finding

A personal touch in text messaging can improve microloan repayment

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Summary. Because payment delays and defaults significantly affect both lenders and borrowers in fragile economies, strategies to improve timely loan repayment are needed to help make credit markets work smoothly. We worked with two microlenders to test the impact of randomly assigned text message reminders for loan repayments in the Philippines. Messages improved repayment only when they included the account officer's name and only for clients serviced by the account officer previously. These results highlight the potential and limits of communication technology for improving loan repayment rates. They also suggest that personal connections between borrowers and bank employees can be harnessed to help overcome market failures.

For credit markets to work, borrowers must repay banks enough for banks to make a profit. When banks don't expect enough repayment to make a profit, they lend less and a market failure ensues. *Microlenders,* banks that make small loans to low-income borrowers, are often plagued by late repayment problems. This costs those lenders and, inevitably, their customers. For banks, frequent late payments add an expensive administrative burden, due to the need for additional account monitoring and lawsuits, which may reduce the assets available for additional loans. For borrowers, missed payments can lead to late fees and possible legal action. Long-term patterns of delinquency may reduce their creditworthiness and ability to borrow again. To help avoid such troublesome outcomes for both parties, we investigated a new, technology-based strategy to encourage timely loan repayment.

Our research suggests that text messaging can be a simple and inexpensive but powerful nudge in this realm. Significantly, our findings also show that some message content is superior to others, even within the constraints of a 160-character limit. The success of low-touch interactions, such as text messaging, may be dependent upon high-touch interactions, such as personal contact between a borrower and an employee at the lending institution. Messaging that acknowledges personal ties, in our research, shows particular promise.

These insights are relevant to another set of important questions in the microlending field: What drives borrowers to default? Does it stem from conditions beyond borrowers' control? Or do borrowers simply decide not to meet their commitments? If repayment messaging is ineffective, this could support

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the idea that loan default is out of a borrower's proximate control, meaning that bad luck plays a larger role than bad behavior does. In contrast, if messaging does effectively improve repayment, this would suggest that what economists call *moral hazard* could be in play. In this scenario, failure to repay on schedule relates to incentive problems, such as a borrower's decision whether to repay, not his or her inability to repay. Banks and researchers want to know how to best mitigate any moral hazard and thereby improve repayment and market efficiency.

Using Text Messaging in Microfinance

Communication via short messaging service (SMS) is already prevalent in many parts of the world where microlending is practiced. A few studies have evaluated the use of this low-cost communication in microfinance. In 2011, Ximena Cadena and Antoinette Schoar randomized whether individual microcredit clients in Uganda were sent an SMS—in most cases, a picture of the bank—three days before each monthly loan installment was due.[1] Their messages improved timely repayment by 7%–9% relative to the control group, an effect size similar to the effect of reducing the cost of the loan by 25% for borrowers who repaid in full. Karlan, McConnell, Mullainathan, and Zinman,[2] along with Kast, Meier, and Pomeranz,[3] further suggested that SMS can affect financial behavior in studies showing that text message reminders increased savings deposits among microfinance clients in four banks in four countries. However, research is still developing on how to best use Information and Communications Technology (ICT) for development (known as *ICT4D*), that is, how to harness digital technologies to advance socioeconomic development, international development, and human rights.[4–6] Studies have devoted relatively little focus to the influence of content, timing, and other mechanics of such communications.

The Philippines is a promising site for such research. Cell phone use there is widespread: In 2009, 81% of the population had a cell phone subscription; by 2014, the cell phone penetration rate was more than 100%.[7] Texting is an especially popular method of communication because of its low cost, generally about 2 cents per message. The Philippines has been ranked first globally in SMS usage, with approximately 1.4 billion text messages sent by Filipinos each day.[8]

To test whether and how text message reminders can induce timely loan repayment by individual liability microloan borrowers, we worked with two for-profit banks that are among the leading microlenders in the Philippines. Green Bank is the fifth largest bank by gross loan portfolio in the Philippines and operates in both urban and rural areas of the Visayas and Mindanao regions.[9] Mabitac is the 34th largest bank and operates in both urban and rural areas of the Luzon region.

