customers could switch to another Mobile Network Operator (MNO), but mobile money markets are typically highly concentrated. Uganda is a duopoly, giving firms substantial market power and weakening consumers' ability to discipline providers.

Redress mechanisms are extremely limited: only 20 percent of users with a challenge manage to resolve it (Mazer and Bird, 2021). Courts refuse to handle small mobile money disputes. We attempted to file cases in both Small Claims Courts and the High Court, and both declined, given that disputes often involve as little as USD 1–25 PPP. Lawyers are unaffordable for low-income users, and arbitration is prohibitively costly (arbitration fees in Uganda start at USD 750 even for the smallest disputes). Consequently, problems remain unresolved and this erodes trust in mobile money and drive users away from the system (Mazer and Bird, 2021).

This raises a central question: what redress mechanisms can effectively resolve mobile money disputes and unlock the technology's full economic benefits?

II. The Intervention

CTDR-U introduces an entirely new strategy for resolving mobile-money disputes in Uganda by systematically escalating cases to the national regulators: the Bank of Uganda (BoU), which oversees payment systems, and the Uganda Communications Commission (UCC).

Before 2020, Uganda lacked a regulatory framework for mobile money, and problems were widespread. As early as 2013 (see Online Appendix B), BoU publicly acknowledged mounting consumer complaints, including cases in which funds simply disappeared, with no meaningful avenues for redress. BoU warned at the time that "Failure to address the vice will compel BoU to take administrative sanctions on the MNO."

This landscape changed dramatically with the National Payments Systems Act, 2020, which brought mobile-money providers under direct central-bank supervision. One of BoU's first actions

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

under the Act was to require MNOs to legally separate their telecommunications and mobile-money businesses, enabling clearer accountability and more effective oversight.

The Act equips BoU with a broad arsenal of sanctions. MNOs must maintain a functional Dispute Resolution Mechanism (Section 65(e)), and non-compliance carries fines and potential imprisonment. MNOs must apply for a licence (Section 7(1)), which BoU may revoke if an operator acts "in a manner detrimental to the best interest of the public" (Section 13(1)(g)). BoU may also remove senior management or appoint new management (Section 12). BoU has not hesitated to use these powers: it has enforced directives on customer identification, opened investigations into MNO practices, and encouraged consumers to file formal complaints (Appendix B).

Regulation strengthened further in 2022 with the National Payments System Consumer Protection Regulations, which require MNOs to resolve customer complaints within 24 hours and authorize BoU to order compensation or refunds (Section 21).

Figure B1 illustrates a CTDR-U letter sent to an MNO and copied to BoU and UCC, with acknowledgment stamps from all three institutions. Appendix C documents multiple disputes successfully resolved through this mechanism. The credibility of regulatory escalation is reinforced by BoU's reputation for integrity; a 2023 IMF assessment highlights BoU's commitment to transparency and accountability (IMF, 2023).

Thus, the intervention is best understood as a package: CTDR-U's third-party involvement combined with credible regulatory enforcement.

Could CTDR-U alone have generated these effects? This is unlikely. Prior to engaging regulators, CTDR-U attempted to negotiate a Memorandum of Understanding (MOU) directly with MNOs. This approach failed: one MNO signed but did not act on disputes; the other refused to sign. MNO lawyers repeatedly asked, "Who is CTDR-U?", underscoring that CTDR-U lacks sanctioning authority. Regulatory pressure fills precisely this gap.

We also provide statistical evidence consistent with this mechanism. Treatment effects are largest in cases where the MNO is directly responsible (for example, "money sent but not received") consistent with a channel in which regulatory oversight compels compliance. Effects are weaker in fraud cases, where the MNO bears little responsibility and cannot easily be compelled to act.

Appendix E formalizes these ideas in a simple model of disputes between consumers and MNOs. The CTDR-U intervention increases the probability of successful resolution and reduces the time and cost of pursuing it. This increases consumers' incentives to complain, which in turn disciplines MNO behavior ex ante. Mechanically, stronger expected protections increase entrepreneurs' incentives to exert effort and transact through mobile money, thereby stimulating economic activity.

III. Data

A. Recruitment

The target population for this study consists of individuals with unresolved mobile money disputes. We focus on Kampala, Uganda's capital city. To construct a representative sample, we randomly selected a list of "villages," the most disaggregated administrative unit in Kampala. Because access to effective dispute resolution may have substantial economic implications for informal business owners who rely heavily on mobile money, we stratified the village sampling frame by the prevalence of informal businesses to ensure inclusion of areas with high concentrations of such entrepreneurs. We also stratified by education levels to ensure representation of low-education, disadvantaged communities. Online Appendix G provides additional detail on this procedure.

Our recruitment strategy begins with visits to the selected villages, where field teams introduce the study to Village Health Teams (VHTs). VHTs are volunteer community health workers with detailed local knowledge and acted as a referral for households that have recently encountered mobile money problems.

We first administer a screening questionnaire to confirm eligibility, asking households whether they experienced a mobile money dispute within the last 90 days, ensuring the issue is recent and salient.

Baseline data were collected from all eligible cases between May and September 2022. The study design is summarized in Figure H1 in Online Appendix H.

B. Descriptive Statistics

In our sample, individuals use mobile money for multiple purposes, including sending and receiving funds and saving, as documented in Table I1 of Online Appendix I. Uganda's mobile money market is a duopoly, with only two MNOs operating nationwide (Table I2).

The concentrated market structure likely contributes to the challenges that customers face. When asked how they attempt to resolve disputes, the most common response is to contact their provider (48 percent; Table I4). Yet users consistently report poor customer care: 42 percent indicate they did not know how to reach customer service, and 32 percent describe the service as low quality (Table I3). This helps explain why the second most common response is doing nothing (34 percent; Table I4).

The intervention provides a new DRM in this environment characterized by weak customer care and widespread inaction among consumers.

C. Statistical Power Calculations

We collect surveys from 817 participants. This sample size was determined through a statistical power calculation based on expected treatment effects. CTDR-U projected that 32.5 percent of disputes would be resolved in the treatment group (see Appendix J for details). For the control group, we assumed a 20 percent resolution rate, consistent with (Mazer and Bird, 2021) showing that only 20 percent of users with disputes successfully resolve them. Our final sample of 817 participants provides sufficient power to detect this expected difference.

D. External Validity

In Appendix K, we compare our dataset to three benchmark sources: the Uganda National Panel Survey (UNPS) 2018–2019, the Kampala Informal Sector Survey (ISS) 2016, and the random digit dialing IPA survey conducted in 2020 (Mazer and Bird, 2021). Based on normalized differences, our sample closely matches these datasets across several dimensions, including business ownership, number of employees, key constraints to starting a business (with shortage of capital being the most common), consumption levels, borrowing behavior, exposure to negative shocks, likelihood of recommending one's MNO or mobile loan provider, MNO market shares (MTN, Airtel, or both), and the various uses of mobile money.

Our sample is poorer than the Kampala average (USD PPP 5 per capita per day compared to USD PPP 9 in Kampala) which is expected given that we stratified the sampling frame by education levels to ensure adequate coverage of low-education, disadvantaged communities.

Regarding external validity of the results, the intervention hinges on the existence of strong consumer protection regulations and active regulators. CTDR-U alone could not generate these effects without regulatory pressure. Fortunately, many countries already meet this requirement. The Mobile Money Regulatory Index[2] shows that Uganda scores 100 on dispute resolution mechanisms, probably thanks to recent reforms, and 88 of 90 countries in the dataset receive similarly high scores. This suggests that the regulatory conditions necessary for this intervention to work are widespread, making the results likely to generalize to many other settings, at least at the regulatory level.

IV. Experimental Design

To test whether the new Dispute Resolution Mechanism (DRM) provided by CTDR-U improves dispute resolution, trust, and usage of mobile money, we implemented an individual-level random-

[2]https://www.gsma.com/mobile-money-metrics/#regulatory-index?y=2025

ized controlled trial with two groups:

1) Treatment group: receives assistance from CTDR-U.

2) Control group: continues business-as-usual.

