Do social concerns affect information-passing about new technologies?

Evidence from mobile banking in Pakistan

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July 29, 2023

Abstract

This paper reports on an experiment designed to test whether information-sharing about new technologies is hampered by social concerns–in particular, the fear of recommending at technology that causes a negative outcome for one's peer, and the fear of offending peers by appearing patronizing. The experiment is run in Pakistan and the technology considered is mobile banking. Some individuals ("senders") were given information about both the growth potential (e.g. ability to save) and the safety concerns (e.g. risk of fraud) with mobile banking, then asked whether they want to share the information with other villagers ("receivers"). I cross-randomize two conditions (known to the senders): whether the receiver is told the identity of the sender, and whether the receiver is told they were specifically targeted by the sender. The key hypotheses are that (a) hiding the sender's identity reduces the sender's blame concerns; and (b) hiding the targeting reduces the sender's offense concerns. Results are consistent with both hypotheses: sharing of the growth pamphlet increases when the sender knows their identity will be hidden; and sharing of the safety pamphlet increases when the sender knows the targeting will be hidden. Heterogeneity by social distance suggests that offense concerns are present only with socially-distant contacts, while blame concerns are present with both close and distant contacts. Together, these results suggest that social concerns are one important factor behind the slow diffusion of information about new technologies.

1 Introduction

Communication between social ties is critical for the diffusion of new technologies and for building relationships. In many cases, these roles can be mutually-reinforcing as individuals share useful information to reinforce social bonds or gain prestige among their social circle (Henrich and Gil-White, 2001). However, in some cases, social concerns may cut against sharing useful information about a technology. One may worry about being blamed for sharing information that could lead to bad outcome even if it is useful in expectation or about offending others by sharing information meant for the unsophisticated.

In this paper, I explore how social concerns influence information-passing decisions about a new technology. In rural Punjab, Pakistan, I measure the willingness of villagers to pass information on mobile banking, an emerging technology in this context. The experiment offers participants (senders) the opportunity to pass up to two types of mobile banking information to fellow villagers (receivers). One of the pamphlets focuses on protecting people from mobile banking scams (the safety pamphlet), while the other focuses on enabling people to use advanced services (the growth pamphlet).[1] Each sender makes information-passing decisions for a socially-close receiver and a socially-distant receiver. As shown in Table S1, the sender knows both receivers but is more likely to have exchanged advice, loans, and gifts with the socially-close receiver.

To identify social concerns, I vary whether the identity of the sender is revealed to the receiver (tell the receiver "[Sender Name] shared" or "a fellow villager shared"). For both socially-close and socially-distant pairs, hiding the sender's identity increases information-sharing. Pooling these groups, we find that the percentage of senders sharing both pamphlets increases from 26.3% to 32.8% (p-val=.004) when the sender's identity is hidden. This result indicates that social concerns inhibit information-sharing in this context.

I unpack the mechanisms driving social concerns by varying whether the sender's targeting of the receiver is revealed or hidden (tell the receiver "shared to you, [Receiver Name], specifically" or "shared to a fellow village"). This treatment focuses on identifying the role of the sender's concerns around signaling their regard for the receiver's abilities. For example, if the sender shares information meant for low-types, the receiver can infer that the sender holds them in low-regard. The receiver may then become offended and withdraw from future interactions with the sender or subtly retaliate against them (Mosquera et al., 2008). Given that the

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[1]Refer to Appendix S.2.3 for pamphlets and English translations

safety pamphlet is meant for those who are likely to fall for scams, one would expect offense concerns to be stronger around this pamphlet. One would also expect the effect to be larger for socially-distant pairs where there is more uncertainty around how the sender regards the receiver's abilities. Consistent with these expectations, I estimate a 9.4 pp (p=.086) greater effect on sharing of the safety pamphlet to socially-distant receivers relative to socially-close receivers.

By comparing the offense effects to the overall social concerns effect, I can identify the role of non-offense social concerns. In this context, villagers cite being blamed for sharing information that leads to a bad outcome as the primary non-offense social concern. Blame should be more present when there is a greater chance of a negative outcome. Therefore, blame should affect sharing of the growth pamphlet more than sharing of the safety pamphlet. Consistent with this prediction, hiding the sender's identity (overall social concerns) increases sharing of the growth pamphlet by 6.4 pps (p=.061), while hiding the sender's targeting (the offense effect) has no effect on the growth pamphlet. In contrast, there is no difference in the overall social concerns and the offense effects for the safety pamphlet.

These findings build upon the literature on social image concerns (for a review refer to (Bursztyn and Jensen, 2017). This literature has examined the effect of social image concerns on voting (Dellavigna et al., 2017), educational choices (Bursztyn et al., 2019a), work effort (Mas and Moretti, 2009), and consumption (Bursztyn et al., 2019b). In general, these applications focus on actions that are not directed toward a specific person. This paper examines an action directed toward a specific receiver, where the traits of receiver and possible effect on the receiver's outcomes are likely to influence decisions. These dynamics give rise to the offense and blame concerns that are not present for undirected actions.

This paper also contributes to the growing literature on how information spreads through social networks (Acemoglu et al., 2011; Jackson et al., 2012; Banerjee et al., 2020). Foundational theoretical work in this literature highlights the importance of the network position of seeds and the structure of the network for the diffusion and aggregation of information. When these theories have been tested in empirical work, the findings typically have supported their central results. For example, studies in a variety of settings have found that seeding socially-central nodes increases information diffusion (Aral et al., 2013; Banerjee et al., 2013, 2019, 2021; Beaman et al., 2021). However, in many cases, diffusion is still disappointingly low even if the seeds adopt and appear to benefit from the technology themselves (Kondylis et al., 2017; Banerjee et al., 2018; Benyishay and Mobarak, 2019; Duflo

et al., 2022; Chandrasekhar et al., 2022). These apparent learning failures led to increased interest in models of endogenous communication decisions (as opposed to the mechanical communication typically assumed in most canonical models). Immorlica et al. (2014) explore how strategic communication of rivalrous information influences diffusion. Chandrasekhar et al. (2018) explores how shame and stigma affect information-seeking behaviors. Chandrasekhar et al. (2022) interpret the results of an RCT on fertilizer use in Kenya through a model where informed farmers are concerned about sharing information and being perceived as unreliable by others. In this paper, I find evidence for constrained communication in a setting where information is likely to be non-rivalrous[2] and perceived as reliable.[3] Explaining these results requires a novel model of communication choices that incorporates blame and offense concerns.

In Section 2, I present a simple model of information-passing. I outline the sampling procedures and experimental design in Section 3. I present the empirical framework in Section 4.1 and discuss the experimental results in Section 4. Section 5 concludes.

2   Model

In this section, I describe a simple model of information-passing between social ties. The model is a variation of the social image models described by Bursztyn and Jensen (2017). Similar to Chandrasekhar et al. (2018) who looks at signaling concerns around seeking, I evaluate the decision of one person to interact with social tie. In their case, the receiver of the action is endowed with information by the experiment. I look at the reverse case where the individual making the decision is endowed with information. This difference means that the action signals more about the sender's regard of the receiver's ability rather than the sender's own ability.

2.1   Environment

I focus on the decision of one social tie (the Sender) to pass information to another social tie (the Receiver).

The Receiver believes the Sender has information to share with probability q. If the Sender has

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[2]There are no supply constraints on mobile banking accounts.

[3]Similar to the blue fertilizer measuring spoons that were viewed as reliable in Chandrasekhar et al. (2022), we distribute physical pamphlets to increase the perceived reliability of the information.

information, she can share it ($d = 1$) or withhold it ($d = 0$).

If the Sender shares the information, the Receiver gets a draw from the distribution of Receiver payoffs $U_R(T)$, where $U_R(T)$ represents the effect of having the information on the receiver's future welfare. This receiver payoff will depend on the receiver's type $T \in H, L$. We call the probability the sender assigns to the receiver being a high-type θ.

The receiver cares about θ because they care about how others view them. The receiver will have a prior probability distribution of θ which we label π. π represents the receiver's perception of how highly or lowly their ability is rated by the Sender. Once the Sender makes a decision and the Receiver observes it, the Receiver will update π using a Bayesian belief updating function.

The Sender will make the decision that maximizes their payoff which is:

$$U_S = 1_{d=1} * (\underbrace{U_R}_{\text{altruism}} - c + \underbrace{\lambda_\eta * \eta(U_R)}_{\text{credit/blame}}) + \underbrace{\lambda_\gamma * \gamma(B)}_{\text{compliment/offense}} \tag{2.1}$$

This equation represents how altruism and social concerns affect the sender's payoff from sharing information.

The first term (which we label altruism) captures that Sender may directly value the Receiver's payoff, U_R. The second term , c, represents the cost of sending the information such as walking to someone's house or calling them on the phone. The latter two terms capture social concerns relating to the effect of the information-sharing on the relationship between the Sender and the Receiver. The second term (labeled credit/blame) captures concerns related to being credited for positive outcomes or blamed for negative outcomes, which is why its value depends on the Receiver's payoff U_R. The final term (labeled offense/compliment) represents concerns related to the Receiver updating positively (being complimented) or negatively (being offended) by what the Sender's decision signals about their regard for the Receiver's ability.

λ_η and λ_γ are weights on credit/blame and compliment/offense, respectively. λ_η can be interpreted as the likelihood that the Receiver attributes credit/blame for their payoff to the Sender. Similarly, λ_γ can be interpreted as the likelihood that the Receiver takes a compliment or offense from receiving the information. These weights will be useful in analyzing the effects of the experimental interventions.

We denote the expected sum of the terms relating to the receiver's expected payoff (altruism

and credit/blame) minus the cost as V. Note that these terms disappear if the Sender does not share any information. V will be privately known to the Sender but random from the perspective of others. V will depend on the Sender's opinion of the Receiver's type, θ. F_θ denotes the c.d.f. of V for a Receiver of ability type θ and G_θ is the complementary c.d.f. We can define an equilibrium in the following way:

Definition 1 (Equilibrium)**.** A (mixed) strategy for the Sender is a map from θ and a realization of V to a probability of sharing the information: $\sigma : \theta \times \mathbb{R} \to [0, 1]$. Thus, $\sigma(\theta, w)$ is the probability $d = 1$ given the Sender's perceived Receiver ability θ and a realization of V equal to w. A belief function for the Receiver is a map from the sender's decision to posterior belief over the value of θ: $B : \{0, 1\} \to \mathcal{P}([0, 1])$. Thus, $B(d)$ is the probability distribution function over θ induced by the sender decision d.

A Bayes-Nash equilibrium is defined to be a pair (σ, B) where B is consistent with Bayesian updating assuming the Seeker plays according to σ, and σ maximizes the Sender's payoff taking B as given.

A tuple of primitives $(\pi, F_\theta, \eta, \gamma, \lambda_\eta, \lambda_\gamma)$ denotes the environment.

2.2   Basic analysis

We will analyze the Bayes-Nash equilibria of this model. We can think of this model as a game where the Sender is attempting to best-respond to the belief-updating function of the Receiver.

For simplicity, we make the following technical assumption on the distribution of V:

Assumption 1. For any perceived Receiver ability $\theta \in (0, 1)$ the random variable V has an atomless distribution whose support contains the positive reals.

Using this assumption, we can define the equilibria of the game in the following way:

Proposition 1. *Under Assumption 1, an equilibrium exists and every equilibrium is in cutoff strategies. An equilibrium is characterized by a cutoff v (used by all Senders independent of θ) which satisfies*

$$v = \gamma(B(0)) - \gamma(B(1)) \tag{2.2}$$

where $B_{v,d}$ is the c.d.f. of the belief-updating function induced by this cutoff rule:

$$\frac{B_{v,0}(x)}{1 - B_{v,0}(x)} = \frac{\pi}{1 - \pi} * \frac{1 - q \int_{y=\theta}^{1} G_{(}y, v)}{1 - q \int_{y=0}^{\theta} G(y, v)} \qquad \frac{B_{v,1}(x)}{1 - B_{v,1}(x)} = \frac{\pi}{1 - \pi} * \frac{\int_{y=\theta}^{1} G(y, v)}{\int_{y=0}^{\theta} G(y, v)} \qquad (2.3)$$

[4] Essentially, this proposition tells us that senders will decide whether the share information based on a cutoff level of expected altruism and credit/blame. This cutoff will be equal to the difference in compliment/offense between sharing and not sharing the information. Given the cutoff rule followed by all Senders, the receiver will be able to update about the Sender's perception of their ability based on whether the sender's sharing decision.

2.3   Identification and predictions

2.3.1   Identifying the effect of social concerns

We define social concerns as the joint effect of credit/blame and compliment/offense, $1_{d=1} * (\lambda_\eta * \eta(U_R)) + \lambda_\gamma * \gamma(b)$. If the Receiver cannot identify the Sender, then the Receiver cannot credit/blame the Sender ($\lambda_\eta = 0$) or update about the Sender's regard for their ability ($\lambda_\gamma = 0$). Thus, we can identify the effect of social concerns by varying the observability of the Sender's identity as long as this does not effect the expected outcome of the receiver, U_R.

If reducing the observability of the Sender's identity increases information-sharing, we can conclude that the Sender benefits from the social concerns involved in information-sharing in line with models such as Henrich and Gil-White (2001). The effect of positive social concerns on Receiver welfare is ambiguous. It will encourage sharing of useful information that would have been deterred by costs, but may also encourage sharing of harmful/useless information.

We can conclude that social concerns are negative if information-sharing falls when observability of the Sender's identity is reduced. In this model, negative social concerns will reduce Receiver welfare as Senders withhold useful information they would have otherwise shared.

2.3.2   Identifying the effect of compliment/offense concerns

If the Receiver does not know the Sender targeted them specifically, then it is more difficult for the Receiver to draw inferences about the Sender's regard for their ability. In other words, λ_γ will be lowered which will decrease the influence of compliment/offense concerns. Thus, we can

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[4]Refer to Appendix S.2.1 for proof

identify the effect of compliment/offense concerns by reducing the observability of the Sender's targeting of the Receiver, assuming this does not affect U_R.

If we find a negative compliment/offense effect, then this means that sharing this information signals the Sender holds the Receiver in low regard. Within our model, this signaling equilibrium can arise if we assume the information is more beneficial to low-types.