Each participating branch sent the research team weekly reports of clients with payments due in the following week. We randomized clients to either a control group (no messages) or the treatment group (receiving text messages) as they appeared in these weekly reports. The treatment group received text messages weekly until their loan maturity date. We randomly assigned them to receive one of four different messages two days before, one day before, or the day the loan payment was due. The text messages were automatically sent using SMS server software. We also classified clients as either new or repeat borrowers on the basis of their loan history prior to the commencement of our study. Additional details about the randomization can be found online in the Supplemental Material.

Our final study sample included 943 loans originated by Green Bank and Mabitac between May 2008 and March 2010. We eliminated loans that could not be adequately matched with payment information and included only the first loan per client during this time period. The final sample captured about half of the individual liability microloans made by the two banks during this period for which the client provided a cell phone number to the lender. Additional details about the study sample are included online in the Supplemental Material.

The average loan in our study was approximately $400, repaid weekly over a 16- to 20-week term at around a 30% annual percentage rate. Microloan charge-off rates were typically around 3% for the banks in this study. Late payments were common, with 29% of weekly loan payments made at least one day late and 16% made a week late in the control group. Fourteen percent of loans were not paid in full within 30 days of the maturity date. The banks followed a standard procedure to follow up on late payments, with Mabitac beginning three days after the due date and Green Bank beginning after seven days. More detailed information regarding the loans and payments are available online in the Supplemental Material.

Can Text Messaging Change Loan Repayment Behavior?

We examined a number of variations of the text message sent to borrowers, the effects of these variations on the timeliness of borrowers' weekly payments, and borrowers' unpaid balance at loan maturity. The variations included using the borrower's name, using the account officer's name, timing when the message was sent to the borrower, and framing the message negatively (as a threat) versus positively (as a benefit). Borrowers were randomly assigned to receive no message or one of four different messages, which are shown in Table 1.

Our results were quite clear and consistent. None of the message variations significantly affected loan repayment except one: naming the account officer. We conducted two types of statistical analyses to look for effects on borrower repayment behavior. First, we compared each of the payment outcomes between the control group (who received no messages) and the treatment groups (who received the message variations) using a process called *pairwise means comparison*. We also used an analysis called *ordinary least squares regression,* which allowed us to do the pairwise means *comparison* for all treatments at once, *comparing* each to the others.

The details of the study design, the analyses, and the results can be found online in this article's Supplemental Material. To provide a more concrete illustration of these results, we include some of the specifics here.

Overall, simply receiving a text message did not improve borrowers' repayment performance relative to the repayment performance of those who did not (see Figure 1A). In both groups, an average of 29% of weekly payments were made late and around 15% were made more than a week late. Text messages also did not significantly affect the percentage of loans with a remaining balance at maturity (see Figure 1B). However, text messaging did reduce the percentage of loans with an unpaid balance 30 days past maturity, from 13.5% to 9.8% (a statistically significant reduction).

Neither the timing of when messages were sent nor positive versus negative wording significantly affected repayment. We also found no evidence that the overall effect of receiving messages changed over the time course of the loan (see Table 6 in the Supplemental Material). However, we did find that including the account officer's name, but not the borrower's name, in the message significantly improved repayment (see Figure 1A). For example, we estimated that using the account officer's name reduced the likelihood that a loan was unpaid 30 days after maturity by 5.1 percentage points (a 38% reduction on a base of 0.135; see Figure 2). We found the effect of mentioning the account officer's name was only statistically significant for borrowers who had previously borrowed from the same bank and thereby had a preexisting relationship with the account officer. No such effect was seen with first-time borrowers.

In a more detailed regression analysis designed to look for a relationship between the message variations, we found that only the positively framed messages containing the account officer's name reliably reduced payment delinquency relative to receiving no messages at all. Additional details and supporting analyses are described online in the Supplemental Material.