Randomization followed a paired design using Mahalanobis matching (Bruhn and McKenzie, 2009). Pairs were constructed based on baseline outcomes (dispute resolution and trust in mobile money operators), geographic indicators (village), and basic demographics (gender, age, and income). Within each pair, one individual was randomly assigned to treatment and the other to control, improving baseline balance.

As a result, we find no meaningful differences between treatment and control groups along any baseline characteristic (Appendix L). This includes trust in MNOs, dispute types (MNO fault, fraud, or missing funds), dispute value, demographic variables (household headship, access to information, income, marital status, agricultural reliance), and risk-sharing variables (consumption, negative shocks, borrowing, and savings).

Endline data were collected from June to August 2023, approximately one year after baseline. We re-interviewed 656 of the 817 baseline participants; the remainder had moved away. Attrition is not significantly related to treatment status (Online Appendix M, Table M1). Standard attrition corrections (Lee, 2009) yield similar results. A further robustness check leverages the paired design: dropping an entire pair whenever one member attrits ensures equal attrition rates across treatment and control, and the results remain unchanged. Including pair fixed effects also produces similar estimates (Bruhn and McKenzie, 2009).

The study received ethical approval from the Uganda National Council for Science and Technology (UNCST SS1255ES), Mildmay Uganda REC (MUREC-2021-87), and the IPA IRB (Protocol #16011). A pre-analysis plan was registered under AEARCTR-0009146. Appendix F documents minor deviations from the PAP. The PAP specified that another treatment arm will be implemented after this project: an information treatment that will provide participants letter templates gathered in this project to file complaints independently. This remains an important direction for future research, as it would help disentangle further whether the effects operate primarily through CTDR-U's assistance or through the regulatory authority of the Bank of Uganda (BoU), and could further reduce the cost of delivering the intervention.

V. Empirical Specification

The research question is whether access to the new DRM improves dispute resolution and increases trust and usage of mobile money. All outcomes were pre-specified in our pre-analysis plan.

To estimate treatment effects, we use the following ANCOVA specification (McKenzie, 2012):

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

where Y_i is the endline outcome of interest for individual i and $Treatment_i$ equals 1 for treated individuals and 0 otherwise. Y_{i0} is the baseline value of the outcome, which improves statistical power and controls for baseline imbalance. Standard errors are robust.

In our main specification, we do not include additional controls. In robustness checks, we add several sets of covariates:

(i) pair fixed effects from the randomized matching design (Bruhn and McKenzie, 2009),

(ii) stratification variables used in village sampling (mean informal business ownership and mean education level), and

(iii) baseline characteristics including relationship to household head, frequency of reading newspapers, hours of radio and TV use, income, marital status, and reliance on agriculture for consumption.

Results are virtually identical across specifications. We present the simpler specification in the main text to retain the full sample and report the results with pair dummies in Appendix Q, which are nearly unchanged.

To address multiple hypothesis testing, we use the Sharpened False Discovery Rate (FDR) procedure of (Anderson, 2008). This method adjusts p-values within a family of outcomes by accounting for the number of hypotheses tested and the rank of each p-value, thereby controlling the expected proportion of false discoveries.

We also report exact p-values from the Fisher randomization (permutation) test (Young, 2019). This test is exact regardless of sample size or distributional assumptions, unlike conventional t-tests that rely on asymptotic approximations. For each outcome, we calculate the observed t-statistic, randomly permute treatment assignment 1,000 times, compute the corresponding t-statistics, and report the share of permutations yielding a t-statistic more extreme than the observed one. This is the Fisher p-value.

VI. Effects on Mobile Money Disputes and Trust of the System

Before turning to the regression results, we first present the raw data on dispute resolution in Panel A of Figure 1. The resolution rate is 30 percent in the control group and 37 percent in the treatment group, a 7-percentage-point increase, corresponding to a 23 percent improvement relative

to the control group. The regressions reported below confirm that this difference is statistically significant.

These effects are fully consistent with CTDR-U's expectations. The statistical power calculations anticipated a 32.5 percent resolution rate in the treatment group and a 20 percent rate in the control group.

This effect is large given the absence of any structural reforms or changes in market power: the MNO duopoly remains and the broader political and economic institutions are unchanged. The DRM relies solely on a structured escalation process and the credible threat of involving regulators, yet still delivers a meaningful and statistically significant improvement. Moreover, many "unresolved" cases at endline were still being processed (Appendix D), implying that the effect would likely be even larger with a longer follow-up period.

Resolution alone, however, may not imply satisfaction. Panel B of Figure 1 shows that satisfaction with outcomes also increases. We find higher satisfaction overall and higher satisfaction conditional on resolution. Because resolution itself is an endogenous outcome, the conditional estimate is difficult to interpret causally, but both patterns point to improved consumer experiences.

Table 1 reports the regression estimates. We find a statistically significant increase in disputes resolved (Column 1), satisfaction with the dispute outcome (Column 2), and trust in the mobile money system (Column 3).

The trust index in Column (3) combines measures of confidence in both MNOs and agents. Trust in the control group averages 57.7 percent, in essence an approval rating of 57.7 percent. The treatment increases this by 4.5 percentage points, an 8 percent improvement. In Appendix N, we test the robustness of this result by expanding the trust measure to include eight additional variables (e.g., perceived likelihood of cheating by MNOs or agents, trust in mobile loan providers). Results remain highly consistent across all specifications.

All effects remain statistically significant after correcting for multiple hypothesis testing using the Sharpened False Discovery Rate. Intuitively, within this family of three outcomes, the smallest p-value (0.007 for trust) is below the adjusted $10\%/3\times1 = 0.033$ threshold, with an FDR-adjusted p-value of 0.022. The remaining outcomes also remain significant.

Finally, Fisher randomization inference yields even more significant p-values than conventional t-tests (Table 1), underscoring that this exact test is more appropriate in samples of this size.

A. Attrition

There is no evidence of differential attrition between treatment and control groups: attrition is 19.7 percent in the control group and 23 percent in the treatment group, a difference that is not statistically significant (see TableM1). Table M1 also shows that attrition is unrelated to the type of dispute, the financial amount at stake, or exposure to negative shocks, i.e., changing economic conditions.

We account for attrition using the Lee (2009) trimming procedure. Because attrition is slightly higher in the treatment group, we trim the bottom 3.3 percent of control observations (23 – 19.7) to construct the worst-case bound. The trimmed estimates are reported alongside the main results. The treatment effect on dispute resolution remains similar in magnitude to the main estimate (0.61 versus 0.71), though no longer statistically significant, and the effects on satisfaction and trust remain statistically significant in Columns (2) and (3).

We also exploit our randomized paired design: we drop any pair in which one member attrits. This ensures attrition is the same in the treatment and control groups. As shown in Appendix Q, all results remain statistically significant under this approach, albeit with a reduced sample size. We present the specification without this correction in the main text in order to retain the full sample.

Finally, we obtain similar estimates when including pair fixed effects in the regression (Bruhn and McKenzie, 2009). Although the sample size decreases because pairs with attrition are necessarily excluded, the coefficients on dispute resolution are even larger under this specification.

B. Control Variables

As an additional robustness check, Table P1 of Appendix P includes the two stratifying variables used in the village sampling procedure (mean informal business ownership and mean education levels at the village level). These variables were not used in the randomization itself but only in sampling. All treatment effects remain statistically significant.

The results are also unchanged when we control for the full set of baseline demographic characteristics: household headship, newspaper readership, hours of radio and TV use, income, marital status, and reliance on agriculture for consumption (Appendix O). The estimates are identical when these controls are included individually rather than jointly.

C. *Spillovers*

We find some evidence of positive spillovers in Appendix R. Using GPS coordinates for all participants, we measure the number of treated households living near each control household. As expected, we do not observe higher dispute-resolution rates among control households, since they did not receive the intervention. However, trust in the mobile money system increases with the number of treated neighbors. A plausible explanation is that control households learn about the new procedure (and the prospect of escalating disputes to the regulators) through nearby treated individuals, which may strengthen confidence in the system even without direct intervention. These indirect positive effects imply that our main estimates likely represent lower bounds on the true impact of the DRM.