Assumption 2. If $\theta' < \theta$, then $F_{\theta'}$ strictly first-order stochastically dominates F_θ

There are a number of cases where the assumption that low-types benefit more from information-sharing is likely to hold. High-types may be more likely to already know the information. Alternatively, high-types may be able to figure out the information on their own without advice. With this assumption, we can show that the following signaling equilibrium will arise:

Proposition 2. *Under Assumptions 1 and 2, in any equilibrium of the signaling game, Senders with higher regard for the ability of the Receiver will share more than Senders with a lower regard in the ability of the Receiver. Therefore, sharing information signals a low regard in the ability of the Receiver. If v is the equilibrium cutoff and $\beta' > \beta$, then*

$$\mathbf{P}_v(\theta = \beta \mid d = 0) > \mathbf{P}_v(\theta = \beta' \mid d = 1)$$

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Since v depends on the the Sender's regard for the Receiver's ability, v is more likely to be above the cutoff if the Sender believes the Receiver is a low-type. Thus, sharing information signals low regard for the Receiver's ability under these assumptions and the offense/compliment effect will be negative. If we assume that the information is more beneficial to high-types, we would get the opposite result; sharing information would signal high regard for the Receiver's ability and the offense/compliment effect will be positive.

2.3.3 Identifying the effect of credit/blame concerns

To identify credit/blame, we would want to vary λ_η. However, we cannot reduce the observability of the Sender's identity (λ_η) without also reducing the observability of the

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[5] Refer to Appendix S.2.1 for proof

Sender's targeting the Receiver (λ_γ). Instead, we will compare when the Sender's identity is not hidden but the Sender's targeting is hidden (low λ_γ and high λ_η) to when the Sender's identity is hidden (low λ_γ and low λ_η). If information-sharing is higher in the former condition, than we can say that the credit/blame effect is positive. If it is lower, we can say that the credit/blame effect is negative.

If we know the Sender perceives the information as useful ($E(U_R) > 0$), then we can also learn about the shape of $\eta(.)$. If the information is useful and the credit/blame effect is negative, then $\eta(.)$ must be concave. Otherwise, we would expect $\eta(.)$ to be positive when U_R is positive in expectation.

2.3.4 Predictions on social distance

One's awareness of how someone else regards them should increase with each social interaction. Thus, we would expect close friends to know more each other than mere acquaintances. Within our model, this means that the precision of the Receiver's prior, π, should be decreasing in social distance. A less precise prior means that the Receiver will update more to the information revealed by the information-sharing decision, d. A larger update means that the compliment/offense concern, $\gamma(B)$, will be larger. This phenomena should lead offense concerns to be increasing in social distance.

2.3.5 Predictions on information type

As mentioned in Section 2.3.2, information that is more beneficial to low-types will cause more offense, while information that is more beneficial to high-types will compliment the receiver. If the information is equally beneficial to both types then we would expect no compliment/offense effects.

For credit/blame effects, the predictions depend on the shape of $\eta(.)$. If we find that $\eta(.)$ is concave,[6] then we would expect information with a higher variance of receiver payoffs to reduce sharing more than information with a lower variance of receiver payoffs.

[6]Refer to Section 2.3.3 for the test of concavity

3 Study design

3.1 Overview

I conducted this study in partnership with Gallup Pakistan from March-July 2023. To select the study locations, we randomly sample 56 rural communities from the Gujranwala, Mandi Bahuddin, and Hafizabad districts of Punjab, Pakistan.[7] For each community, we assign two field officers the responsibility for completing the study activities.

The field officers begin work in a village by compiling a list of social ties from two randomly-selected villagers (whom we will call the "listers"). Then, the field officers sample 16 other villagers and elicit recommendation decisions from them under randomly-assigned recommendation environments. Each of these 16 villagers (the "sender" respondents) makes a recommendation decision for one of their close social ties (the "socially-close receiver") and for one of the close social ties of a lister (the "socially-distant" receiver).[8] Finally, we randomly-select half of the sender respondents to have a recommendation decision implemented and the relevant receiver interviewed.[9]

I detail the procedures for sampling the lister and sender respondents in Section 3.2 and for assigning receivers to senders in Section 3.3. I describe the protocol for the recommendation experiment in Section 3.4 and present descriptive statisticts in Section 3.5.

3.2 Respondent sampling

For each village, we randomly select a geographic starting point for the field officers. The field officers begin work in the village by traveling to this point and engaging the households to its immediate left and right. The field officer selects one household member to be the listers for the village. After completing a lister survey, each field officer samples 8 households (16 per village) for the sender respondent surveys through circular random sampling.[10]

We require that listers and senders are potential mobile banking users of working age.[11] These

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[7]We reviewed the list to ensure communities were 1.5 kilometers apart, removing and replacing the handful of communities that did not fit these criteria.

[8]The lister respondent also makes recommendation decisions but to two socially-close receivers rather than one socially-close receiver and one socially-distant receiver.

[9]Half of the listers also have a recommendation implemented and the relevant receiver interviewed.

[10]Circular random sampling is a random walk method where the field officer starts at the edge of the village and then, spirals through the village interviewing every nth household passed; Refer to Appendix S.2.2 for full description of our random walk procedure

[11]Meaning that they had to possess a Pakistani Computerised National Identity Card (CNIC), a phone sim

requirements raise the likelihood that the mobile banking information in the pamphlets is relevant for the listers, senders, and their social ties. We also instruct field officers to prioritize the household head or the spouse of the household head so that the respondent is likely to be involved in financial decisions such as saving/transferring money through mobile banking. The survey protocol calls for field officers to prioritize female household members in half of surveys, but in this context, households are wary of having female household members speak extensively with unfamiliar males. Since the majority of the field officers are male, we end up with a predominantly male sample for listers and senders (Table 1).

3.3   Sender-Receiver assignment

We elicit social ties by asking listers and senders to list "people in [Community Name] outside of your household who you give advice to and receive advice from on farming, financial, or health issues?" We ask for two names from senders and four names from listers.

We assign one of the two names listed by the sender to be socially-close receiver of the sender. We assign one of the social ties listed by the lister to be the socially-distant receiver of the sender.[12]   We expect that each sender will have a stronger social tie with the socially-close receiver since they reported giving and receiving advice from them frequently. In Table S1, we show that the sender reports knowing the socially-close receiver better, sharing advice more frequently, and having a higher willingness to help them in a time of need. These results indicate that senders have closer socially ties with the socially-close receiver in the sense of Granovetter (1973); they spend more time spent together, mutually confide in each other, and exchange reciprocal services. It is important to note that almost all senders know of the socially-distant receiver and many have given or received advice from the socially-distant receiver in the past two months (Table S1).

The primary motivation for using this assignment procedure is to avoid imbalance between the socially-close and socially-distant receivers on personal characteristics. If we had simply asked senders for a socially-distant villager or randomly-selected a villager, we would have expected the socially-close receiver to be more socially-central due to the "friendship paradox", whereby one will have fewer friends than their average friend (Feld, 1991). This difference in

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card, and be between 18-65 years old.

[12]The socially-distant receivers of a sender surveyed by a given field officer will be selected from the four names listed by the lister surveyed by that same field officer. The field officer cannot select from the 8 names listed by both listers because the field officers had poor data connection in most study areas, meaning that their tablets could not access the lister names recorded by the other field officer.

social centrality would likely have led to differences on a range of other personal characteristics. With this imbalance between socially-close and socially-distant receivers, any heterogeneity in outcomes by social distance might be attributable to these differing personal characteristics.[13] With our assignment procedure, the personal characteristics of the socially-close and socially-distant receivers will be the same in expectation because we select these groups through the same procedure, namely randomly-selecting a villager and then eliciting an information-sharing tie. As Table 2 shows, our assignment procedure is successful in producing balance across socially-close and socially-distant receivers on key personal characteristics.

The other advantage of this protocol is cost. Most studies that avoid the friendship paradox use full network data to compare interactions across social distance holding social centrality constant (Mobius et al., 2005; Chandrasekhar and Jackson, 2018), but full network data is notoriously costly to gather (Breza et al., 2020).[14] Another option was to draw socially-distant receivers from the social ties of all other respondents sampled in a village. However, this would have required us to visit each respondent once to elicit social ties and again to assign socially-distant receivers and record recommendation decisions. By drawing the socially-distant receivers from the close social ties of the first respondents interviewed by a field officer in a given villager (the listers), the field officer has a fixed pool of villagers for the assignment of socially-distant partners in subsequent surveys without having to visit any respondent more than once.[15]

It is important to note that some field officers listed two socially-close receivers for senders, which is why we have far more socially-close than socially-distant pairs in our sample. Mid-way through data collection, we began using surveyCTO's offline dataset publishing feature which allowed us to preload the socially-distant receiver names and remove the possibility of human error.

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[13]For example, socially-distant receivers may be less socially-central and less financially literate. This might mean that they would benefit less from the growth pamphlet than the socially-close receivers

[14]Breza et al. (2020) shows how Aggregational Relational Data can substitute for the full network in many cases. Unfortunately, this method does not address the needs of this study.

[15]Additionally, the procedure of sampling a lister from a randomly-chosen point ensures that the lister's geographic location is random with respect to the other sender respondents. If we used circular random sampling for all respondents, the first respondent (the lister) would be geographically closer to the second respondent than other respondents. Thus, the geographical distance between respondents would be correlated with the order in which respondents were surveyed.

3.4 Recommendation experiment

In the recommendation experiment, each sender has the opportunity to recommend pamphlets with mobile banking information to a socially-close and socially-distant receiver. This section describes the pamphlet content and chronologically presents the experimental protocol.

3.4.1 Pamphlet content

We contracted with a designer from Punjab, Pakistan[16] to create two pamphlets with information on mobile banking. Both pamphlets include information about the Asaan Mobile Account. The Asaan Mobile Account is an initiative that the State Bank of Pakistan and the Pakistan Telecommunication Authority launched in December 2021 to enable the financial inclusion of low-income citizens. The Asaan Mobile Account allows any Pakistani holding a valid CNIC to open a mobile banking account with one of 13 private financial service providers by entering a standardized USSD code on their basic/smart phone and confirming their CNIC's validity.[17]

In addition to the information about the Asaan Mobile Account, the "Making your money grow with mobile banking" pamphlet provides information about advanced digital financial services. The pamphlet mentions savings accounts where one can earn profit,[18] commitment savings accounts, e-commerce, and agricultural finance. In contrast, the "Keeping your money safe with mobile banking" pamphlet focuses on avoiding negative outcomes when using mobile banking. This pamphlet includes information on protecting your PIN number, identifying common scams, checking your bank statement, and contacting mobile banking helplines. Appendix S.2.3 contains the pamphlets as they appeared to respondents (in Urdu) as well as the English translations of the text of the pamphlets.

[16]The same region as our sample

[17]After signing up via USSD code, the user has 60 days to biometrically verify their account with a mobile money agent. This process takes 30-60 minutes. In the 2022 Financial Inclusion Insights Survey, 73% of the denizens of the districts in our sample districts report being within 30 minutes of a mobile money agent, 10% reporting being 30-60 minutes away, 1% reported being over an hour away, and 16% said they did not know how far away they were from a mobile money agent.

[18]Since Pakistan is a Muslim-majority country, banks typically offer savers profit rather than interest to ensure compliance with Sharia law. In this system, banks and customers agree to a profit-sharing ratio rather than a guaranteed interest rate. Usually, banks quote an expected profit rate to customers and gear their investments to meet or exceed this profit rate

3.4.2 Pre-intervention: Sender survey questions, information provision, and priming

Since the pamphlets introduce new information to the senders, we ask about their financial goals and mobile banking knowledge prior to giving them the pamphlets. The field officer also presents the sender with basic information about mobile banking to create a baseline level of understanding. After these sections, the field officer hands each pamphlet to the sender and reads out a summary of the information on the pamphlet.[19]

Half of the senders receive a social concerns prime before the recommendation experiment. The field officer asks these senders whether they agree with the statements: "If I told others to use [a mobile banking account/the Lockbox], I would worry that something would go wrong and they would blame me" and "If I told others to use [a mobile banking account/the Lockbox], I would worry that they would be offended." [20] These questions are meant to bring social concerns to the front of the sender's mind. The other half of senders answer these questions after the recommendation experiment.[21]

3.4.3 Introduction of recommendation experiment

At the beginning of the recommendation section, we inform the sender that we will ask them to decide what pamphlets we offer to their assigned receiver. At this point, we mention the name of the assigned receiver for their first recommendation decision. As in most information-passing contexts, the information sender has the option to share no information and not have the receiver informed of their decision or their identity.

3.4.4 Treatment arms

We randomize senders into four different pamphlet recommendation environments, stratifying by community and field officer. The field officers then read a script that describes the recommendation environment in the relevant treatment arms. The experiment is a two-by-two design with the following treatments:

1. Hidden or revealed sender identity

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[19]Refer to Appendix S.2.3 for the summaries that the field officers read. We randomize which pamphlet is presented first so that we will be able to control for order effects if present. As Table S5, this randomization had no effect on our results so we ignore this randomization in our analyses.

[20]Refer to Appendix S.3 for a picture and the description of the lockbox

[21]In Table S9, I test the effect of the priming on the main outcomes and find no significant effects.

- (Hidden sender): The sender knows that the receiver will be told that "a fellow villager" recommended the pamphlets. Thus, the sender knows that the receiver will not know their identity.

- (Revealed sender): The sender knows that the receiver will be told that [Insert sender name] recommended the pamphlets. Thus, the sender knows that the receiver will know their identity.

2. Hidden or revealed targeting of the receiver

- (Hidden targeting): The sender knows that the receiver will be told that the recommendation was made to "a fellow villager" and that Gallup Pakistan randomly selected them. Thus, the sender knows that the receiver will not know the sender made the decision specifically for the receiver.

- (Revealed targeting): The sender knows that the receiver will be told that the recommendation was made to [Insert receiver name]. Thus, the sender knows that the receiver will know that the sender made the decision specifically for the receiver.

Note that the key difference across arms is the information revealed to the receiver. The sender always knows the identity of the receiver and how their recommendation will be presented to the sender. Therefore, any differences in recommendation decisions across arms are attributable to the sender's concern with how the receiver will react to the information presented.[22]

3.4.5 Outcome measurement: Pamphlet recommendations

After reading the script and ensuring the respondent understands the information-passing environment, the field officer prompts the respondent to make recommendations to their two assigned receivers.[23]

The field officer elicits decisions from the sender by asking whether the sender would prefer to share "Both pamphlets", "No pamphlets", the "Keeping your money safe with mobile banking pamphlet", or the "Making your money grow with mobile banking pamphlet". In the control group (Revealed sender, Revealed targeting), 13.6% recommend no pamphlets, 26.3% recommend both pamphlets, 30.2% recommend the "Keeping your money safe with mobile

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[22]After our data checks uncovered respondent misunderstandings of the treatments, we added three comprehension checks for senders prior to their recommendations. Refer to Appendix S.2.6 for more details

[23]The order of the socially-close and socially-distant receiver is randomized so we can control for order effects if necessary.

banking pamphlet" only, and 29.9% recommend the "Making your money grow with mobile banking pamphlet" only (Table 3).

3.4.6 Post-intervention: Sender survey questions, recommendation implementation, and receiver survey

To ensure the senders are maximally alert and engaged when making the recommendation decisions, we postpone some sender survey questions to after the pamphlet recommendations. A downside to postponing the questions is that the treatments may affect the sender's responses, but we can test and control for these effects when necessary. In the post-recommendation questions, we measure the sender's financial literacy using questions from the Financial Inclusion Insights survey (InterMedia, 2020) and their susceptibility to social desirability bias using questions from the Marlowe-Crowne module (Crowne and Marlowe, 1960). We also have the sender rate the intelligence and financial literacy of the receivers and ask about their advising and transfer relationships with the receivers. In the last part of the survey, the field officer offers to help the sender sign up for a mobile banking account. 32% of senders take up this offer.

Due to budget constraints, we cannot implement all of the recommendation decisions. We randomly select half of the senders to have one of their recommendation decisions implemented. Within the selected senders, we randomize whether the recommendation decision to the socially-close or distant partner is implemented, meaning that 50% of senders should have no recommendation decision implemented, 25% should have the socially-close recommendation implemented, and 25% should have the socially-distant recommendation decision implemented.[24]

For these selected decisions, we track the selected receiver and attempt to complete a short survey. If the sender recommends any pamphlet, the field officer offers the pamphlet (or pamphlets) to the partner regardless of whether the receiver is willing to answer the short survey. If the sender recommended any pamphlets and the field officer could not track the receiver, the field officer slips the pamphlet/s under the door of the receiver's home. If the respondent recommended no pamphlets, we do not mention the sender's recommendation decision or their name to the receiver; we still track the receiver and try to complete the short survey. We successfully track 63% of the selected receivers.

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[24]50% of listers have recommendation implemented with a socially-close receiver since they do not make recommendations to socially-distant receivers.

The short survey contains questions on demographics, financial behaviors, and digital literacy. We also ask the receiver to complete the financial literacy test and the Digit Span test.

3.5   Descriptive statistics

In Table 1, we present summary statistics and balance tests on the senders' characteristics. As expected, the randomization yields balance across the four treatment groups.

The senders are primarily male household heads. The majority have completed some secondary school but very few went on to tertiary education. They are relatively digitally literate with high smartphone ownership rates and comfort using the internet.

Despite this digital literacy, respondents favor informal finance over mobile banking. For savings, most opt to keep their money at home or with a savings committee. Very few mention saving via a bank, microfinance institution, or mobile banking service (Table S2). When facing a financial emergency, they primarily rely on their friends and family rather than formal lending channels (Table S2).

Most are aware of mobile banking but their knowledge of its uses is limited. About half know you can transfer money via a mobile money agent, but only a quarter know you can transfer money via your phone or that you can save money on your phone (Table S3). Even fewer mention advanced uses that are popular in other low-and-middle-income countries such as savings accounts, e-commerce, micro-loans, or paying utility bills (InterMedia, 2020)). When we specifically ask about the information on the pamphlets, we find that at most one quarter of senders claim to have heard of the products or services mentioned in the pamphlets(Table S3 and Table S4). Unsurprisingly, given this low knowledge, mobile banking usage is infrequent at best. Only 30% have a mobile banking account and almost half of those with an account have not used it in the past eight weeks.

One reason for this low usage may be fears around fraud and user error. Over half of senders say that they have heard of someone losing money due to mobile banking. About one third report personal experience being contacted on their phone by an unknown person requesting money or their PIN number, and many of them responded to the likely scammer rather than ignoring them or reporting them to their mobile network operator (Table S4). This low digital financial literacy may be why our sample reports being more comfortable keeping large amounts of money at home compared to compared to storing it in a mobile banking account (Table S4).

4 Results and discussion

In this section, I describe and discuss the results of the recommendation experiment. I outline the empirical framework in Section 4.1. Then, I look at the overall effect of social concerns which is measured by varying whether the sender knows their identity will be hidden from the receiver if they make a recommendation (Section 4.2). I discuss the contribution of concerns around offending the receiver (Section 4.3) and concerns around being blamed by the receiver (Section 4.4). I explore interaction effects (Section 4.5), alternative hypotheses (Section 4.6), and robustness (Section 4.7). Finally, I consider the implications of the results for receiver welfare (Section 4.8) as well as information diffusion and aggregation (Section 4.9).

4.1 Empirical Framework

I identify the impact of the interventions by estimating the following equation via probit for binary outcomes and ordinary least squares (OLS) otherwise:

$$Y_{ij} = \beta_0 + \beta_1 \text{HiddenTarget}_i + \beta_2 \text{HiddenSender}_i + \beta_3 \text{HiddenTarget*HiddenSender}_i + \eta_{ij} + \epsilon_i$$

(4.1)

i denotes a sender and j denotes a receiver. Y_{ij} is the outcome of interest, such as number of pamphlets recommended or whether the growth pamphlet was recommended. HiddenTarget_i is a dummy variable equal to 1 if the sender knows their targeting of the recommendation to the receiver will be hidden from the receiver and is 0 otherwise. HiddenSender_i is a dummy variable equal to 1 if the sender knows their identity will be hidden from the receiver and 0 otherwise. η_{ij} is a vector of recommendation-level covariates including community-field officer fixed effects, whether the sender was primed to think of social concerns, and whether the receiver is socially-close or socially-distant from the sender. The error term ϵ_i is clustered at the sender-level.

β_1 captures the effect of hiding the sender's targeting of the receiver from the receiver. As discussed in Section 2.3.2, hiding the sender's identity should reduce compliment/offense concerns, so we can interpret β_1 as the effect of reducing compliment/offense concerns. β_2 captures the effect of hiding the sender's identity from the receiver. As discussed in Section 2.3.1, hiding the sender's identity should reduce overall social concerns. We can interpret β_2 as the overall social concerns effect. In the model, social concerns consist of credit/blame and compliment/offense. Therefore, $\beta_2 - \beta_1$ will estimate the effect of credit/blame under the model's assumptions. β_3 captures any interaction effects between the

treatments. We will be interested in testing whether these parameters are significantly different from zero.

4.2 Do social concerns affect information-sharing?

The first row of Table 3 estimates the effect of hiding the sender's identity on the quantity of information the sender shares with the receiver. When the sender knows that the field officer will not reveal their identity to the receiver when conveying the recommendation, the sender shares .09 more pamphlets (8% of the control mean;p-val= .026) and is 6.5 percentage points (24.7% of the control mean; p-val = .004) more likely to share both pamphlets. In terms of the type of pamphlets shared, hiding the sender's identity increases the likelihood of recommending the growth pamphlet by 6.4 percentage points (p-val= .061) and the likelihood of recommending the safety pamphlet by 2.6 pps (p-val= .46). These results provide strong evidence that social concerns inhibit information-sharing in this context.

In Table 4, we investigate heterogeneity in results by social distance. Recall that our receiver assignment procedure created balance between the socially-distant and socially-close receiver on personal characteristics, meaning I can interpret differences in recommendations to each group as resulting from the differences in the social relation between the sender and receiver. Beginning with the control group (Revealed Sender, Revealed Targeting), we see that senders share .088 fewer pamphlets (p-val= .072) to socially-distant receivers. This gap is driven by reduced sharing of the safety pamphlet to socially-distant receivers; socially-distant receivers are 12.7 pp less likely to receiver the safety pamphlet (Table 4). In fact, socially-distant receivers are 4.1 pps *more* likely to receive the growth pamphlet. When we hide the sender's identity, the gap between socially-distant and socially-close pairs drops by .062 pamphlets (70% of the total gap; p= .095). The gap in sharing of the safety pamphlet decreases by 8.9 pp (70% of the total gap; p= .089).

In Section 2.3.4 and Section 2.3.5, I describe the model's predictions for heterogeneity by social distance. To summarize, the model predicts that socially-distant pairs should be more susceptible to offense concerns and that pamphlets designed for low-types should raise more offense concerns. These tendencies would explain why the pamphlet aimed at low-types (the safety pamphlet) was recommended less to socially-distant receivers. The fact that 70% of the gap in recommendations disappears once the sender's identity is hidden, supports the interpretation that offense was the primary driver of the initial gap. In the next section, I more explicitly test the hypothesis by analyzing the effects of hiding the sender's targeting of the

receiver (an intervention designed to reduce offense concerns).

4.3 Do offense concerns affect information-sharing?

In the second row of Table 3, I estimate the effect of the sender knowing that the field officer would hide the sender's targeting of the receiver when conveying a recommendation to the receiver. Among all sender-receiver pairs, we do not find significant effects on the quantity or type of information shared. Turning to heterogeneity by social distance, we find that effects on number of pamphlets shared are slightly larger for socially-distant pairs (.026 pamphlets; p= .696). For socially-close pairs, the effects of hiding the sender's targeting of the receiver on type of information shared are relatively small (1.4 pp increase in sharing growth pamphlet; $p = .719$; 2.8 pp decrease in sharing safety pamphlet; $p = .453$). While the effect on sharing of the growth pamphlet is lower for socially-distant pairs (-6.3 pp; $p = .269$), the effect on sharing of the safety pamphlet is 9.4 pps greater (p= .086).

These estimates suggest that offense concerns inhibit sharing of the safety pamphlet among socially-distant pairs, but do not substantially affect sharing among socially-close pairs. In terms of magnitude, hiding the sender's targeting of the receiver closes 74% of the safety pamphlet sharing gap between socially-close and socially-distant pairs, while hiding the sender's identity closes 70% of the gap. This result supports the interpretation that offense is the primary force causing the initial gap in sharing of the safety pamphlet between socially-close and socially-distant receivers.

In Section 2.3.4, I outline why the model predicts offense concerns to be larger among socially-distant pairs. To summarize, socially-distant pairs will have less precise priors on each other's characteristics and thus, are more liable to update based on the information revealed by information-sharing. To understand the level of information socially-distant pairs in our sample have about each other, I ask the sender to rate the receivers' intelligence and financial literacy and then, ask the sender how confident they are in their rating. About 30% of senders are very confident in their rating for the socially-close receiver but only 7% are very confident in their ratings for the socially-distant receiver (Table S1). While the model's predictions specifically relate to the receiver's prior over the sender's regard for them, the sender's responses to these questions suggest that socially-distant pairs do seem to have less precise priors on each other's characteristics which would mean that the receiver would also have imprecise priors. The lower confidence expressed by senders does raise the question of whether

senders' are primarily worried about offense from sharing safety information with highly financially literate receiver. In the simple model of Section 2, the receiver's level of offense does not depend on their true type. If receiver's level of offense was increasing in their type, this would likely strengthen the signal sent by sharing the safety pamphlet because senders who had high-regard for a receiver would be even less likely to share a safety pamphlet.

4.4 Do blame concerns affect information-sharing?

As described in Section 4.1, we estimate credit/blame concerns by comparing the effect of hiding sender's identity to the effect of hiding the sender's targeting of the receiver. In terms of quantity of information shared, hiding the sender's identity has a .09 pamphlet larger effect (p-val$< .05$) than hiding the sender's targeting. For type of information shared, hiding the sender's identity has a .065 pp larger effect (p$< .10$) on the growth pamphlet than hiding the sender's targeting of the receiver and .029 pp larger effect on the safety pamphlet. Across social distance, we do not measure significant differences in the blame effects. For both socially-close and socially-distant pairs, blame appears to inhibit information-sharing by causing senders to withhold the growth pamphlet.

We interpret these results as evidence that blame primarily inhibits sharing of the growth pamphlet and that worries about blame exist between socially-close and socially-distant receivers.

As mentioned in Section 2.3.3, if blame inhibits sharing of useful information, then we would expect the function that maps receiver payoffs to blame, $\eta(.)$, to display risk-aversion. When we ask directly, 78% of senders say that receiving the growth pamphlet would be somewhat or very useful to receivers and 96% say that the it would be at least a bit useful. When we ask receivers who have just received the growth pamphlet, 92% say that it is somewhat or very useful. Assuming most respondents are telling the truth, then withholding of the growth pamphlet due to blame would be evidence that blame induces senders to be more risk-averse on behalf of the receiver. The fact that the safety pamphlet (which reduces the variance of receiver outcomes) is less affected by blame than the growth pamphlet (which likely increases the variance of receiver outcomes) coheres with this interpretation of the results.

4.5 Interaction effects

For the most part, we do not see significant interaction effects overall (Table 3 or by social distance Table 4). In general, the estimated coefficients are negative indicating that hiding the sender's identity and hiding the sender's targeting are substitutes.

The simple model predicts that the interaction effects would be negative and of the same magnitude as the offense effects since removing offense effects should be irrelevant when the sender's identity is hidden. This prediction would mean that (Hidden Sender, Revealed Targeting) would have the same effect as (Hidden Sender, Hidden Targeting). We explicitly test this hypothesis in Table S6. In contrast to the model's prediction, we find that when the sender's identity is hidden, hiding the sender's targeting of the receiver reduce the number of pamphlets shared (.067 pamphlets; $p = .094$). This effect is entirely driven by sharing of the growth pamphlet (6.9 pp decrease; $p = .030$).

4.6 Alternative explanations

One alternative explanation for the results is that the treatments affected receiver's actions or outcomes holding constant the information shared. For example, the receiver may place more weight on a non-anonymous recommendation than on an anonymous one and thus, may respond more to a non-anonymous recommendation. If the sender cares about the receiver (altruism) or cares about what actions they take,[25] then they will account for these differing responses when sharing information. We ask a subset of senders about the expected effects of recommending the pamphlets under the conditions of their treatment arm. In Table S10, I estimate negative but noisy effects of the treatments on the perceived likelihood of the receiver adopting mobile banking or earning a lot of money over the next 8 weeks.

Even if hiding the sender's identity or hiding the targeting along reduces expected receiver adoption or earnings, it is unlikely that this effect could explain the results. We can summarize the main effects on pamphlet recommendations as telling us that some senders prefer (Hidden sender/targeting recommendation)>(No recommendation)>(Revealed sender and targeting recommendation). If Hidden Sender alone or Hidden Targeting alone reduce expected receiver adoption, then P(Receiver adopts | Revealed sender and targeting recommendation) > P(Receiver adopts | Hidden sender/targeting recommendation) >

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[25]There could be substitutes or complementarities between the actions of the sender and of the receiver which could induce the sender to care about the actions of the receiver independently of their payoffs.