D. *Sub-Group Analysis*

The pre-analysis plan specified subgroup analyses along three dimensions:

- Type of dispute, since some disputes may be easier to resolve than others;
- Socioeconomic background, as lower-income respondents may have fewer alternative redress mechanisms and thus benefit more;
- Financial amount of the dispute, since smaller disputes might be resolved more quickly by MNOs.

Appendix S reports the full results.

Heterogeneity by Type of Dispute: Testing the Mechanism

This subgroup analysis is particularly informative for testing the mechanism through which the intervention operates. We classify disputes into three categories:

- MNO fault (e.g., money sent but not received, with clear evidence of a completed transaction). These cases are precisely where regulatory pressure should be most effective: the MNO is responsible, and a credible threat of escalation to regulators should compel action.
- Fraud cases, which are criminal matters involving the police. Since MNOs are not at fault, threats of regulatory intervention do not directly apply and should have limited impact.
- Money missing from account, typically difficult to verify. In these cases the source of the error is ambiguous, and the MNO can reasonably contest responsibility, making regulatory threats less effective.

The intervention has the largest effects for cases where the MNO is clearly at fault and much smaller effects for fraud or ambiguous "money missing" cases (Tables S1). This provides strong evidence that the DRM is particularly effective at disciplining MNOs when they are responsible for the problem.

Heterogeneity by Socioeconomic Status and Dispute Size

We find no heterogeneous effects by income or by the financial value of the dispute. The intervention benefits respondents across the income distribution equally, and the likelihood of resolution does not vary with the size of the dispute. This suggests that the DRM provides equitable access to recourse, rather than disproportionately benefiting either wealthier or poorer users.

Additional (Non-PAP) Heterogeneity: Gender

Although not specified in the pre-analysis plan, Appendix S presents subgroup analyses by gender. The effects are slightly larger for women (Table S4) than for men (Table S5).

The next question is whether these improvements in resolution, satisfaction, and trust translate into increased usage of mobile money. In the following section, we examine remittance flows to assess whether usage of the system increased in the treatment group.

VII. Risk Sharing and Use of Mobile Money

The pre-analysis plan specified secondary outcomes based on the mobile money literature, namely, risk sharing and access to digital finance. The central prediction is that households experiencing negative shocks should be better able to smooth consumption if they can reliably receive remittances through mobile money.

Remittances Received (Column 1)

Column (1) of Table 2 confirms this prediction. The dependent variable equals 1 if the household received a remittance in the past six months. The vast majority of these transfers are sent via mobile money (88 percent), compared to only 6 percent delivered by hand.

We define "Negative Shock" as an indicator equal to 1 if the household experienced a negative shock in the past six months. As shown in Table T1 in Appendix T, such shocks are frequent: 56 percent of households report an illness, and others report death of a household member, theft, or accidental injury. We interact "Negative Shock" with the treatment indicator.

The coefficient on "Treated × Negative Shock" is significantly positive. Treated households experiencing a negative shock are more likely to receive remittances, and these transfers are overwhelmingly mediated through mobile money. This is direct evidence that the intervention strengthens risk-sharing.

By contrast, the coefficient on "Negative Shock" (in the control group) is positive but not significant, indicating limited risk-sharing among control households. This is consistent with the mechanism: unresolved disputes reduce trust and usage of the system, weakening the ability of households to receive support when shocks occur. There is still some risk-sharing in the control group since people do not completely stop using mobile money in the control group: only 9 percent report stopping mobile money entirely after a dispute, and 24 percent report reducing their usage. In fact, we use this variable in Appendix U as another way to measure use, and find a statistically significant increase in usage among treated households, reinforcing the result.

The coefficient on Treated is negative, reflecting the other side of risk-sharing: in the absence of a shock, treated households are more likely to send rather than receive remittances.

Remittances Sent

Although we lack data on negative shocks experienced by others in a respondent's social network, we can examine remittances sent for emergencies (health expenses, funeral costs, or other urgent needs). These events can be interpreted as shocks occurring in other households. We find that treated households increase remittances sent for these reasons by 5 percentage points. This symmetry (more remittances received when one's own household experiences a shock, and more remittances sent when others experience one) provides further evidence of enhanced risk-sharing.

Expenditures and Consumption Smoothing (Columns 2–7)

Column (2) examines whether households can raise expenditures in response to shocks. Consistent with theory, "Treated × Negative Shock" is positive and significant: treated households are able to mobilize resources to pay for the increased expenses associated with negative shocks. The "Negative Shock" coefficient for control households is again positive but not significant, reflecting weaker risk-sharing.

Column (3) isolates the case of illness, the most common shock (56 percent). The same pattern emerges: treated households can increase expenditures to meet health-related costs.

Column (4) uses the financial amount of the shock. A shock of USD 1,000 PPP (about 10 percent

of annual household income in our sample[3]) raises expenditures by 1 percent in the control group, but by 10 percent in the treatment group. Thus, treated households can match a 10 percent income shock with a 10 percent increase in expenditures, consistent with effective smoothing.

Column (5) restricts the sample to severe shocks (rated 4 or 5 on a 5-point scale). The effects are even stronger, indicating that the intervention particularly enhances households' ability to cope with major shocks.

Column (6) focuses on the first (and typically most important) shock reported by the household. Results are unchanged.

Column (7) distinguishes idiosyncratic shocks (those affecting only the household) from common shocks (those affecting many households in the village or region). Informal insurance works best for idiosyncratic shocks, as network members can assist; common shocks constrain all households and limit their ability to insure one another. The results follow theoretical predictions: mobile money facilitates insurance against idiosyncratic shocks but not against common shocks. "Treated $\times$ Negative Shock" is significant for idiosyncratic shocks but attenuated for common ones. This provides further confirmation that mobile money is especially effective for smoothing idiosyncratic shocks.

VIII. Access to Credit

Beyond facilitating transfers, mobile money also promises to expand access to digital finance. Table 3 shows that the intervention meaningfully improves credit access. In Column (1), the share of households that borrowed in the past year increases by 9.3 percentage points, an 18.6 percent increase relative to the 50 percent borrowing rate in the control group.

Not all sources of borrowing rely on mobile money; government programs, workplaces, and banks generally operate outside the mobile money ecosystem. Consistent with this, Column (2) shows no effect of the intervention on these traditional sources. In contrast, Column (3) shows a significant increase in borrowing from sources that plausibly use mobile money, such as mobile money loans themselves and loans from friends and family, who frequently use mobile money to disburse funds and receive repayments.

Columns (4) and (5) show that the results are unchanged when we examine the amount borrowed rather than the incidence of borrowing.

This improvement in credit access is economically meaningful. A large share of respondents (64 percent) operate small businesses (Table V1), and the most common constraint they face is lack of

[3]In our sample, household income is USD PPP 9k, which corresponds to USD PPP 5 per day per capita

capital (Table V2). By increasing access to loans (particularly informal loans facilitated via mobile money), the treatment alleviates this primary barrier to business operation and growth.

Finally, the pre-analysis plan also specified savings as an outcome. As shown in Table W1 in Appendix W., we do not find evidence of increased savings.

IX. Magnitude of Effects

How large are the effects we document, particularly relative to the existing literature on the economic consequences of improved DRMs?

In our setting, satisfaction with dispute resolution increases by 0.079 points on a standard deviation of 0.44, corresponding to an effect size of 0.18 SD. We also find substantial improvements in risk-sharing: treated households exhibit near-full insurance, with a health shock equal to 10 percent of income generating a 10 percent increase in expenditures, indicating one-to-one smoothing of shock-related expenses. Access to credit increases by 9.3 percentage points on a base of 50 percent, likewise an effect size of approximately 0.18 SD. Thus, a 0.18 SD improvement in access to DRM yields roughly a 0.18 SD improvement this key economic outcome, an almost one-to-one relationship between DRM quality and economic benefits, in the narrow domain of the mobile money ecosystem.

Our estimates closely match those found in the broader DRM literature:

- Chemin (2020) shows that judicial reforms improving court quality, speed, and access increase the perception of unbiased DRMs by 0.15 SD and increase firm productivity by 0.09 SD, again, nearly a one-to-one mapping.
- Aberra and Chemin (2021) find that offering farmers a free lawyer to defend their land rights increases agricultural output by (310/387 =) 0.80 SD, implying a strong one-to-one relationship between improved access to legal recourse and economic performance.
- In our cross-country correlation (Figure A1), a 1 SD increase in the rule of law is associated with an 89 percent increase in GDP per capita, an almost linear relationship between unbiased DRMs and economic development.

Taken together, our results fall squarely within the range of estimates in the literature, further reinforcing the interpretation that improving DRMs has large and economically meaningful impacts.

Importantly, the intervention we study achieves these benefits at a fraction of the cost of existing DRM reforms. Judicial reform programs such as those studied in Chemin (2020) require investments on the order of USD 5.4 billion. Providing a free lawyer, as in Aberra and Chemin (2021), is likewise

expensive and hard to scale. By contrast, CTDR-U operated on a budget of roughly USD 2.7k per month (Appendix X). A law student drafted the letters sent to MNOs and regulators, and now that these templates exist, much of the process could be automated. This suggests that the cost of delivering such a DRM could fall even further.

X. Conclusion

Institutions, the "rules of the game", are central to economic development. If these rules are not enforced impartially, ordinary citizens cannot protect themselves against more powerful actors, weakening incentives to invest and innovate. Conversely, when individuals are confident that disputes will be resolved fairly, they are more willing to undertake productive activities.

This paper provides the first randomized experiment that creates a functioning DRM in a setting with virtually no existing redress mechanisms: mobile money disputes against two dominant MNOs in Uganda. In the treatment group, we introduce an entirely new DRM that leverages recently enacted regulations, giving consumers credible recourse through the regulators. These regulators have historically exercised real authority (splitting MNOs, launching investigations, and imposing sanctions) making the threat meaningful.

The intervention is effective: dispute resolution increases significantly in the treatment group. Consistent with institutional theory, greater enforcement generates trust in the system, increases usage of mobile money, and unlocks its economic benefits. Treated households experience stronger risk-sharing through remittances and greater access to credit, thereby alleviating the key constraint for business growth in this context.

The paper thus offers a new microeconomic foundation for how DRMs influence economic development: improved access to redress enhances trust and adoption of high-potential but risky technologies, enabling households and firms to realize their growth opportunities. A promising direction for future work is an information-based treatment that equips participants to file complaints independently, helping disentangle mechanisms and further reduce costs. Since most countries already have similar consumer protection regulations, the core mechanism documented here is likely to apply broadly.

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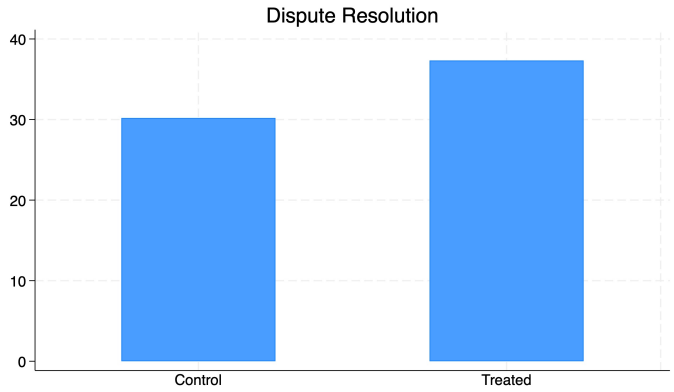
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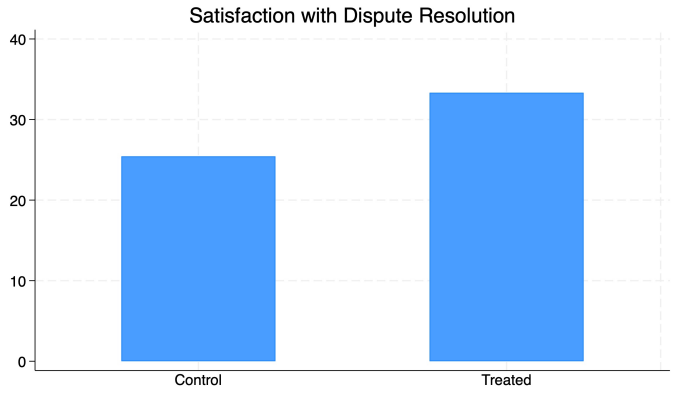
Figure 1. Effects on Resolution of Mobile Money Disputes

A. Dispute Resolution



Note: The outcome is based on the question "Did you resolve the issue?" (0 = No, 1 = Yes). To ensure respondents referred to the correct dispute, fieldworkers reminded participants of the specific case discussed at baseline. A concise summary of the case (recorded during baseline) was displayed on the fieldworkers' tablets and read aloud to facilitate accurate recall.

B. Satisfaction with Dispute Resolution



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

Table 1—Effect on Resolution of Mobile Money Disputes

	(1)	(2)	(3)
	Dispute Resolved	Satisfied with Resolution	Trust in MM
Treated	0.071*	0.079**	4.49***
	(0.037)	(0.036)	(1.66)
Robustness:			
FDR q-val	0.051*	0.032**	0.022**
Fisher p-val	0.047**	0.03**	0.009***
Attrition (Lower Bound)	0.061	0.07*	3.04*
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	643	634	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 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.

Table 2—Effect on Use and Risk-Sharing

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

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 equal to 1 if the household has received a remittance in the last 6 months, 0 otherwise. "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 Columns (2) to (7), the dependent variable is the logarithm of total annual household expenditures, measured in USD PPP (which includes expenditures on food, healthcare costs, durables, and non-durables). 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. In Column (7), 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).

Table 3—Access to Credit

	(1)	(2)	(3)	(4)	(5)
	Borrowed	Borrowed Gov Bank Workplace	Borrowed Mobile Money friends/family	Amount Gov Bank Workplace	Amount Mobile Money friends/family
Treated	0.093**	-0.0060	0.099***	11.0	86.5**
	(0.037)	(0.027)	(0.037)	(115.8)	(39.1)
Control Group mean	0.50	0.12	0.46	140.7	142.8
SD	0.50	0.32	0.50	793.9	980.1
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 government, workplace, bank in the last year, 0 otherwise. In Column (3), 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 (4), the dependent variable is the amount borrowed last year from government, workplace, bank. In Column (5), the dependent variable is the amount borrowed last year from Mobile Money, friends or family.

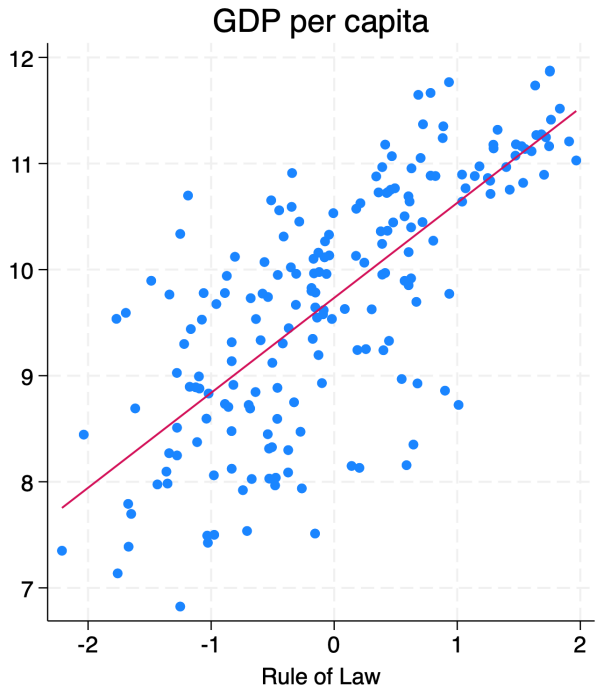
ONLINE APPENDIX (Not For Publication)

Appendix A: Positive Correlation between Dispute Resolution Mechanisms and Economic Development

Unbiased Dispute Resolution Mechanisms are proxied here by the Rule of Law index from the Worldwide Governance Indicators (World Bank), for 2023. This index is a global measure of all dispute resolutions mechanisms, not just formal courts: it "captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence." One of the source is the World Bank Enterprise Surveys, which contains questions on courts, arbitration and mediation. It is thus a broad measure of all DRMs.