P(Receiver adopts | No Recommendation). Therefore, sender's preferences over receiver adoption (and subsequent earnings) cannot explain the revealed preferences from our results unless there are non-monotonicities in the sender's preferences over the probability of the receiver adopting mobile banking.

Another possibility is that the senders do not believe the pamphlets will be useful to the receivers. In Section 4.4, I noted that the vast majority senders and receivers say the pamphlets are useful when directly asked. I can provide additional evidence on the perceived usefulness of the pamphlets from the questions on the expected effects of recommending pamphlets on receiver outcomes used for (Table S10). In these questions, field officers vary whether the growth pamphlet, the safety pamphlet, both pamphlets, or no pamphlets are (hypothetically) recommended to the receiver.[26] Controlling for treatment arm, senders believe that receivers are more likely to earn a lot of money (8.9 pp; $p < .10$) and less likely to lose a lot (11.8 pp; $p < .05$) when they receive both pamphlets (Table S11). Given that only 22% of senders share both pamphlets in the control group (Revealed sender identity and targeting), we can conclude that many senders are withholding information that they perceive to be useful from receivers.

4.7 Robustness checks

In Table S7, we test the robustness of our results to selecting controls via double lasso. Given that the interventions are assigned randomly, we would not expect choices around covariate inclusion to significantly change the coefficients. Reassuringly, the coefficients in Table S7 roughly match our main specification (Table 3) and standard errors are generally more precise. With the double lasso-selected controls, Hidden Sender is estimated to increase pamphlets shared by .99 pamphlets (p-val= .039), the sharing of both pamphlets by 7.0 pps (p-val= .011), and the sharing of the growth pamphlet 7.4 pp (p-val= .057) overall. Comparing socially-close to socially-distant receivers, I again estimate a larger effect of Hidden Sender on sharing of the safety pamphlet for socially-distant pairs, though this effect is slightly less precisely estimated (9.5 pps; p-val= .139). For Hidden Targeting, the larger effect on sharing of the safety pamphlet for socially-distant pairs is also slightly less precisely estimated (9.4 pps; p-val= .144).

The most substantive difference between our main results and the double lasso results is in the interaction effects. With the double lasso-selected controls, we estimate a negative 9.7 pp

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[26]We exclude the surveys where the sender was asked about no pamphlets from Table S10.

interaction effect on the likelihood of sharing both pamphlets (p-val= .062) and a negative 15.1 pp interaction effect on recommending the growth pamphlet (p-val= .037).

4.8 Social concerns and receiver welfare

The experimental results show that social concerns inhibit information-sharing among social ties. Specifically, senders shift from sharing no pamphlets or only the safety pamphlet to sharing both pamphlets when social concerns are removed (meaning the sender's identity is hidden from the receiver) (Table S12). Assuming that sender's beliefs are accurate, this shift should increase receivers' likelihood of earning a lot of money and decrease their likelihood of losing a lot of money (Table S11). Thus, it seems like the social concerns are reducing receiver welfare by inhibiting the sharing of the growth pamphlet. Since the overall social concerns effect is primarily driven by worries around blame, we can also conclude that blame is reducing receiver welfare.

While blame inhibits sharing of growth pamphlet for socially-close and socially-distant pairs, offense only inhibits sharing of the safety pamphlet for socially-distant pairs. When concerns around offense are reduced (the sender's targeting of the receiver is hidden), then senders shift away from sharing the growth pamphlet only and toward sharing the safety pamphlet only or sharing both pamphlets. Senders expect that sharing both pamphlets will be more beneficial for the receiver than just sharing the growth pamphlet. While it is ambiguous whether sharing the growth pamphlet or the safety pamphlet alone is more beneficial for receiver welfare, one would expect that reducing offense concerns allows the sender to better match the pamphlets with the skills of the receiver.[27]

4.9 Social concerns, information diffusion, and information aggregation

Canonical models information diffusion and aggregation show that information only spreads and social learning is wise when a network is well-connected (Golub and Jackson, 2010; Lobel and Sadler, 2015).[28] In this experiment, we show that informed nodes often fail to communicate even when communication costs are near zero, information is not rivalrous, and the information

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[27]A test of this will be added in later versions of the paper.

[28]Wise social learning is defined as converging to the best approximation of the truth (an average of all initial independent signals

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is perceived to useful. When nodes do not share certain information, then, for the purposes of modeling information diffusion or aggregation, these nodes should not be linked. Essentially, social concerns reduce connectedness of social network by severing communication links between nodes. Thus, theory would predict that information would diffuse less well and social learning would be less wise when social concerns inhibit information-sharing. Interventions that reduce the impact of social concerns on information-sharing could allow information to spread more widely in a social network and enable the wise aggregation of that information.

In the context of mobile banking information in Pakistan, social concerns prevent communication about the growth pamphlet across social distance. The network of communication about the growth pamphlet would thus be sparser and this information would be less likely to diffuse widely. For safety information, social concerns only affect communication between socially-distant ties. However, as first noted by Granovetter (1973), nodes are more likely to get novel information from their weak ties, so severing communication between weak ties may have a disproportionately large impact on the spread of safety information.

In terms of social learning, I can analyze the effects of social concerns through the Generalized DeGroot Model (GDM) of Banerjee et al. (2013). The GDM builds on the DeGroot model which is canonical model of social learning (Degroot, 1974; DeMarzo et al., 2003) where each agent starts with a signal and then repeatedly updates by averaging their neighbors. Despite its simplicity, Golub and Jackson (2010) show that the DeGroot model is "wise"[29] as long as the influence of the most influential agent vanishes as the society grows. Banerjee et al. (2013)'s GDM extends this model to the case of sparse initial signals. Banerjee et al. (2013) show that some signals are ignored (i.e. information is lost) for certain network geometries that would be wise under the dense seeding of the standard DeGroot model. To analyze the effects of social concerns, I can simply add to the GDM model that nodes endogenously choose whether to communicate with a given neighbor based on the sender's utility function. Given our results, social concerns would reduce the sharing of growth information overall and reduce the sharing of safety information with weak ties. Assuming finite time, one would expect to see over-wariness in clusters where seeding is dense since nearby seeds would share more safety than growth information. In clusters where seeding is sparse or non-existent, we would expect to see over-enthusiasm as socially-distant seeds (or their neighbors) share more about the upsides than the downsides. Furthermore, inhibiting communication would likely create more bias in

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[29]Wisdom is defined as converging to the best approximation of the truth (an average of all initial signals)

the limit belief as the opinions of well-connected agents and/or agents who do not care about social concerns become over-weighted.

5   Conclusion

The diffusion of a new technology is often determined by the willingness of individuals to share information about the technology with their social ties. In this paper, I estimate that social concerns substantially decrease sharing of mobile banking pamphlets among socially-close pairs and socially-distant pairs of villagers in rural Punjab, Pakistan. For socially-close pairs, the decrease in information sharing seems to be driven primarily by concerns around being blamed for negative outcomes from sharing a pamphlet with information on advanced digital financial services. In socially-distant pairs, senders seem to also be worried about offending the receiver by sharing a pamphlet describing how to avoid common mobile banking scams.

Policymakers aiming to diffuse new technologies should be cognizant of the social concerns of individuals who they rely on to champion these technologies. A general strategy for information that raises social concerns is to rely on direct provision of information. However, direct provision is often infeasible and can be ineffective since understanding and remembering information often requires discussion with others (Banerjee et al., 2018).

When direct provision is likely to be ineffective, policymakers should attempt to identify the role of blame and offense concerns. For blame concerns, one could investigate the distribution of outcomes from using a given technology. When negative outcomes are likely for some, blame is likely to be a concern. Insuring users against negative outcomes could catalyze information-sharing in these cases.

When benefiting from the information is correlated with an undesirable trait,[30] offense concerns are likely to be present. Policymakers can create channels where this information can be shared with multiple people at once so that the receivers are not offended by being personally targeted. Additionally, since "offensive" information is able to spread among close social ties, an information campaign could seed each cluster of close social ties with the information. The network of close social ties will be sparser than the network of all social ties, meaning that a information campaign will need more seeds to reach the same level of diffusion.

This research is particularly applicable to the spread of digital technologies in developing country contexts. As more and more of the global poor acquire smartphones, they will gain

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[30]This may often be the case for social insurance programs such as unemployment insurance

access to a range of new digital services. Unfortunately, their lack of experience with digital services also make them prime targets for scammers and opportunists. As in the case of mobile banking, these frequent scam attempts cause digital technologies to seem like (or even to actually be) risky endeavors for the global poor. When digital technologies are seen as risky, individuals will be reluctant to share information about them which prevents the learning necessary for one to feel comfortable using a technology. This cycle could cause the global poor to forgot the potential of digital technologies despite increasing access. Reducing social concerns around digital technologies could help catalyze a virtuous cycle where the global poor share information on avoiding fraud and availing the benefits of digital technologies and begin adopting and gaining expertise using digital services. The exponential rise of mobile banking in areas such as India and Kenya (Suri and Jack, 2016) show how these virtuous cycles can lead to an equilibrium where most individuals quickly become comfortable with a new technology.

While this experiment only focuses on the sharing of information from one sender to one receiver, future work could focus on diffusion and learning processes at the level of the social network. Important considerations, such as the mediating effects of network structure, require using the social network as the unit of analysis. Social concerns may also directly affect the social network by changing communication patterns. Future work could vary social concerns at the village-level and measure how information spreads and changes in patterns of communication. This research could also help us better understand the welfare impacts of social concerns by directly measuring how information diffusion feed into network-wide technology adoption and usage.

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Tables

Table 1: Summary statistics for villagers who can send recommendations

	Control		Hidden Target		Hidden Sender		HT + HS		C=HT	C=HS	C=HT+HS
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	p-val	p-val	p-val
Age	34.93	8.55	35.49	9.62	34.88	8.80	36.05	9.53	0.494	0.944	0.173
Male	0.88	0.33	0.88	0.32	0.86	0.34	0.90	0.29	0.759	0.691	0.312
Married	0.86	0.35	0.81	0.40	0.83	0.38	0.84	0.37	0.132	0.429	0.584
Completed some secondary education	0.68	0.47	0.67	0.47	0.63	0.48	0.63	0.48	0.973	0.333	0.339
Completed some tertiary education	0.02	0.15	0.02	0.15	0.03	0.16	0.02	0.16	0.989	0.914	0.949
HH head	0.82	0.38	0.83	0.37	0.79	0.41	0.83	0.37	0.694	0.365	0.682
Farmer	0.40	0.49	0.41	0.49	0.38	0.49	0.43	0.50	0.773	0.702	0.480
Smartphone	0.87	0.33	0.87	0.34	0.86	0.34	0.86	0.35	0.819	0.791	0.672
Comfortable searching internet	0.66	0.47	0.70	0.46	0.65	0.48	0.63	0.48	0.356	0.765	0.441
Has bank account	0.17	0.37	0.15	0.36	0.15	0.36	0.14	0.35	0.751	0.724	0.507
Has mobile banking account	0.30	0.46	0.31	0.46	0.31	0.46	0.32	0.47	0.671	0.804	0.509
F-test p-value									0.929	0.979	0.952
Observations	250		252		235		241				

This table includes the respondents referred to as the senders and listers in rest of the paper. The control group are the villagers whose identity and targeting of a receiver would be revealed if they recommend a pamphlet to a receiver. The Hidden Targeting group are respondents whose targeting of the receiver would be hidden from the receiver if they recommend a pamphlet to the receiver. The Hidden Sender group are the respondents whose identity would be hidden from the receiver if they recommend a pamphlet to the receiver. The HT + HS group are respondents whose identity and targeting of the receiver would be hidden from the receiver if they recommend a pamphlet to the receiver. The p-values in the last three columns are from regressions that control for field officer-community fixed effects and whether the sender was primed to think about social concerns. The F-test p-value reported at the bottom of the table is for the joint significance of the differences between the treatment groups for all of the variables reported in the table. The seventh column reports p-values from comparing Control and Hidden Targeting. The eighth column is comparing Control and Hidden Sender. The ninth column is comparing HT + HS.

Table 2: Summary statistics for villagers who can receive recommendations

	Socially-close		Socially-distant		SC=SD
	Mean	SD	Mean	SD	p-val
Male	0.76	0.43	0.84	0.37	0.195
Completed some secondary education	0.60	0.49	0.69	0.47	0.203
Has smartphone	0.84	0.37	0.91	0.29	0.147
Bank account	0.21	0.41	0.20	0.40	0.959
Has a registered mobile banking wallet	0.24	0.43	0.26	0.44	0.750
Financial literacy score	-0.02	0.45	0.05	0.43	0.290
Digit span score	-0.04	1.04	0.05	0.94	0.508
F-test p-value					0.681
Observations	102		110		

This table includes the receiver respondents that we attempted to survey. The socially-close receivers are those who the sender respondents listed as someone they give/receive advice with. The socially-distant receivers are those who the lister respondents listed as someone they give/receive advice with and who could be assigned to the sender respondents as their socially-distant receiver. We only attempted to survey 25% of the receivers who could have received a recommendation. We completed surveys with 76% of the selected socially-close receivers and 72% of the selected socially-distant receivers. The p-value in the last column tests for differences between the socially-close and socially-distant neighbors. The F-test p-value reported at the bottom of the table is for the joint significance of the differences between the treatment groups for all of the variables reported in the table.

Table 3: Treatment effects on pamphlets shared by sender to receiver

	(1) # of pamphlets shared	(2) Both	(3) One	(4) None	(5) Rec. growth	(6) Rec. safe
Sender's identity is hidden from receiver	0.084**	0.068***	-0.055***	-0.009	0.054	0.028
	(0.041)	(0.022)	(0.021)	(0.021)	(0.037)	(0.037)
Sender's targeting of receiver is hidden from receiver	-0.015	-0.003	-0.018	0.017	-0.010	-0.006
	(0.041)	(0.024)	(0.022)	(0.019)	(0.038)	(0.038)
Hidden sender*Hidden targeting	-0.049	-0.030	0.014	0.011	-0.052	0.005
	(0.059)	(0.033)	(0.031)	(0.029)	(0.054)	(0.053)
Control Mean	1.139	0.262	0.614	0.123	0.559	0.580
N	1446	1446	1446	1446	1446	1446

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

An observation is a recommendation from one villager (the sender) to a fellow villager (the receiver). Standard errors in parentheses are clustered at the respondent-level. Each regression controls for field officer-community fixed effects, whether the sender was primed to think about social concerns, and whether the receiver of the recommendation was listed as an information-sharing tie by the respondent. The first panel estimates Equation (4.1) for all sender-receiver pairs. The second panel estimates it only socially-close sender-receiver pairs, meaning that the sender listed the receiver as someone exchange advice with The third panel estimates it for only socially-distant sender-receiver pairs, meaning that the sender did not list the receiver, but another villager did list the receiver as someone they exchange advice with. The first row in a panel is the coefficient on the dummy variable for if the sender's targeting of the receiver is hidden from the receiver when we relay any pamphlets recommended by the sender to the receiver. The third row is the coefficient on the dummy variable for if the sender's identity is hidden from the receiver when we relay any pamphlets recommended by the sender to the receiver. The fifth row is the interaction of these two dummy variables.