GDP per capita is measured in current U.S. dollars and displayed on a logarithmic scale.

Figure A1. Positive Correlation between Dispute Resolution Mechanisms and Economic Development

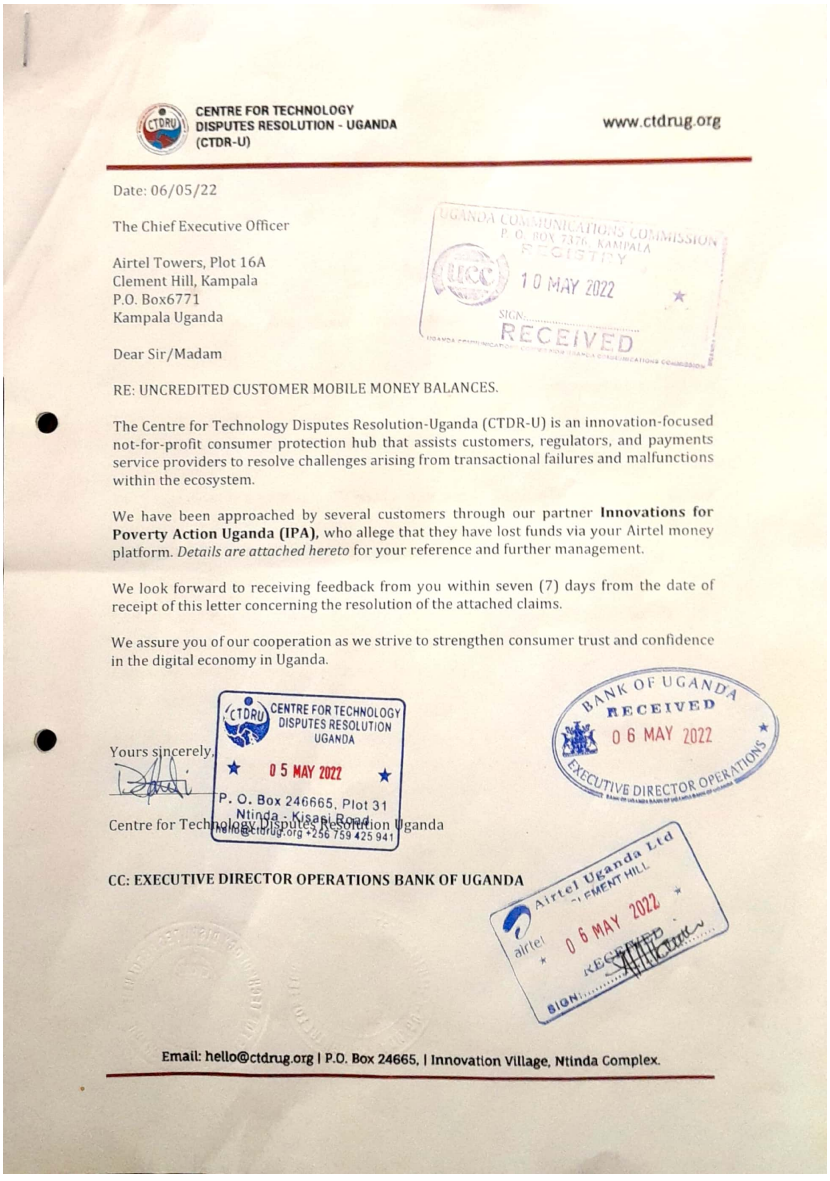


Note: GDP per capita is measured in current U.S. dollars and displayed on a logarithmic scale. The Rule of Law index reflects the quality of a broad set of dispute resolution mechanisms operating in a country

Appendix B: Intervention

The figure below displays a letter from CTDR-U addressed to one of the MNOs and copied to the Bank of Uganda. The letter bears acknowledgment stamps from the MNO, the Bank of Uganda, and the Uganda Communications Commission, indicating that all parties received and reviewed it. The details of the case on the second page are omitted to preserve participant anonymity.

Figure B1. Intervention



CENTRE FOR TECHNOLOGY DISPUTES RESOLUTION - UGANDA (CTDR-U)

www.ctdrug.org

Date: 06/05/22

The Chief Executive Officer

Airtel Towers, Plot 16A
Clement Hill, Kampala
P.O. Box6771
Kampala Uganda

UGANDA COMMUNICATIONS COMMISSION P.O. BOX 7376, KAMPALA REGISTRY UCC 10 MAY 2022 SIGN..... RECEIVED

Dear Sir/Madam

RE: UNCREDITED CUSTOMER MOBILE MONEY BALANCES.

The Centre for Technology Disputes Resolution-Uganda (CTDR-U) is an innovation-focused not-for-profit consumer protection hub that assists customers, regulators, and payments service providers to resolve challenges arising from transactional failures and malfunctions within the ecosystem.

We have been approached by several customers through our partner **Innovations for Poverty Action Uganda (IPA),** who allege that they have lost funds via your Airtel money platform. *Details are attached hereto* for your reference and further management.

We look forward to receiving feedback from you within seven (7) days from the date of receipt of this letter concerning the resolution of the attached claims.

We assure you of our cooperation as we strive to strengthen consumer trust and confidence in the digital economy in Uganda.

CTDRU CENTRE FOR TECHNOLOGY DISPUTES RESOLUTION UGANDA 05 MAY 2022 P. O. Box 246665, Plot 31 Ntinda - Kisasi Road hello@ctdrug.org +256 759 425 941

BANK OF UGANDA RECEIVED 06 MAY 2022 EXECUTIVE DIRECTOR OPERATIONS

Yours sincerely,

Centre for Technology Disputes Resolution Uganda

CC: EXECUTIVE DIRECTOR OPERATIONS BANK OF UGANDA

Airtel Uganda Ltd CLEMENT HILL 06 MAY 2022 RECEIVED SIGN.....

Email: hello@ctdrug.org | P.O. Box 24665, | Innovation Village, Ntinda Complex.

CamScanner

In 2013, the Bank of Uganda (BoU) publicly warned mobile-network operators (MNOs) that it would "take administrative sanctions" if they failed to address widespread complaints about disappearing mobile-money deposits. The announcement is reported here:

https://observer.ug/business/mtn-under-fire-over-mobile-money-reversal/#:~:text=In%20the%20same%20letter%2C%20Bank,service%20provid

A comprehensive framework was introduced only with the National Payments Systems Act, 2020, available at:

https://bills.parliament.ug/attachments/National%20Payments%20Systems%20Act,%202020.pdf

see Section 65(e) "Consumer protection in payment system" mandating MNOs to provide a Dispute Resolution Mechanism, Section 7 (1) Licence, Section 13(1)(g) licence revoked and section (12) sanctions against MNOs.

BoU has exercised these powers actively:

- Directives on Customer Identification (May 2024): BoU required agents to verify customer identification for mobile-money transactions above UGX 1 million and warned it could take legal action against non-compliant operators. MTN and Airtel issued compliance notices to customers.

https://techpoint.africa/news/bank-of-ugandas-id-verification-directive/

- Investigations into 'Hidden Charges': Regulators launched investigations into MTN and Airtel regarding alleged undisclosed mobile-money fees.

https://techpoint.africa/insight/techpoint-digest-1020/

- Response to Fraud Allegations: Following public complaints, the BoU Governor urged consumers to use formal complaint channels and committed the central bank to follow up on unresolved mobile-money cases.

https://businesstimesug.com/bou-urges-ugandans-to-report-mobile-money-fraud-through-proper-channels/

Regulatory authority was strengthened further with the National Payments System Consumer Protection Regulations, 2022, available at:

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

See in particular section 2: "The licensee shall handle the request and give clarification or decision in writing within the time specified in the Schedule to these Regulations".