Table 4: Treatment heterogeneity in pamphlets shared by partner type

	(1) # of pamphlets shared	(2) Both	(3) One	(4) None	(5) Rec. growth	(6) Rec. safe
Sender's identity is hidden from receiver	0.056	0.047*	-0.045*	-0.000	0.060	-0.008
	(0.049)	(0.026)	(0.024)	(0.025)	(0.043)	(0.042)
Sender's targeting of receiver is hidden from receiver	-0.031	-0.020	0.002	0.019	0.015	-0.051
	(0.047)	(0.027)	(0.026)	(0.024)	(0.043)	(0.042)
Hidden sender*Hidden targeting	-0.033	-0.019	0.013	0.003	-0.055	0.027
	(0.068)	(0.038)	(0.036)	(0.034)	(0.060)	(0.059)
Socially-distant receiver	-0.101**	-0.035	-0.043	0.074***	0.039	-0.140***
	(0.049)	(0.030)	(0.027)	(0.024)	(0.041)	(0.039)
Hidden sender*Socially-distant	0.077	0.067	-0.029	-0.023	-0.013	0.094*
	(0.069)	(0.043)	(0.043)	(0.036)	(0.059)	(0.055)
Hidden targeting*Socially-distant	0.045	0.051	-0.057	-0.002	-0.066	0.117**
	(0.068)	(0.044)	(0.043)	(0.033)	(0.058)	(0.054)
Hidden sender*Hidden targeting*Socially-distant	-0.042	-0.034	0.000	0.019	0.007	-0.057
	(0.099)	(0.061)	(0.062)	(0.050)	(0.082)	(0.077)
Control Mean	1.182	0.291	0.599	0.109	0.555	0.628
N	1446	1446	1446	1446	1446	1446

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

Refer to notes in Table 3

Supporting Information for

Technology diffusion and social concerns: Evidence from mobile banking in Pakistan

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This appendix includes details about the study and analysis omitted from the manuscript due to space constraints. In order, this section includes information for:

1. Appendix Tables
2. Appendix Sections

S.1 Appendix Tables

Table S1: Summary statistics on sender-receiver relationship

	(1) All	(2) Control	(3) HT	(4) HS	(5) Both
Socially-close: Knows a bit or more about	0.983	0.989	0.983	0.972	0.989
	(0.129)	(0.104)	(0.130)	(0.166)	(0.107)
Socially-distant: Knows a bit or more about	0.927	0.928	0.913	0.945	0.924
	(0.260)	(0.260)	(0.283)	(0.228)	(0.267)
Socially-close: Same clan	0.276	0.280	0.311	0.274	0.241
	(0.447)	(0.450)	(0.464)	(0.447)	(0.428)
Socially-distant: Same clan	0.148	0.114	0.155	0.148	0.178
	(0.355)	(0.319)	(0.364)	(0.356)	(0.383)
Socially-close: Gave advice in last 2 months	0.958	0.972	0.949	0.960	0.950
	(0.201)	(0.165)	(0.221)	(0.196)	(0.218)
Socially-distant: Gave advice in last 2 months	0.802	0.819	0.750	0.805	0.829
	(0.399)	(0.386)	(0.434)	(0.397)	(0.378)
Socially-close: Transfer	0.332	0.320	0.349	0.337	0.324
	(0.471)	(0.467)	(0.478)	(0.474)	(0.469)
Socially-distant: Transfer	0.220	0.229	0.203	0.221	0.224
	(0.414)	(0.421)	(0.403)	(0.417)	(0.418)
Socially-close: Very confident rating intelligence	0.343	0.364	0.383	0.326	0.299
	(0.475)	(0.482)	(0.487)	(0.470)	(0.459)
Socially-distant: Very confident rating intelligence	0.0707	0.101	0.0476	0.0703	0.0611
	(0.257)	(0.303)	(0.214)	(0.257)	(0.240)
Socially-close: Very confident rating financial literacy	0.321	0.353	0.291	0.309	0.328
	(0.467)	(0.479)	(0.456)	(0.463)	(0.471)
Socially-distant: Very confident rating financial literacy	0.0669	0.0797	0.0476	0.0547	0.0840
	(0.250)	(0.272)	(0.214)	(0.228)	(0.278)
Observations	978	250	235	252	241

Observations are at the sender-level. Means are in the first row; Standard deviations are below in parentheses.

Table S2: Summary statistics of villager sharing information: Household financial behavior

	(1)	(2)	(3)	(4)	(5)

	All	Control	HT	HS	Both
Saves cash at home	0.492	0.532	0.477	0.480	0.477
	(0.500)	(0.500)	(0.501)	(0.501)	(0.501)
Savings committee	0.207	0.196	0.221	0.190	0.220
	(0.405)	(0.398)	(0.416)	(0.393)	(0.415)
Saves in Bank/MFI/mobile banking	0.00920	0.00800	0.00426	0.00794	0.0166
	(0.0955)	(0.0893)	(0.0652)	(0.0889)	(0.128)
Gift from friends/fam if 10k emer.	0.376	0.380	0.362	0.365	0.398
	(0.485)	(0.486)	(0.482)	(0.482)	(0.491)
Loan from from friends/fam if 10k emer.	0.544	0.580	0.557	0.516	0.523
	(0.498)	(0.495)	(0.498)	(0.501)	(0.501)
Use savings kept at home if 10k emer.	0.208	0.224	0.200	0.214	0.191
	(0.406)	(0.418)	(0.401)	(0.411)	(0.394)
Observations	978	250	235	252	241

Observations are at the sender-level. Means are in the first row; Standard deviations are below in parentheses.

Table S3: Summary statistics of villager sharing information: Mobile banking knowledge

	(1) All	(2) Control	(3) HT	(4) HS	(5) Both
Heard of Konnect by HBL	0.369	0.361	0.377	0.360	0.379
	(0.483)	(0.481)	(0.486)	(0.481)	(0.486)
Heard of Daraz	0.217	0.207	0.234	0.208	0.218
	(0.412)	(0.406)	(0.425)	(0.407)	(0.414)
Heard of JazzCash	0.811	0.833	0.802	0.829	0.778
	(0.392)	(0.374)	(0.400)	(0.377)	(0.417)
Heard of Nayapay	0.0165	0.0312	0	0.0303	0
	(0.128)	(0.177)	(0)	(0.174)	(0)
Heard of Dost Kissan	0.193	0.174	0.206	0.197	0.195
	(0.395)	(0.380)	(0.405)	(0.399)	(0.398)
Heard of the Asaan Mobile Account	0.255	0.236	0.232	0.256	0.298
	(0.436)	(0.426)	(0.423)	(0.437)	(0.459)
Knows of MB use: Transfer through an agent	0.420	0.456	0.426	0.413	0.386
	(0.494)	(0.499)	(0.495)	(0.493)	(0.488)

	0.263	0.308	0.226	0.254	0.261
Knows of MB use: Transfer through your phone	(0.440)	(0.463)	(0.419)	(0.436)	(0.440)
Knows of MB use: Save money on your phone	0.244	0.276	0.243	0.222	0.237
	(0.430)	(0.448)	(0.430)	(0.417)	(0.426)
Knows of MB use: Borrow money	0.135	0.132	0.166	0.147	0.0954
	(0.342)	(0.339)	(0.373)	(0.355)	(0.294)
Knows of MB use: Buy mobile packages	0.188	0.184	0.179	0.202	0.187
	(0.391)	(0.388)	(0.384)	(0.403)	(0.390)
Knows of MB use: Pay utility bills	0.103	0.0960	0.0894	0.115	0.112
	(0.304)	(0.295)	(0.286)	(0.320)	(0.316)
Knows of MB use: Savings account with profit	0.104	0.112	0.106	0.107	0.0913
	(0.306)	(0.316)	(0.309)	(0.310)	(0.289)
If MB: Used to transfer money in past 8 wks	0.549	0.639	0.500	0.462	0.603
	(0.499)	(0.484)	(0.504)	(0.502)	(0.493)
If MB: Used to save money in past 8 wks	0.233	0.296	0.155	0.222	0.258
	(0.423)	(0.459)	(0.364)	(0.418)	(0.440)
Observations	978	250	235	252	241

Observations are at the sender-level. Means are in the first row; Standard deviations are below in parentheses.

Table S4: Summary statistics of villager sharing information: Consumer financial protection

	(1) All	(2) Control	(3) HT	(4) HS	(5) Both
Heard of someone losing money due to mobile banking	0.613	0.603	0.632	0.583	0.639
	(0.487)	(0.491)	(0.484)	(0.494)	(0.482)
Very comfortable leaving 30k in MB for 60 days	0.209	0.208	0.198	0.218	0.212
	(0.407)	(0.407)	(0.400)	(0.414)	(0.410)
Very comfortable leaving 30k cash at home for 60 days	0.388	0.408	0.371	0.382	0.391
	(0.488)	(0.493)	(0.485)	(0.487)	(0.489)
Contacted by likely scammer	0.332	0.326	0.371	0.326	0.305
	(0.471)	(0.470)	(0.485)	(0.470)	(0.462)
If contacted: Responded to likely scammer	0.288	0.350	0.200	0.276	0.340
	(0.454)	(0.481)	(0.403)	(0.451)	(0.478)
Comfortable texting	0.763	0.724	0.749	0.806	0.772

	(0.426)	(0.448)	(0.435)	(0.397)	(0.421)
Comfortable using WhatsApp/Facebook	0.703	0.720	0.706	0.714	0.672
	(0.457)	(0.450)	(0.456)	(0.453)	(0.470)
Observations	978	250	235	252	241

Observations are at the sender-level. Means are in the first row; Standard deviations are below in parentheses.

Table S5: Effect of order in which pamphlets presented

	(1) # of pamphlets shared	(2) Both	(3) One	(4) None	(5) Rec. growth	(6) Rec. safe
Panel A: All						
Safety pamphlet presented first	-0.004	-0.006	0.010	-0.003	-0.003	-0.001
	(0.027)	(0.016)	(0.015)	(0.014)	(0.025)	(0.025)
Control Mean	1.148	0.283	0.581	0.136	0.578	0.569
N	1689	1689	1689	1689	1689	1689
Panel B: Socially-close receiver						
Safety pamphlet presented first	-0.012	-0.007	0.004	0.003	0.002	-0.014
	(0.031)	(0.019)	(0.018)	(0.015)	(0.026)	(0.026)
Control Mean	1.167	0.297	0.574	0.129	0.584	0.584
N	1187	1187	1187	1187	1187	1187
Panel C: Socially-distant receiver						
Safety pamphlet presented first	0.016	-0.006	0.032	-0.022	-0.005	0.026
	(0.045)	(0.024)	(0.025)	(0.023)	(0.040)	(0.038)
Control Mean	1.101	0.252	0.597	0.151	0.566	0.535
N	502	502	502	502	502	502

*** p<0.01, ** p<0.05, * p<0.1
Refer to notes in Table 3.

Table S6: If senders identity is hidden, effect of hiding sender's targeting of receiver

	(1)	(2)	(3)	(4)	(5)	(6)
	# of pamphlets shared	Both	One	None	Rec. growth	Rec. safe
Panel A: All						
Sender's targeting of receiver is hidden from receiver	-0.067*	-0.022	-0.024	0.043**	-0.069**	0.004
	(0.040)	(0.022)	(0.021)	(0.020)	(0.032)	(0.033)
Control Mean	1.202	0.320	0.563	0.117	0.624	0.578
N	825	825	825	825	825	825
Panel B: Socially-close receiver						
Sender's targeting of receiver is hidden from receiver	-0.071	-0.031	-0.016	0.046*	-0.061*	-0.012
	(0.046)	(0.026)	(0.025)	(0.026)	(0.035)	(0.035)
Control Mean	1.209	0.328	0.554	0.118	0.627	0.582
N	581	581	581	581	581	581
Panel C: Socially-distant receiver						
Sender's targeting of receiver is hidden from receiver	-0.057	-0.010	-0.042	0.049	-0.093**	0.038
	(0.066)	(0.027)	(0.031)	(0.033)	(0.045)	(0.046)
Control Mean	1.187	0.301	0.585	0.114	0.618	0.569
N	244	244	244	244	244	244

*** p<0.01, ** p<0.05, * p<0.1
Refer to notes in Table 3.

Table S7: Treatment effects on pamphlets shared by sender to receiver using double lasso to select controls

	(1)	(2)	(3)	(4)	(5)	(6)
	# of pamphlets shared	Both	One	None	Rec. growth	Rec. safe
Sender's identity is hidden from receiver	0.043	0.060**	-0.041	-0.010	0.056	0.010
	(0.045)	(0.029)	(0.029)	(0.025)	(0.041)	(0.039)
Sender's targeting of receiver is hidden from receiver	-0.042	0.021	-0.030	0.027	-0.005	-0.018
	(0.046)	(0.029)	(0.029)	(0.027)	(0.042)	(0.042)
Hidden sender*Hidden targeting	-0.095	-0.075	0.043	0.030	-0.137*	0.016
	(0.077)	(0.048)	(0.047)	(0.046)	(0.073)	(0.071)
Control Mean	1.143	0.261	0.620	0.119	0.561	0.582
N	1414	1414	1414	1414	1414	1414

*** p<0.01, ** p<0.05, * p<0.1
An observation is a recommendation from a sender to a receiver. We use the double Lasso approach of Belloni et al. (2013) as implemented by Ahrens et al. (2019) to flexibly choose control variables for each equation. Standard errors are clustered at the respondent-level.

Table S8: Treatment heterogeneity in pamphlets shared by partner type using double lasso to select controls

	(1) # of pamphlets shared	(2) Both	(3) One	(4) None	(5) Rec. growth	(6) Rec. safe
Sender's identity is hidden from receiver	0.016	0.017	-0.017	0.001	0.041	-0.025
	(0.057)	(0.043)	(0.047)	(0.029)	(0.047)	(0.047)
Sender's targeting of receiver is hidden from receiver	-0.073	-0.036	-0.000	0.037	0.014	-0.087*
	(0.056)	(0.042)	(0.047)	(0.030)	(0.047)	(0.048)
Hidden sender*Hidden targeting	0.046	0.033	-0.019	-0.013	-0.043	0.089
	(0.083)	(0.061)	(0.067)	(0.045)	(0.068)	(0.068)
Socially-distant receiver	-0.100*	-0.068*	0.036	0.032	0.020	-0.120***
	(0.052)	(0.036)	(0.038)	(0.027)	(0.044)	(0.043)
Hidden sender*Socially-distant	0.097	0.072	-0.048	-0.025	-0.003	0.100
	(0.077)	(0.052)	(0.056)	(0.043)	(0.064)	(0.063)
Hidden targeting*Socially-distant	0.069	0.065	-0.061	-0.004	-0.063	0.132**
	(0.078)	(0.053)	(0.059)	(0.045)	(0.064)	(0.063)
Hidden sender*Hidden targeting*Socially-distant	-0.125	-0.086	0.048	0.038	-0.016	-0.109
	(0.115)	(0.077)	(0.084)	(0.065)	(0.092)	(0.088)
Control Mean	1.178	0.285	0.607	0.107	0.554	0.624
N	1414	1414	1414	1414	1414	1414

Refer to Table S7

Table S9: Effect of social concerns prime

	(1) # of pamphlets shared	(2) Both	(3) One	(4) None	(5) Rec. growth	(6) Rec. safe
Panel A: All						
Social concerns priming	0.010	0.018	-0.026	0.007	0.006	0.004
	(0.030)	(0.019)	(0.018)	(0.015)	(0.027)	(0.027)
Control Mean	1.108	0.242	0.624	0.134	0.563	0.545
N	1689	1689	1689	1689	1689	1689
Panel B: Socially-close receiver						
Social concerns priming	0.032	0.034	-0.033	0.000	0.034	-0.005
	(0.035)	(0.022)	(0.022)	(0.017)	(0.028)	(0.028)
Control Mean	1.099	0.231	0.637	0.132	0.551	0.547
N	1187	1187	1187	1187	1187	1187
Panel C: Socially-distant receiver						
Social concerns priming	-0.036	-0.023	-0.006	0.021	-0.052	0.011
	(0.045)	(0.024)	(0.026)	(0.025)	(0.041)	(0.040)
Control Mean	1.129	0.266	0.597	0.137	0.588	0.541
N	502	502	502	502	502	502

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

Refer to Table 3. This table does not include a control for the social concerns prime since the social concerns prime is the treatment variable. The social concerns prime consists of asking the respondent whether they would worry about blame and offense if telling others to use a mobile banking account or a lockbox. For more details refer to Section 3.4.2.

Table S10: Expected effect of anonymity on monetary outcomes

	(1) Likely adopt	(2) Likely earn lot	(3) Likely lose lot
Sender's identity is hidden from receiver	-0.066	-0.068	-0.034
	(0.049)	(0.055)	(0.050)
Sender's targeting of receiver is hidden from receiver	-0.054	-0.049	-0.109**
	(0.046)	(0.052)	(0.050)
Hidden sender*Hidden targeting	0.008	-0.048	0.101
	(0.067)	(0.075)	(0.071)
Control Mean	0.738	0.636	0.505
N	396	396	396

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

Refer to Table 3. Field officers ask the sender the likelihood that the receiver adopts and earns/loses money over the next eight weeks if the field officer gives the receiver the safety pamphlet, the growth pamphlet, or both pamphlets and conveys that it was recommended according to the sender's treatment arm. In addition to the controls listed in Table 3, controls also include whether the field officer asks about the effect of recommending the safety pamphlet, the growth pamphlet, or both pamphlets.

Table S11: Expected effect of pamphlets on receiver actions and monetary outcomes

	(1) Likely adopt	(2) Likely earn lot	(3) Likely lose lot
Growth pamphlet only	0.080*	0.041	-0.056
	(0.046)	(0.051)	(0.048)
Safety pamphlet only	0.002	0.063	-0.042
	(0.044)	(0.049)	(0.048)
Both pamphlets	0.018	0.089*	-0.118**
	(0.046)	(0.050)	(0.049)
Control Mean	0.656	0.534	0.519
N	527	527	527

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

Refer to Table 3. Field officers ask the sender the likelihood that the receiver adopts and earns/loses money over the next eight weeks if the field officer gives the receiver the safety pamphlet, the growth pamphlet, or both pamphlets and conveys that it was recommended according to the sender's treatment arm. In addition to the controls listed in Table 3, controls also include which treatment arm the sender is in.

Table S12: Treatment effects on additional pamphlet recommendation outcomes

	(1) Safe only	(2) Grow only	(3) Both	(4) None	(5) If 1, growth	(6) If 1, safe
Sender's identity is hidden from receiver	-0.040	-0.012	0.068***	-0.009	-0.002	0.001
	(0.034)	(0.032)	(0.022)	(0.021)	(0.034)	(0.037)
Sender's targeting of receiver is hidden from receiver	-0.006	-0.009	-0.003	0.017	-0.029	0.023
	(0.035)	(0.034)	(0.024)	(0.019)	(0.036)	(0.038)
Hidden sender*Hidden targeting	0.034	-0.023	-0.030	0.011	-0.008	0.005
	(0.049)	(0.047)	(0.033)	(0.029)	(0.050)	(0.053)
Control Mean	0.318	0.297	0.262	0.123	0.344	0.507
N	1446	1446	1446	1446	1446	1446

*** p<0.01, ** p<0.05, * p<0.1
Refer to Table 3.

Table S13: Treatment effects on additional pamphlet recommendation outcomes

	(1) Safe only	(2) Grow only	(3) Both	(4) None	(5) If 1, growth	(6) If 1, safe
Sender's identity is hidden from receiver	-0.056	0.014	0.047*	-0.000	0.012	-0.016
	(0.039)	(0.037)	(0.026)	(0.025)	(0.039)	(0.041)
Sender's targeting of receiver is hidden from receiver	-0.032	0.035	-0.020	0.019	0.004	-0.014
	(0.039)	(0.038)	(0.027)	(0.024)	(0.040)	(0.042)
Hidden sender*Hidden targeting	0.046	-0.036	-0.019	0.003	-0.007	0.018
	(0.055)	(0.053)	(0.038)	(0.034)	(0.055)	(0.058)
Socially-distant receiver	-0.108***	0.068**	-0.035	0.074***	0.064*	-0.120***
	(0.036)	(0.033)	(0.030)	(0.024)	(0.037)	(0.039)
Hidden sender*Socially-distant	0.043	-0.064	0.067	-0.023	-0.037	0.047
	(0.053)	(0.048)	(0.043)	(0.036)	(0.054)	(0.057)
Hidden targeting*Socially-distant	0.067	-0.111**	0.051	-0.002	-0.087*	0.099*
	(0.052)	(0.048)	(0.044)	(0.033)	(0.053)	(0.055)
Hidden sender*Hidden targeting*Socially-distant	-0.031	0.024	-0.034	0.019	-0.009	-0.037
	(0.074)	(0.069)	(0.061)	(0.050)	(0.077)	(0.079)
Control Mean	0.336	0.263	0.291	0.109	0.320	0.543
N	1446	1446	1446	1446	1446	1446

*** p<0.01, ** p<0.05, * p<0.1
Refer to Table 3.

S.2 Appendix Sections

S.2.1 Supplementary theory

S.2.1.1 Characterizing equilibria in cutoff strategies

First, we will prove the existence of an equilibrium in cutoff strategies.

Suppose a cutoff strategy where $d = 1$ iff $V \geq v$. In this case, the Sender should be indifferent between sending and withholding when $V = v$. Using the Sender payoff function U_s, we can solve for v when a Sender is indifferent to get:

$$v = U_R + \eta(U_R) = \gamma(b(0)) - \gamma(b(1)) \tag{S.2.1}$$

By the Intermediate Value Theorem, there exists a v that satisfies Equation (S.2.1). The IVT requires that V is continuous and $\gamma(b(0)) - \gamma(b(1))$ is in the domain of V. V is continuous by Assumption 1. V's domain contains $\gamma(b(0)) - \gamma(b(1))$ because V contains all positive reals by Assumption 1 and γ is a bounded function. Note that v does not vary by θ because θ does not directly feed into the compliment/offense term.

S.2.1.2   Sharing signals low-regard

Next, we need to establish that sharing information creates a strict ordering in the beliefs of the Receiver, b_0 and b_1. We will establish this by showing that the c.d.f of beliefs when the Sender shares $B_{v,0}$ first order stochastically dominates the c.d.f. of beliefs when the Sender withholds $B_{v,1}$. To do this, we must show that $B_{v,0}(x) \leq B_{v,1}(x)$ for all $x \in (0,1)$.

To begin, we characterize B under cutoff v using Bayes Rule:

$$B_{v,0}(x) = P_v(\theta \geq x \mid d = 0) = \frac{P_v(d = 0 \mid \theta \geq x) * \pi(x)}{P_v(d = 0)}$$

$$B_{v,1}(x) = P_v(\theta \geq x \mid d = 1) = \frac{P_v(d = 1 \mid \theta \geq x) * \pi(x)}{P_v(d = 1)}$$

We can simplify the probability that information is shared if $\theta > x$ to the probability that the Sender has information q and a high enough V to motivate sharing:

$$\mathbf{P}_v(d = 1 \mid \theta > x) = q \int_{y=\theta}^{1} G(y, v) \tag{S.2.2}$$

The probability that information is not shared if $\theta > x$ is just the $1 - \mathbf{P}_v(d = 1 \mid \theta > x)$

$$\mathbf{P}_v(d = 0 \mid \theta > x) = 1 - q \int_{y=\theta}^{1} G(y, v). \tag{S.2.3}$$

Using these equations, we can begin simplifying the Bayesian update terms:

$$B_{v,0}(x) = \frac{1 - q \int_{y=\theta}^{1} G(y, v) * \pi(x)}{P_v(d = 0)}$$

$$B_{v,1}(x) = \frac{q \int_{y=\theta}^{1} G(y, v) * \pi(x)}{P_v(d = 1)}$$

We can then divide through both equations by $1 - B_{v,d}(x)$. Since $1 - B_{v,d}(x) = P(\theta < x \mid d) = \frac{P(d=0|\theta<x)(1-\pi)}{P(d)}$ and $P(\theta < x \mid d = 0) = 1 - q$

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$int_{y=0}^{\theta} G(y,v)$, this allows us to re-write the equations as:

$$\frac{B_{v,0}(x)}{1-B_{v,0}(x)} = \frac{\pi}{1-\pi} * \frac{1-q\int_{y=\theta}^{1} G(y,v)}{1-q\int_{y=0}^{\theta} G(y,v)}$$

$$\frac{B_{v,1}(x)}{1-B_{v,1}(x)} = \frac{\pi}{1-\pi} * \frac{\int_{y=\theta}^{1} G(y,v)}{\int_{y=0}^{\theta} G(y,v)}$$

Importantly $x \mapsto \frac{x}{1-x}$ being strictly increasing for $x \in (0,1)$, so we now just need to show that $\frac{B_{v,1}(x)}{1-B_{v,1}(x)} < \frac{B_{v,0}(x)}{1-B_{v,0}(x)}$ to show that sharing signals low-regard.

We can start by noting that $\int_{y=\theta}^{1} G(y,v)$ is the expected value of V from θ to 1 and $\int_{y=0}^{\theta} G(y,v)$ is the expected value of 0 from θ. By assumption 2 on FOSD, $G_{\theta'} < G_{\theta}$ if $\theta' > \theta$. Thus, the expected value form θ to 1 will be lower than the expected value from 0 to θ giving us that $\int_{y=\theta}^{1} G(y,v) < \int_{y=0}^{\theta} G(y,v)$. Using that $G = 1 - F$, we also get that $\int_{y=\theta}^{1} F(y,v) > \int_{y=0}^{\theta} F(y,v)$. Putting these together, we can write:

$$\frac{\pi}{1-\pi} \frac{\int_{y=\theta}^{1} G(y,v)}{\int_{y=0}^{\theta} G(y,v)} < \frac{\pi}{1-\pi} \frac{\int_{y=\theta}^{1} F(y,v)}{\int_{y=0}^{\theta} F(y,v)}$$

Assumption 2 on FOSD also gives us that:

$$\frac{\pi}{1-\pi} \frac{\int_{y=\theta}^{1} G(y,v)}{\int_{y=0}^{\theta} G(y,v)} < \frac{1}{1}$$

Note that for any positive reals x, y, z, y', z' if we have $x < y'/z'$ then it follows that $x < \frac{qy+(1-q)y'}{qz+(1-q)z'}$. Thus,

$$\frac{\pi}{1-\pi} \frac{\int_{y=\theta}^{1} G(y,v)}{\int_{y=0}^{\theta} G(y,v)} < \frac{\pi}{1-\pi} \frac{q\int_{y=0}^{\theta} F(y,v)+(1-q)}{q\int_{y=0}^{\theta} F(y,v)+(1-q)}$$

We can then use the identity $G_a(v) = 1 - F_a(v)$ to show

$$\frac{\pi}{1-\pi} \frac{\int_{y=\theta}^{1} G(y,v)}{\int_{y=0}^{\theta} G(y,v)} < \frac{\pi}{1-\pi} \frac{q\int_{y=\theta}^{1} F(y,v)+(1-q)}{q\int_{y=0}^{\theta} F(y,v)+(1-q)} = \frac{\pi}{1-\pi} \frac{1-q\int_{y=\theta}^{1} G(y,v)}{1-q\int_{y=0}^{\theta} G(y,v)} \qquad \text{(S.2.4)}$$

This proves that $B_{v,1} < B_{v,0}$ because $x \mapsto \frac{x}{1-x}$ is strictly increasing for $x \in (0,1)$ as noted above.

S.2.2 Random walk procedure for sampling households

In order to randomly sample households, the field supervisors randomly pick a starting point in each community. The field officers survey a member of the household to the left and the right of this starting point (these are the lister respondents described in Section 3.2. Then, the field officers sample 16 households for the sender survey through circular random sampling. In circular random sampling, the field officers start at the same point on the boundary of the village. One field officer begins walking around the boundary of the village keeping the houses on their right. This field officer would count each household they pass and attempt to survey an eligible member of the 4th household passed on their right. If unable to survey this household, the field officer attempts to survey a member of the next household to the right. The field officer would then repeat this process. The other field officer would do the same but keeping households on their left. Once the boundary of the village was covered by one of the field officers. The field officers would move to the next layer of the village and do the same. They would keep moving to further in layers until completing 16 sender surveys.

S.2.3 Mobile banking pamphlets

We designed the pamphlets in collaboration with a designer from Lahore whom we contacted through the freelancing platfrom Upwork. The design of the two pamphlets are nearly identical besides the color. We used different colors for each pamphlet to enable us to better trace the diffusion of the pamphlets through the network.