Finally, BoU's regulatory credibility is supported by its institutional reputation. A recent IMF review notes that the Bank of Uganda is committed to transparency and accountability, available here:

https://www.imf.org/en/publications/cr/issues/2023/02/14/uganda-central-bank-transparency-code-review-imf-country-report-no-529812

Appendix C: Disputes Resolved

Summary of Case	Resolution
Money sent, not received	
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 warning letters to Airtel Mobile Money Limited and the regulators, in order to retrieve the money. The matter was resolved. 25,000Ugx was refunded to the client's mobile money account.
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 reversed.	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 and the regulators 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) and the regulators to retrieve the transaction details. These details were crucial in enabling the Uganda Police Force to apprehend the thief and recover the stolen money.
Money disappearing from 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 and the regulators. 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 and the regulators 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 the consumer, the responsible Mobile Network Operator (MNO) and the regulators. 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 D: On-Going Disputes

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.
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 is locating the mobile money agent, to obtain better details regarding the transaction.

Appendix E: 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 account.

A fraction τ of this deposit is lost because of the cases encountered in this project: accounts blocked by MNOs, money sent but never received, money sent to the wrong number, or fraud.

This loss 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.

The problem is the absence of Dispute Resolution Mechanisms (DRM).

The consumer files a complaint. 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 $(p\beta^T - c)\tau A\sqrt{e}$ (where β is the discount factor of the customer). The consumer complains only if :

$$p\beta^T - c > 0 \tag{E1}$$

which we call the "Complaint Constraint" (E1).

In the absence of the intervention, the probability $p$of resolving a case is low because participants are dissatisfied with the poor quality of customer care centers. Resolution often takes a long time T, with some respondents reporting multiple visits before any progress is made. The costs c (in terms of lost work time, transportation, and the stress of navigating unfamiliar bureaucratic procedures) can also be substantial. As a result, the "complaint constraint" fails: many individuals do not file a complaint at all, and instead choose to stop using the system altogether.

The CTDR-U intervention increases the probability of resolution p and reduces both the expected time T and the cost c of pursuing a complaint. By leveraging the new regulatory framework, which requires MNOs to resolve disputes within a short timeframe, the intervention simultaneously raises p and lowers T. It also reduces the private costs c borne by consumers by preparing documentation and handling much of the administrative burden on their behalf.

These improvements make it more likely that the Complaint Constraint ($p\beta^T - c > 0$) holds.

When this constraint binds, consumers choose to complain. Once complaints are filed, the intervention also affects MNO incentives. If the consumer files a complaint, the MNO faces a sanction equal to $(p\beta^T + c_{MNO})\tau A\sqrt{e}$, where c_{MNO} captures the MNO's costs of addressing complaints, both the operational costs of operating customer care centers and the reputational costs of being referred to the regulators. These reputational costs can be substantial, especially under the new regulatory regime.

If the disputed amount $\tau A\sqrt{e}$ was wrongfully withheld by the MNO, the MNO will refrain from such behavior if and only if the expected sanction exceeds the gain: $(p\beta^T + c_{MNO})\tau A\sqrt{e} > \tau A\sqrt{e}$. This simplifies to the No Wrongful Behavior Constraint:

$$p\beta^T + c_{MNO} > 1 \tag{E2}$$

This condition can plausibly hold, particularly when c_{MNO} is large, reflecting both the resource cost of handling complaints and the reputational cost of regulator involvement. Importantly, however, (E2) only matters if the complaint constraint holds; that is, MNO deterrence only operates when consumers are willing and able to complain in the first place.

The CTDR-U intervention increases the likelihood that both constraints bind. It raises p, reduces T, lowers c, and increases c_{MNO} by credibly threatening escalation to the regulators. As a result, MNOs face stronger incentives to avoid wrongful behavior.

Turning to economic implications, a reduction in wrongful behavior mechanically strengthens entrepreneurs' incentives to exert effort e. With higher expected returns from mobile money transactions—and greater trust in the system—users engage more actively in mobile money–enabled economic activity. This, in turn, enhances risk-sharing, access to credit, and overall economic development.

Appendix F: Deviations from PAP

This section documents deviations from the pre-analysis plan (PAP). We begin by describing how the main variables and analyses align with the PAP, then explain one treatment arm that was not implemented, and finally outline deviations related to participant recruitment.

F1. Alignment With the PAP and Minor Additions

We follow the PAP closely and report all pre-specified outcomes, with only minor adjustments:

We add "satisfaction with the resolution" as an outcome, placed immediately after the variable measuring whether the dispute was resolved. This addition is motivated by the fact that a dispute may be resolved without the participant being satisfied, and satisfaction is a commonly used outcome in the dispute-resolution literature (e.g., Blattman, Hartman and Blair (2014)).

We measure the concept of use of mobile money through the two economic channels through which improved DRMs should increase mobile money use: (i) risk-sharing, measured through remittances received in response to negative shocks, and (ii) access to credit. We present evidence along both channels (more remittances received following shocks and greater borrowing from mobile money-enabled sources) and interpret these as increased use of mobile money.

We add a subgroup analysis by gender, which was not pre-specified. All other subgroup analyses follow the PAP.

F2. Treatment Arm Not Implemented

The PAP proposed two treatment arms:

- Treatment 1 (implemented): direct support from CTDR-U in resolving disputes.
- Treatment 2 (not implemented): an information treatment providing clients with a webpage containing letter templates and contact information for complaint departments, enabling them to file complaints independently.

Due to budget constraints and concerns about reduced statistical power with two treatment arms, we chose not to implement Treatment 2. Instead of splitting the sample (˜333 participants per arm across two treatments plus control), we prioritized a single, well-powered treatment arm.

Importantly, the PAP stated: "We will start with treatment 1 only in a first stage, because we need to develop the material to be delivered in treatment 2 based on the protocol we develop and refine in treatment 1."

This confirmed that Treatment 1 would be implemented first. Treatment 2 remains an avenue for future research.

F3. Recruitment Methods

The PAP listed three potential recruitment strategies:

1) Door-to-door recruitment in sampled villages: this is the method we implemented. It aligns with our goal of reaching ordinary citizens and was supported by the village stratification on education and informal business ownership.

2) Referral of cases by the Uganda Communications Commission (UCC): not implemented. Despite discussions, UCC did not refer cases to the project.

3) A promotional campaign on social media: not implemented. Uganda implemented a social media tax during the project period, making social media inaccessible to many low-income users. Because our target population is ordinary citizens (particularly those with low education levels), we decided not to pursue a recruitment method that would systematically exclude them.

Thus, the only recruitment method used in the project was door-to-door surveying. As a result, a fourth subgroup analysis specified in the PAP (heterogeneity by recruitment channel) cannot be implemented.

Appendix G: 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[4] (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,[5] 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 G1 shows that education displays important variation at the Parish level.

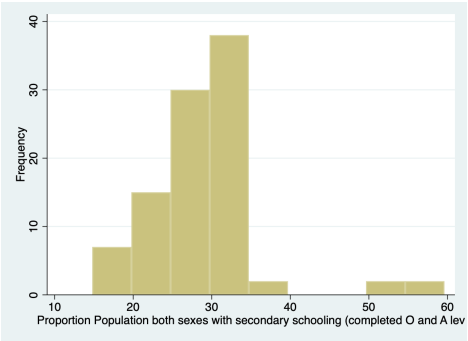
To measure informal business ownership, we use the Kampala Informal Sector Survey.[6] This survey was designed to produce representative estimates for the informal sector in Kampala, with 1,464 observations in Kampala alone. We calculate the number of informal businesses at the Parish level, multiply it by the observation weight in the sample, and divide it by Parish population

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

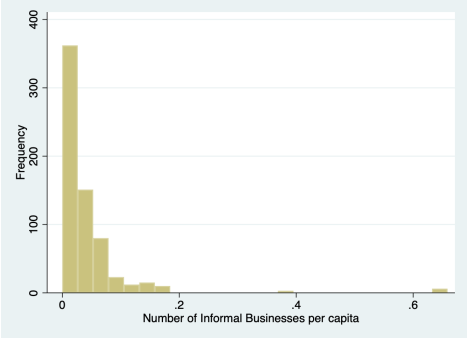
[6] https://microdata.worldbank.org/index.php/catalog/3397

Figure G1. Education



estimates (from UBOS - Central Region - Parish Level Profiles (Census 2014)) to get the number of informal business per capita in a parish. Figure G2 below shows that informal business ownership displays important variation at the Parish level, although with a few outliers.