For both pamphlets, the front-side contains five points related to mobile banking, while the back-side contains tables related to the information conveyed on the front-side. The first point on the front-side for each pamphlet is "Open a reliable account such as the Asaan Mobile Account." The Asaan Mobile Account is an initiative by the Pakistani government to expand financial access among low-income segments. In the pamphlets, we directly use the framing of the Asaan Mobile Account used on the State Bank of Pakistan's website as of February 2023.[31] We then provide the USSD code that respondents can enter on their basic/smart phones to initiate the registration process. We also provide the USSD code for registering with the partner bank of one's mobile network operate in case respondents prefer this option. The remaining information differs between pamphlets.

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[31]https://web.archive.org/web/20230202162102/https://www.sbp.org.pk/Finc/AMAscheme.html

S.2.3.1 "Keeping your money safe with mobile banking" pamphlet

Points 2-5 of the 'Keeping your money safe with mobile banking" pamphlet are about avoiding negative events that could occur when one uses mobile banking. The second point implores respondents to protect their PIN number. The third point tells respondents to ignore contact from unknown numbers and informs that their service providers will use short-code or toll-free numbers. The results of our baseline survey confirm that this is useful advice. 42% of respondents reported being contacted by unknown numbers with 35% of those contacted responded to the numbers instead of ignoring or reporting it. Among the 63% who ignored the contact, the most common reason was that the number was not a short-code or toll-free. The fourth point informs the reader of common scams in this context, including encouragements to use unauthorized services. The final point provides instructions for monitoring your mobile banking account by checking your bank statement and on how to contact mobile banking helplines.

On the back of the pamphlet, we include a list of authorized services and unauthorized services to help respondents understand when they are dealing with scammers as compared to legitimate mobile banking service providers. In addition, we provide a list of helplines and complaint registration services for common mobile banking providers and the helpline of the State Bank of Pakistan's Consumer Protection department.

The field officer read the following summary of the pamphlet to the senders:

"You can make your money grow with mobile banking by following these tips:

Open a reliable account such as the State Bank of Pakistan-sponsored Asaan Mobile Account.

Open a savings account and earn profits ranging from 5.5% to 14.5% per annum.

Used fixed term or commitment savings such as HBL's Gulak where you commit to saving for 1, 3, 6 or 12 months and can earn up to 13.5% profit.

Open a business mobile banking account to market and sell to distant consumers on online marketplaces such as daraz.pk.

Access agricultural advisory services through Mobilinkâs DOST Kissan or agricultural finance through DigiBoP WhatsApp Banking.
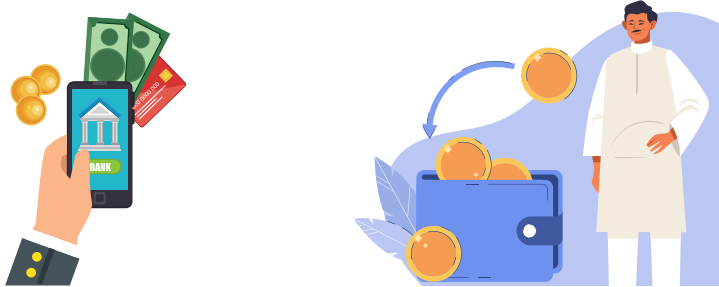
Refer to the pamphlet for more information on these services. On the back of the pamphlet,

Figure S1: Safety pamphlet: Front-side

<div dir="rtl">

موبائل بینکنگ کےاستعمال کے ساتھ محفوظ طریقے سے بچت کریں.

موبائل بینکنگ کے استعمال کے ذریعے محفوظ طریقے سے بچت کیسے کی جا سکتی ہے
اس کے بارے میں معلومات یہاں ہیں

1. ایک قابل اعتماد اکاؤنٹ کھولیں جیسے کہ آسان موبائل اکاؤنٹ: آسان موبائل اکاؤنٹ اسٹیٹ بینک آف پاکستان (SBP) اور پاکستان ٹیلی کمیونیکیشن اتھارٹی (PTA) کا ایک اقدام ہے جو موبائل بینکنگ اکاؤنٹس کو تیز، آسان، محفوظ اور سستے طریقے سے کھولنے میں سہولت فراہم کرتا ہے۔ آسان موبائل اکاؤنٹ کھولنے کے لیے #2262* ڈائل کریں۔ موبائل بینک اکاؤنٹس جاز (JAZZ) یا ٹیلی نار(TELENOR) یا یوفون (UFONE) سمز پر #786* ڈائل کرکے یا ایپلیکیشن کے ذریعے بھی کھولے جاسکتے ہیں۔

2. اپنی پن کی حفاظت کریں: آسانی سے اندازہ لگانے والے نمبر ہرگز استعمال نہ کریں۔ اپنا پن دوسروں کے ساتھ شیئر نہ کریں۔

3. نامعلوم نمبروں سے کالز یا ایس ایم ایس SMS کا جواب نہ دیں: سروس فراہم کرنے والے ٹول فری نمبر (0800 xxxxx*) یا شارٹ کوڈ نمبر جیسے 4444 (جاز کیس/ Jazzcash) یا 3737 (ایزی پیسہ / Easypaisa) استعمال کریں گے۔

4. جعل سازی سے بچیں: ایسے اسکیمرز (جعل سازوں) کے ساتھ مشغول نہ ہوں جو "غلط نمبر" پر پیغام بھیجنے یا رقم بھیجنے کا دعوی کرتے ہیں،اور کہتے ہیں کہ آپ نے "لاٹری" جیت لی ہے، یا آپ کو غیر تصدیق شدہ مالیاتی سروسز استعمال کرنے کی ترغیب دیتے ہیں۔ جب شک ہو تو اس پمفلٹ کی پشت پر منظور شدہ اور ممنوعہ خدمات کی فہرست دیکھیں

5. اپنی بینک سٹیٹمنٹ چیک کریں اور کسی بھی مسئلے کی اطلاع دیں: آسان موبائل اکاؤنٹ کے صارفین #2262* ڈائل کرکے منی اسٹیٹمنٹ کو منتخب کرسکتے ہیں۔دوسرے صارفین #786* ڈائل کرکے اکاؤنٹ اسٹیٹمنٹ منتخب کرسکتے ہیں یا اپنی موبائل بینکنگ ایپلیکیشن استعمال کرسکتے ہیں۔ اگر کوئی مشکل پریشانی ہو تو اپنے بینک کی ہیلپ لائن یا اسٹیٹ بینک آف پاکستان کے کنزیومر پروٹیکشن ڈیپارٹمنٹ سے رابطہ کریں۔ ہیلپ لائنز کے لیے اس پمفلٹ کے پچھلے حصے سے رجوع کریں۔

</div>

there is a list mobile savings account products with relevant information."

S.2.3.2 "Making your money grow with mobile banking" pamphlet

Points 2-5 on the front-side of the "Making your money grow with mobile banking" relate to benefits of using mobile banking that are not well-known in our context. Point 2 tells the reader that one can earn profits by using a mobile banking savings account. In this context, savings accounts provide benefits through profit rates rather than interest rates in order to comply with the strictures of Sharia law. Point 3 mentions the commitment savings products of Konnect by HBL. This product provides high profit rates relative to other savings accounts. Furthermore, the demand for commitment devices among low-income households has been demonstrated in a number of contexts (Ashraf et al., 2006; Gugerty, 2007; Dupas and Robinson, 2013). Point 4

Figure S2: Safety pamphlet: Front-side (English translation)

Keeping your money safe with mobile banking

Here is information on how one can keep their money safe with mobile banking:

1. **Open a reliable account such as the Asaan Mobile Account (AMA)**: The AMA is a State Bank of Pakistan (SBP) and Pakistan Telecommunication Authority (PTA) initiative to facilitate the swift, easy, safe, and affordable opening of mobile banking accounts. Dial *2262# to open an AMA. Mobile bank accounts can also be opened by dialing *786# on Jazz, Telenor, or Ufone sims or via apps.

2. **Protect your PIN**: Do not use easily guessable numbers. Do not share your PIN with others.

3. **Do not respond to calls or SMSs from unknown numbers**: Service providers will use a toll-free number (*0800 xxxxx) or a short-code number such as 4444 (JazzCash) or 3737 (EasyPaisa).

4. **Avoid common scams:** Do not engage with strangers who claim to have messaged or sent money to the "wrong number", say you have won a "lottery", or encourage you to use unauthorized financial services. When in doubt, refer to the list of approved and banned services on the back of this pamphlet.

5. **Check your banking statement and report any issues:** AMA users can dial *2262# and select Mini Statement. Other users can dial *786# and select Account Statement or use their mobile banking app. If there are discrepancies, contact your bank helpline or the State Bank of Pakistan's Consumer Protection Department. Refer to the back of this pamphlet for helplines.

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Figure S3: Safety pamphlet: Back-side

اسٹیٹ بینک آف پاکستان کے منظورشدہ مالیاتی ادارے	اسٹیٹ بینک آف پاکستان کے غیر منظورشدہ ادارے
الائیڈ بینک (Allied Bank)	OctaFX
عسکری بینک (Askari Bank)	(Easy Forex)ایزی فاریکس
بینک الفلاح (Bank Alfalah)	(Bitcoin)بٹ کوائن
بینک آف پنجاب (Bank Of Punjab)	(Litecoin)لائٹ کوائن
سی ایم پی ای سی سی (CMPECC)	(Pakcoin)پاک کوائن
ایزی پیسہ (Easypaisa)	(OneCoin)ون کوائن
فنجا(Finja)	(DasCoin)ڈاس کوائن
جاز کیش(Jazzcash)	(Binance)بائننس
جے ایس بینک (JS Bank)	(Pay Diamond)پے ڈائمنڈ
کنیکٹ بذریعہ ایچ بی ایل(Konnect By HBL)	دیگر ورچوئل کرنسیاں/ سکے/ ٹوکنز (Other Virtual Currencies/Coin/Tokens)
ایم سی بی بینک(MCB Bank)	
میزان بینک(Meezan Bank)	
نیا پے(NayaPay)	
سدائیک(Sadatech)	
یونائیٹڈ بینک لمیٹڈ(UBL)	
یو مائیکرو فنانس بینک(U Microfinance Bank)	
ایو بینک / یوپیسا(U Bank/UPaisa)	

مالیاتی خدمت فراہم کرنے والے ادارے	ہیلپ لائن	شکایت کا اندراج
جاز کیش (Jazzcash)	جاز صارفین:4444 دیگر:444-124-111-042	یو ایس ڈی : #11#*6*786* complaints@mobilinkbank.com : ای میل
ایزی پیسہ(Easypaisa)	ٹیلی نار صارفین کے لیے: 3737 دیگر:003-111-042-737	complaints@telenorbank.pk : ای میل
ایم سی بی بینک(MCB)	فون: 622-000-111-042	info@mcb.com.pk : ای میل
یو بی ایل(UBL)	فون:32446949-021	customer.services@ubl.com.pk : ای میل
جے ایس بینک(JS)	فون:-654-321-021-111	CCU.helpdesk@jsbl.com : ای میل
یو بینک / یوپیسا(U Bank/U Paisa)	یوفون صارفین کے لیے: 7777 دیگر:282-265-051-111	complaints@ubank.com.pk : ای میل
HBL Konnect	فون:-425-111-042-111	ویب سائٹ: https://www.hbl.com/customer-assistance/complaint-form
اسٹیٹ بینک آف پاکستان کا کنزیومر پروٹیکشن ڈیپارٹمنٹ	فون: 273-727-111-21-0092 ای میل cpd.helpdesk@sbp.org.pk	ویب سائٹ: https://bankingmohtasib.gov.pk/website/CompliantForm.aspx

Figure S4: Safety pamphlet: Back-side (English translation)

State Bank of Pakistan Approved	State Bank of Pakistan Banned
Allied Bank, Askari Bank, Bank Alfalah, Bank of Punjab, CMPECC, EasyPaisa, Finja, JazzCash, JS Bank, Konnect by HBL, MCB Bank, Meezan Bank, NayaPay, Sadatech, United Bank Limited (UBL), U Microfinance Bank (U Bank/UPaisa)	OctaFX, Easy Forex, Bitcoin, Litecoin, Pakcoin, OneCoin, DasCoin, Binance, Pay Diamond, Other Virtual Currencies/Coins/Tokens

Financial Service Provider	Helpline	Complaint registration
JazzCash	Jazz users: 4444 Others: 042-111-124-444	USSD: *786*6*11# Email: complaints@mobilinkbank.com
EasyPaisa	For Telenor users: 3737 Others: 042-111-003-737	Email: complaints@telenorbank.pk
MCB Bank	Phone: 042-111-000-622	Email: info@mcb.com.pk
UBL	Phone: 021-32446949	Email: customer.services@ubl.com.pk
JS bank	Phone: 021-111-654-321	Email: CCU.helpdesk@jsbl.com
U Bank/UPaisa	For Ufone users: 7777 Others: 051-111-282-265	Email: complaints@ubank.com.pk
Konnect by HBL	Phone: 042-111-425-111	Website: https://www.hbl.com/customer-assistance/complaint-form
State Bank of Pakistan's Consumer Protection Department	Phone: 0092-21-111-727-273 E-mail: cpd.helpdesk@sbp.org.pk	Website: https://bankingmohtasib.gov.pk/website/CompliantForm.aspx

mentions products that allow for online marketing or sale of product which could allow them to use e-commerce to grow their businesses. Preliminary results from a forthcoming study in Tanzania provides evidence of increasing use of digital payments to remote collection of payment for goods and services delivered to one's home. Point 5 highlights services related to farming and livestock that may be especially useful for our sample. The Dost Kissan product provides weather, crop, and livestock advice via SMS or Interactive Voice Recording. DigiBoP Whatsapp Banking provides financing for agricultural inputs to qualifying farmers.

On the back of the pamphlet, we provide information on a number of savings account products including the provider of the product, the expected annual profit rate as of February 2023, the minimum account balance, how to open the account, and how to use the account.

The field officer read the following summary of the pamphlet to the senders:

"You can keep your money safe with mobile banking by following these simple tips.

Open a reliable account such as the State Bank of Pakistan-sponsored Asaan Mobile Account.

Protect your PIN by picking a hard-to-guess number and not sharing it with others.

Do not respond to calls or SMSs from unknown numbers since these may be scammers.

Check your banking statement and report any issues.

Refer to the pamphlet for information on how to open a mobile banking account, easily avoid common scams, and check your bank statement. Refer to the back of the pamphlet for a list of approved mobile banking services and banned services as well as the helplines for mobile banking where you can report any issues."