Figure G2. Informal Businesses

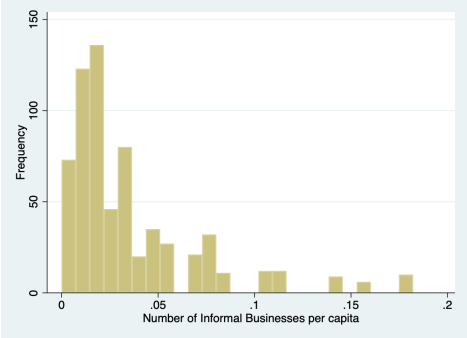


Trimming the data at 0.2 (informal businesses per capita) yields Figure G3, which shows interesting variation.

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.

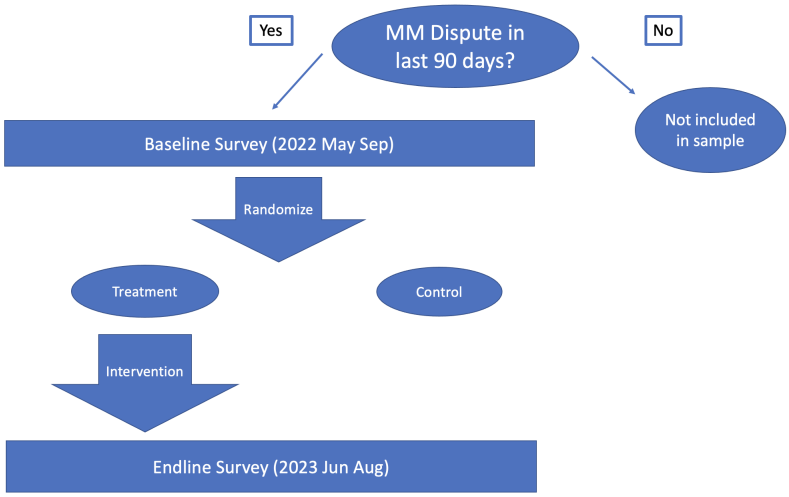
The final dataset gives an order of villages to be visited, with one village per strata. Thus, this methodology ensures that we visit one village of each strata sequentially.

Figure G3. Informal Businesses (Trimmed)



Appendix H: Study Design

Figure H1. Study design



Appendix I: Descriptive Statistics

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 I1 below.

Table I1—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.

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 I2 below. The three numbers sum to 100, which shows that there are essentially only two companies in Uganda.

Table I2—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

The duopolistic nature of the market may explain the challenges experienced by customers, who frequently complain about poor customer care. Table I3 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.

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 I4. The striking finding of this table is that 34 percent take no action. The intervention attempts to change this by providing a new DRM to resolve these disputes.

Table I3—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."

Table I4—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.

Appendix J: Statistical Power Calculations

We collect surveys from 817 participants. This sample size was determined using a statistical power calculation based on expected treatment effects. The anticipated effect size depends on the complexity of the mobile money problems users face. To illustrate, consider two broad categories of disputes.

First, some cases involve complex issues such as direct fraud or instances where money is sent but never received because the MNO retains it. These require lengthy investigations by the provider. The CTDR-U team estimated that roughly one-quarter of such cases would be successfully resolved.

Second, other cases are simpler. For example, when money becomes stuck with aggregators or third-party payment intermediaries, often due to power outages, transactions fail to complete even though the aggregator may be debited. These problems are easier to identify and rectify. CTDR-U estimated a 40 percent resolution probability for these simpler cases.

Assuming these two categories occur with equal frequency, the expected resolution rate in the treatment group is:

$$0.5 \times 25 + 0.5 \times 40 = 32.5\%$$

For the control group, we assumed a 20 percent resolution rate, consistent with IPA survey findings showing that only 20 percent of users with disputes were able to resolve them.

To detect a difference between 20 percent (control) and 32.5 percent (treatment) with 80 percent power and a 5 percent significance level, the required sample size is 792 respondents. Our final sample of 817 participants thus provides sufficient power for the main analysis.

Appendix K: Representativeness of Sample

We first compare our sample to the Uganda National Panel Survey 2018-2019 (UNPS).[7] 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 K1 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

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

Table K1—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".

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 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.[8]. 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 K2 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 K2—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.

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 K3 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.

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

Table K3—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 L: Balance test

In Table L1, we assess baseline balance for all variables used in the analysis. We estimate the following specification:

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

where Y_{i0} is the baseline value of each variable. Robust standard errors are reported.

Across all outcomes and demographic characteristics, we find no statistically significant differences between the treatment and control groups. For example, Column (1) shows that baseline trust in the mobile money system is 57.7 percent in the control group, and only 1.94 percentage points lower in the treatment group, a difference that is neither statistically nor substantively meaningful. The corresponding normalized difference is 0.10 standard deviations, well below commonly used thresholds for imbalance. The remaining primary outcomes (dispute resolution and satisfaction with resolution) are measured only at endline and therefore cannot be included in the baseline balance test.

Columns (2)–(4) examine balance in the composition of case types. Column (2) uses a dummy equal to 1 if the dispute involves clear MNO fault (e.g., money sent but not received, blocked account). This proportion is similar across treatment arms. Columns (3) and (4) show that fraud cases and "money missing from account" cases are also evenly distributed at baseline. Column (5) shows that the financial amount at stake in the dispute is balanced between groups. Columns (6)–(12) report balance on demographic characteristics. We find no differences in respondents' status as household head, access to information (newspaper readership, radio and TV hours), income, marital status, or reliance on agriculture for consumption. Overall, the table demonstrates that the paired randomization procedure generated highly comparable treatment and control groups at baseline.

Table L2 presents the balance tests for the variables used in the risk-sharing analysis. Column (1) shows that baseline expenditures are similar across treatment and control groups. Columns (2)–(6) indicate that the prevalence of negative shocks is balanced at baseline. Columns (7)–(18) further demonstrate that the types of shocks experienced (illness, death, theft, injury, and other shocks) are also evenly distributed between the two groups.

Table L1—Balance test

	(1) Trust MM	(2) Type Dispute: MNO	(3) Type Dispute: Fraud	(4) Type Dispute: Money Missing	(5) 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) HH Head	(7) How often read newspaper?	(8) Hours radio per day	(9) Hours TV per day	(10) Income	(11) Marital Status	(12) 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 L2—Balance test Risk Sharing

	(1) Log Expenditures	(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 expenditure, measured in USD PPP. Expenditure is calculated by aggregating spending 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. We use the logarithm of total annual household expenditures, measured in USD PPP. The conversion rate is 1USD PPP = Ugx. 1,221.99 (source: The world bank development indicators, PPP conversion factor, private consumption (LCU per international $). 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 L3 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 L3—Balance test Credit

	(1)	(2)	(3)	(4)	(5)
	Borrowed	Borrowed Gov Bank Workplace	Borrowed Mobile Money friends/family	Amount Gov Bank Workplace	Amount Mobile Money friends/family
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 government, workplace, bank in the last year, 0 otherwise. In Column (3), 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 (4), the dependent variable is the amount borrowed last year from government, workplace, bank. In Column (5), the dependent variable is the amount borrowed last year from Mobile Money, friends or family. 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 M: Differential Attrition

In Table M1, 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. It is not the case that there is more attrition in the control group due to people dropping out the study because they are not helped by CTDR-U. In fact, there is slightly more attrition in the treatment group, not control group. While attrition is 20 percent in the control group, this figure increases by 3.5 percentage points in the treatment group, but not significantly so.

The rest of the table shows that attrition is not related to the type of the dispute (col. 2), to the financial amount of the dispute (col. 3) or to receiving a negative shocks, i.e., changing economic conditions (col. 4).

Table M1—Differential Attrition

	(1)	(2)	(3)	(4)
	Attrition			
Treated	0.035			0.035
	(0.029)			(0.029)
Dispute: MNO		0.030		
		(0.051)		
Dispute: Fraud		0.043		
		(0.059)		
Dispute: Money missing		0.090		
		(0.063)		
Financial Amount Dispute			-0.000077	
			(0.000047)	
Negative Shock				-0.024
				(0.033)
Control Group mean	0.20	0.20	0.20	0.20
SD	0.40	0.40	0.40	0.40
Observations	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.

Appendix N: Trust in Mobile Money

In Table N1, 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 N1—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 O: Control Variables

In Table O1, 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 O1—Control Variables

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.065*	0.079**	4.34***
	(0.038)	(0.037)	(1.67)
Household Head	0.033	0.0056	1.75
	(0.042)	(0.041)	(1.84)
How often read newspaper?	-0.0073	-0.015	-0.097
	(0.012)	(0.012)	(0.55)
Hours radio per day	-0.0063	-0.0071*	-0.043
	(0.0043)	(0.0040)	(0.22)
Hours tv per day	-0.0030	-0.0036	-0.35
	(0.0067)	(0.0063)	(0.30)
Income	-0.0025	-0.0047	-0.45
	(0.011)	(0.010)	(0.45)
Marital status	-0.00097	0.0025	-0.60*
	(0.0080)	(0.0076)	(0.35)
Household rely on Agri. for consumption	0.042	-0.048	2.59
	(0.064)	(0.056)	(2.52)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	639	631	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 dependent variable is the trust measure.

Appendix P: Stratifying Sampling Variables

In Table P1, we include the two stratifying variables: mean informal business ownership and average education levels at the village level. The sample size is smaller in this specification because village names listed in official sources (the Kampala Capital City Authority and the Kampala Informal Sector Survey) did not always match the names used locally during fieldwork. As a result, we were able to match villages for only N = 504 individuals. Despite the reduced sample, all results remain statistically significant when these stratifying variables are included.

Table P1—Including the Stratifying Sampling Variables

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.084**	0.079*	3.66*
	(0.042)	(0.041)	(1.89)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	504	497	512

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. The regressions include the two stratifying variables: mean informal business ownership and education levels at the village 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 dependent variable is the trust measure.

Appendix Q: Paired Randomization

In Table Q1, 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.

Table Q1—Results with Paired Randomization

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.077*	0.076*	4.04**
	(0.043)	(0.041)	(1.94)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	484	478	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 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 dependent variable is the trust measure.

In Table Q2, we include pair dummies in the specification Bruhn and McKenzie (2009). This makes no difference to the results, if anything they are slightly larger for dispute resolved and satisfaction in Columns (1) and (2). The coefficient of Trust in Column (3) is slightly smaller, but not significantly different from the main result (which was 4.49, SD=1.66).

Table Q2—Results with Paired Dummy

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.13***	0.10**	3.32
	(0.048)	(0.050)	(2.29)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	484	478	484

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. This table includes pair dummies. 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 dependent variable is the trust measure.

Appendix R: Spillovers

In Table R1, 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 Columns (3) and (4)) and trust in the system (in Columns (5) and (6)) increase significantly.

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

Table R1—Spillovers

	(1)	(2)	(3)	(4)	(5)	(6)
	Dispute Resolved		Satisfied with Resolution		Trust in MM	
Number Treated in 500m radius	0.010		0.017**		0.82**	
	(0.0083)		(0.0081)		(0.37)	
Number Treated in 1km radius		0.0023		0.0059*		0.36**
		(0.0036)		(0.0035)		(0.15)
Control Group mean	0.30	0.30	0.25	0.25	57.7	57.7
SD	0.46	0.46	0.44	0.44	20.9	20.9
Observations	351	351	346	346	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 dependent variable is the trust measure.

Appendix S: Sub Group Analysis

We start by presenting the sub-group analysis by type of dispute:

- MNO fault
- Fraud cases
- Money missing from account

The intervention has the largest effects for cases where the MNO is clearly at fault and much smaller effects for fraud or ambiguous "money missing" cases. This provides evidence that the regulatory channel places pressures on the MNOs when they are at fault.

Table S1—Heterogeneous Effects by Type of Dispute

A. MNO fault

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.090*	0.096*	6.01***
	(0.050)	(0.049)	(2.14)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	397	390	399

B. Fraud

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.057	0.073	-4.59
	(0.048)	(0.046)	(4.08)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	108	108	111

C. Money missing from account

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	-0.021	-0.053	10.7**
	(0.085)	(0.081)	(4.35)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	86	86	89

Note: Robust standard errors. *** Significant at 99 percent level, ** Significant at 95 percent level, * Significant at 90 percent level. In Panel A, 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 Panel B, the sample is restricted to cases of fraud. In Panel C, 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 dependent variable is the trust measure.

We then show the heterogeneous effects by income. We include Income and interact it with Treated. The coefficient of "Treated * Income" is not statistically significant, indicating that the intervention benefits respondents across the income distribution equally

Table S2—Heterogeneous Effects by Income

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.077	0.14**	4.74
	(0.075)	(0.072)	(3.10)
Income	0.0012	0.0034	-0.15
	(0.013)	(0.012)	(0.53)
Treated * Income	-0.0017	-0.020	-0.080
	(0.020)	(0.019)	(0.84)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	643	634	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 dependent variable is the trust measure.

Finally, we show heterogeneous effects by the financial amount of the dispute. Again, we interact the financial amount of the dispute with Treated and find no significant coefficient, indicating that the likelihood of resolution does not vary with the size of the dispute.

Table S3—Heterogeneous Effects by Financial Amount Dispute

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.074*	0.083**	4.45***
	(0.038)	(0.037)	(1.70)
Financial Amount Dispute	-0.000069	0.0000051	0.0038
	(0.00017)	(0.00017)	(0.0071)
Treated * Financial Amount Dispute	-0.000077	-0.00011	0.00051
	(0.00021)	(0.00021)	(0.0082)
Control Group mean	0.30	0.25	57.7
SD	0.46	0.44	20.9
Observations	643	634	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 dependent variable is the trust measure. Income is measured on a 10 point scale.

In Table S4, 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 S4—Heterogeneous Effects by Gender - Female

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.065	0.078*	5.82***
	(0.047)	(0.047)	(2.04)
Control Group mean	0.31	0.29	57.6
SD	0.46	0.45	20.2
Observations	408	400	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 dependent variable is the trust measure.

Table S5 shows the results for males, with slightly smaller effects.

Table S5—Heterogeneous Effects by Gender - Male

	(1) Dispute Resolved	(2) Satisfied with Resolution	(3) Trust in MM
Treated	0.082	0.084	2.31
	(0.062)	(0.056)	(2.82)
Control Group mean	0.29	0.20	57.7
SD	0.46	0.40	22.1
Observations	235	234	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 dependent variable is the trust measure.

Appendix T: Prevalence of Negative Shocks

Table T1 shows the prevalence of shocks in the sample.

Table T1—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 U: Use of Mobile Money

We present here another variable measuring use of the system.

In Column (1), 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.[9] 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 (1) 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 Column (2), we look at extensive use (1=Did not affect usage, 0=Stopped) versus intensive use in Column (3) (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).

Overall, we find that the treatment increased the likelihood that people continue using the system and not reduce or even stop their usage.

Table U1—Effect on Use of Mobile Money

	(1)	(2)	(3)
	Use	Extensive Use	Intensive Use
Treated	0.11*	0.069**	0.049
	(0.056)	(0.033)	(0.038)
Control Group mean	2.47	0.81	0.68
SD	0.74	0.39	0.47
Observations	630	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 question is "How did this experience affect use of this service?" (3=Did not affect usage, 2=Reduced usage, 1=Stopped). In Column (2), the dependent variable is a dichotomous variable equal to 1 if the respondent answers 1=Did not affect usage, 0=Stopped. In Column (3), the dependent variable is a dichotomous variable equal to 1 if the respondent answers 1=Did not affect usage, 0=Reduced.

[9]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.

Appendix V: Businesses

Table V1 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.

Table V1—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.

We ask business owners the main difficulties in operating a business. The main obstacle is access to finance, as shown in Table V2.

Table V2—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

Appendix W: Savings

In Table W1, 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 W1—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 X: Costs

Table X1 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 X1—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.