Figure S5: Growth pamphlet: Front-side

موبائل بینکنگ کو استعمال کرتے ہوئے اپنا پیسہ بڑھانا

موبائل بینکنگ کے ذریعے کوئی اپنا پیسہ کیسے بڑھا سکتا ہے اس کے بارے میں معلومات یہاں موجود ہیں۔

1. ایک قابل اعتماد اکاؤنٹ کھولیں جیسے کہ آسان موبائل اکاؤنٹ: آسان موبائل اکاؤنٹ اسٹیٹ بینک آف پاکستان **(SBP)** اور پاکستان ٹیلی کمیونیکیشن اتھارٹی **(PTA)**کا ایک اقدام ہے جو موبائل بینکنگ اکاؤنٹس کو تیز، آسان، محفوظ اور سستے طریقے سے کھولنے میں سہولت فراہم کرتا ہے۔ آسان موبائل اکاؤنٹ کھولنے کے لیے #2262 * ڈائل کریں۔ موبائل بینک اکاؤنٹس جاز **(Jazz)**یا ٹیلی نار **(Telenor)** یا یوفون **(Ufone)**سمز پر #786 * ڈائل کرکے یا ایپلیکیشن کے ذریعے بھی کھولے جاسکتے ہیں۔

2. سیونگ /بچت اکاؤنٹس: سالانہ ساڑھے پانچ فیصد سے ساڑھے چودہ فیصد تک منافع کمائیں۔ سیونگ اکاؤنٹ میں آپ کی رقم جتنی دیر پڑی رہے گی، اتنا ہی زیادہ منافع کمائیں گے۔ آپ یو ایس ایس ڈی **(USSD)** کوڈ یا موبائل فون ایپ کے ذریعے سیونگ (بچت) اکاؤنٹ کھول سکتے ہیں۔

3. کمٹمنٹ/ فکسڈ بچت: کنیکٹ حبیب بینک لمیٹڈ گلک پراڈکٹ **(Konnect by HBL's Gulak)** کے ساتھآپ 1، 3، 6 یا 12 ماہ کے لیے بچت کرنے کا پلان منتخب کرتے ہیں اور ساڑھے تیرا فیصد سالانہ تک منافع کی شرح حاصل کرسکتے ہیں۔ اگر آپ پیسے پہلے نکال لیتے ہیں، تو آپ کو فیس ادا کرنی ہوگی۔ مزید معلومات کے لیے اس پمفلٹ کے پچھلے حصے کو دیکھیں۔

4. آن لائن بزنس مارکیٹنگ: بزنس موبائل اکاؤنٹس کے ساتھ، آپ اپنے کسٹمرز کو پروموشنل ایس ایم ایس **(SMS)** پیغامات بھیج سکتے ہیں۔ ایک موبائل بینکنگ اکاؤنٹ آپ کو ڈیجیٹل طور پر ادائیگیاں وصول کرنے کی اجازت دیتا ہے تاکہ آپ دور رہنے والے کسٹمرز کو سامان اور سروسز فروخت کر سکیں۔آپ دراز **(daraz.pk.)**جیسے آن لائن پلیٹ فارم کے ذریعے دور دراز کے صارفین تک رسائی حاصل کر سکتے ہیں۔

5. کاشتکاری اور مویشیوں کے لیے خدمات: موبی لنک دوست کسان **(Mobilink's DOST Kissan)** مائیکرو فنانس بینک انٹرایکٹو وائس ریکارڈنگ اور ایس ایم ایس **(SMS)** کے ذریعے زرعی مشاورتی خدمات فراہم کرتا ہے ۔بینک آف پنجاب اپنی **(DigiBoP WhatsApp Banking.)**کے ذریعے زرعی فنانس کی خدمات کرتا ہے۔

S.2.4 Basic mobile banking information read by field officers to senders

"Many households use their mobile wallets to store or save money. Typically, you deposit and withdraw money by visiting banking agents or branches and then, you can manage your money via USSD code or mobile app. Usually, there are no fees for depositing money and fees ranging from 1-3.5% for withdrawals. If you open a mobile savings account, you often earn profit on these deposits."

Figure S6: Growth pamphlet: Front-side (English translation)

Making your money grow with mobile banking

Here is information on how one can make their money grow with mobile banking:

1. **Open a reliable account such as the Asaan Mobile Account (AMA)**: The AMA is a State Bank of Pakistan (SBP) and Pakistan Telecommunication Authority (PTA) initiative to facilitate the swift, easy, safe, and affordable opening of mobile banking accounts. Dial *2262# to open an AMA. Mobile bank accounts can also be opened by dialing *786# on Jazz, Telenor, or Ufone sims or via apps.

2. **Savings accounts:** Earn profits ranging from 5.5% to 14.5% per annum. The longer your money stays in a savings account, the more profit it earns. You can open a savings account via USSD code or phone app. Refer to back of this pamphlet for more information.

3. **Commitment savings:** With the Konnect by HBL's Gulak product, you commit to saving for 1, 3, 6 or 12 months and earn up to 13.5% annual profit rate. If you withdraw earlier, you will have to pay a fee. Refer to the back of this pamphlet for more information.

4. **Online business marketing:** With Business mobile accounts, you can send promotional SMS messages to your consumers. A mobile banking account allows you to receive payments digitally so you can sell goods and services to consumers living far away. You can access distant consumers via marketplaces like daraz.pk.

5. **Services for farming and livestock:** Mobilink's DOST Kissan from Mobilink Microfinance Bank provides agricultural advisory services through Interactive Voice Recordings and SMS. The Bank of Punjab offers agricultural finance through their DigiBoP WhatsApp Banking.

Figure S7: Growth pamphlet: Back-side

استعمال	کہاں کھول سکتے ہیں	کم از کم بیلنس	متوقع سالانہ منافع کی شرح*	فراہم کنندہ	بچت پروڈکٹ کا نام
ایپلیکیشن	بینک کی برانچ	0	14.5%	الائیڈ بینک	آسان ڈیجیٹل بچت اکاؤنٹ
ایپلیکیشن	بینک کی برانچ	0	14.5%	بینک الفلاح	آسان ڈیجیٹل بچت اکاؤنٹ
ایپلیکیشن	ایپلیکیشن /ایجنٹ	2000	7-14%**	ایزی پیسہ	ایزی پیسہ بچت
ایپلیکیشن	بینک کی برانچ	0	12.6%	میزان بینک	ڈیجیٹل بچت
یو ایس ایس ڈی/ (USSD) ایپلیکیشن	یو ایس ایس ڈی/ (USSD) ایپلیکیشن /ایجنٹ	2000	7.15-10.15%***	جاز کیش	بچت کے منصوبے
ایس ایم ایس SMS/ ایپلیکیشن	ایس ایم ایس ***** / ایپلیکیشن	1000	13.5% ****	HBL Konnect	گلک (Gulak)

فروری 2023 سے۔ مستقبل میں تبدیل ہو سکتا ہے۔

2000 روپے سے کم کے لیے 0 فیصد ، 2000-5000 روپے تک کے لیے 7 فیصد ، 5000-20000 روپے تک کے لیے 9 فیصد ، 20000-50000 روپے تک کے لیے 11 فیصد ، 50000 روپے سے زیادہ کے لیے 14 فیصد

2000روپے سے کم کے لیے 0 فیصد ، 2000-5000 روپے کے لیے 7.15 فیصد ، 5000-20000 روپے کے لیے 9.15 فیصد ، 20000 روپے سے زیادہ کے لیے 10.15 فیصد

گلک (Gulak) کی مدت اور بیلنس کے سائز کی بنیاد پر مختلف ہوتی ہے۔ اگر آپ 1، 3، 6، یا 12 ماہ کی کمٹمنٹ/ فکسڈ سونگ سے پہلے پیسے نکلواتی ہیں، تو آپ کو منافع نہیں ملے گا اور آپ فیس ادا کریں گے۔

آپ درج ذیل ایس ایم ایس (SMS) 8425 پر بھیج کر اکاؤنٹ کھول سکتے ہیں
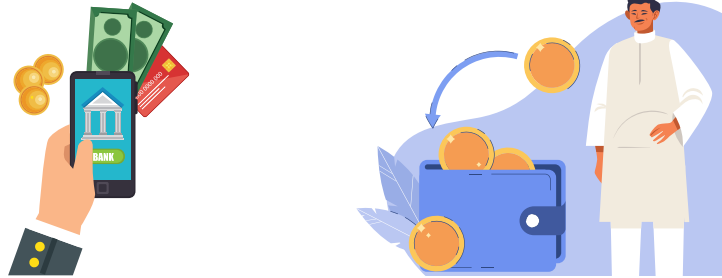
BBAO< SPACE > CNIC > SPACE > CITY > 8425

Figure S8: Growth pamphlet: Back-side (English translation)

Savings product name	Provider	Expected annual profit rate*	Minimum balance	Opening	Usage
Asaan Digital Savings Account	Allied Bank	14.5%	0	Bank branch	App
Asaan Digital Savings Account	Bank Alfalah	14.5%	0	Bank branch	App
EasyPaisa Savings	EasyPaisa	7-14%**	2000	App/Agent	App
Digital Savings	Meezan Bank	12.6%	0	Bank branch	App
Bachat Plans	JazzCash	7.15-10.15%***	2000	USSD/App/Agent	USSD/App
Gulak	Konnect by HBL	13.5%****	1000	SMS*****/App	SMS/App

* As of February 2023. May be changed in the future.

** 0% for under 2000 PKR balance, 7% for 2000-5000 PKR, 9% for 5000-20000 PKR, 11% for 20000-50000 PKR, 14% for over 50000 PKR

*** 0% for under 2000 PKR balance, 7.15% for 2000-5000 PKR, 9.15% for 5000-20000 PKR, 10.15% for over 20000 PKR

****Varies based on duration of Gulak and size of balance. If you withdraw prior to commitment of 1, 3, 6, or 12 months, you will not receive profit and will pay a fee.

***** You can open via SMS by sending the following SMS: BBAO< SPACE >< CNIC >< SPACE >< CITY > to 8425.

S.2.5 Treatment Group: Scripts

S.2.5.1 Control group: (Revealed Sender, Revealed Targeting)

For the senders in the control group, field officers read to sender: "If you recommend any pamphlets and we visit [Receiver Name] for your recommendation, we would tell [Receiver Name] that [Sender Name] recommended that we offer these pamphlets to [Receiver Name], specifically. Therefore, they would know that it was you specifically who recommended the pamphlets and they would know that you recommended the pamphlets specifically to them."

S.2.5.2 Treatment group #1 (Revealed Sender, Hidden Targeting)

For the senders in (Revealed Sender, Hidden Targeting), field officers read to sender: "If you recommend any pamphlets and we visit [Receiver Name] for your recommendation, we would tell [Receiver Name] that [Sender Name] recommended that we give the pamphlets to one of their co-villagers and say that we, Gallup Pakistan, randomly selected [Receiver Name] specifically. Therefore, they would know that it was you specifically who recommended the pamphlets, but they would not know that you recommended the pamphlets specifically to them."

S.2.5.3 Treatment group #2 (Hidden Targeting , Revealed Sender)

For the senders in (Hidden Targeting, Hidden Sender), field officers read: "If you recommend any pamphlets and we visit [Receiver Name] for your recommendation, we would tell [Receiver Name] that another co-villager recommended that we give the pamphlets to [Receiver Name], specifically. Therefore, they would not know that it was you specifically who recommended the pamphlets, but they would know that someone recommended the pamphlets specifically to them."

S.2.5.4 Treatment group #3 (Hidden Targeting , Hidden Sender)

For the senders in (Hidden Targeting, Hidden Sender), field officers read: "If you recommend any pamphlets and we visit [Receiver Name] for your recommendation, we would tell [Receiver Name] that another co-villager recommended that we give this information to one of their co-villagers and say that we, Gallup Pakistan, randomly selected [Receiver Name] specifically. Therefore, they would not know that it was you specifically who recommended this offer and they would not know that someone recommended the offer specifically to them."

S.2.6   Comprehension checks

After the field officer describes the recommendation environment, they ask three comprehension check questions. The first question checks whether the sender is aware that choosing no pamphlets means that their name and their decision will not be mentioned to the receiver. The next two questions check their understanding of whether their identity and/or their targeting of the receiver will be revealed along with a pamphlet recommendation fits with their assigned treatment group. If the respondent does not correctly answer all three questions, the field officer repeats the key instructions and re-asks the questions. When asking the questions for the second time, the field officer does not move forward until the respondent is able to give the correct answer.

S.2.7   Mobile banking SMS tips campaign

The day after all surveys in a villager are completed the villagers selected to receive SMS messages receive the first mobile banking tip. These villagers then receive one mobile banking tip via SMS on each Friday for the next eight weeks. The tips contain a mix of information about advanced usage and consumer financial protection information. Many of the tips about advanced usages mirror language used by mobile banking companies in our context. Here are the English translations of the mobile banking tips:

- Tip #1: Do you have utility bills to pay? Make your life easy by paying them via mobile money.

- Tip #2: Remember to watch out for scammers when you use mobile banking. Your bank will never text to ask you for your PIN or password. Do not share your PIN or password via text!

- Tip #3: If you need money quickly, you can get up to Rs 10,000 via a digital loan.

- Tip #4: To avoid scams, do not click any links or download any attachments from unknown sources. Confirm the source of the message before clicking or downloading.

- Tip #5: More than 600,000 users earn daily profits through a savings plan. So subscribe today with just one tap and zero documentation.

- Tip #6: Want to be safe when using mobile banking? Watch out for spelling mistakes, wrong tense, and incorrect punctuation in SMS messages. These are signs that the message could be a fraud.

- Tip #7: Get insurance via digital insurance. Pay 5 PKR and get 100 PKR in insurance.

- Tip #8: Pay via digital banking with merchants and get up to 40% cashback on your payments.

- Tip #9: Use clear communication when sending mobile money transfers: When sending money to someone, make sure to clearly communicate the purpose of the payment and the amount being sent. This can help prevent misunderstandings and ensure that the recipient is expecting the payment.

S.3 Lockbox description

Field officers read the following script to senders: "Here is a picture of the Lockbox. The Lockbox is a 4 by 4 metal box. The small size of the Lockbox makes it easy to hide in your house. The Lockbox comes with a key and a lock that is opened by the key. By keeping the key on your person, you can ensure that others cannot open the Lockbox. Unlike a mobile banking account, you will not receive profits from your money in the Lockbox. On the other hand, your money in the Lockbox will be safe from the scams, frauds, and user errors that might occur when using a mobile banking account."

Figure S9: Picture of the lockbox