Table 1. Wording of text messages

Account officer named	Positive	From [officer name] of [bank name]: To have a good standing, pls pay your loan on time. If paid, pls ignore msg. Tnx
	Negative	From [officer name] of [bank name]: To avoid penalty pls pay your loan on time. If paid, pls ignore msg. Tnx.
Client named	Positive	From [bank name]: [client name], To have a good standing, pls pay your loan on time. If paid, pls ignore msg. Tnx.
	Negative	From [bank name]: [client name], To avoid penalty pls pay your loan on time. If paid, pls ignore msg. Tnx.

Evaluating ICT for Development

These results have implications for several aspects of research and practice. First, showing that repayment can be swayed by the mere wording of a text message adds evidence that default in credit markets is at least partially due to whether borrowers choose to repay or to not repay. This implies that improved enforcement strategies, such as closer monitoring of late payments, could reduce default.[10,11] Second, our results emphasize the importance of content and delivery in ICT-driven development efforts, even in brief text messages.

Figure 1A. Percentage of borrowers making late weekly payment, by message category

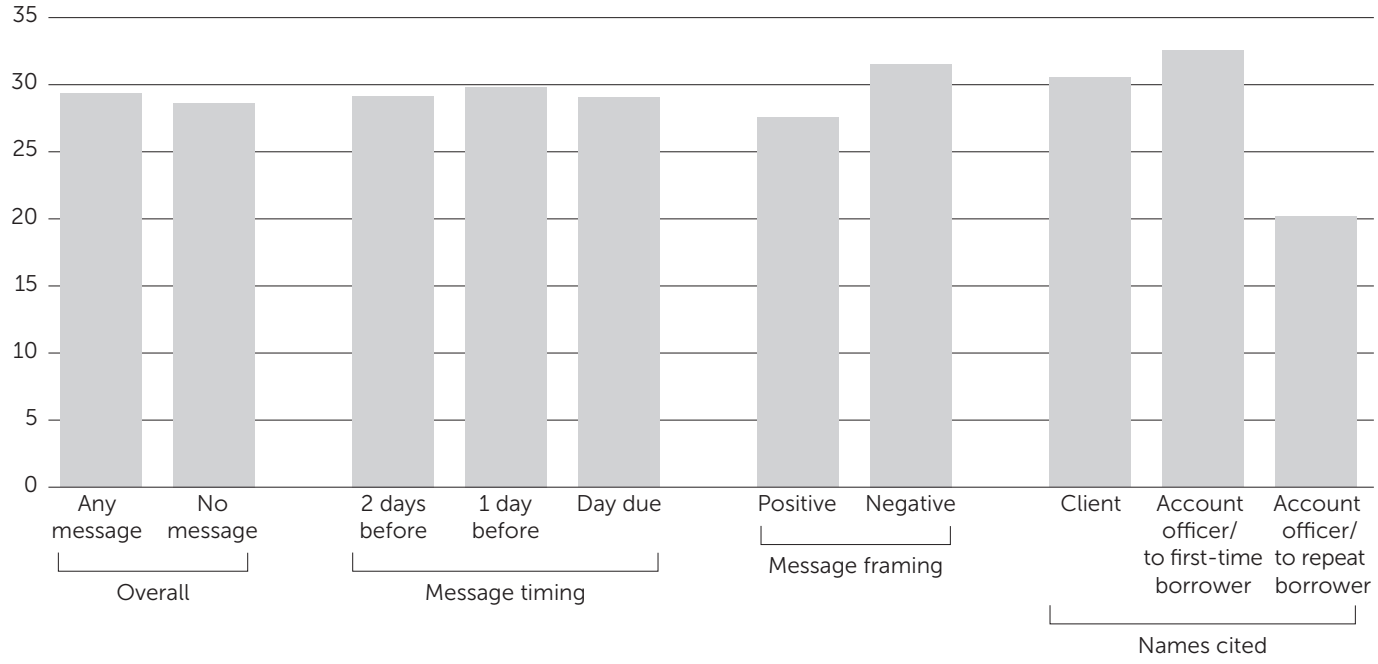


Figure 1B. Percentage of borrowers with unpaid balance at maturity, by message category

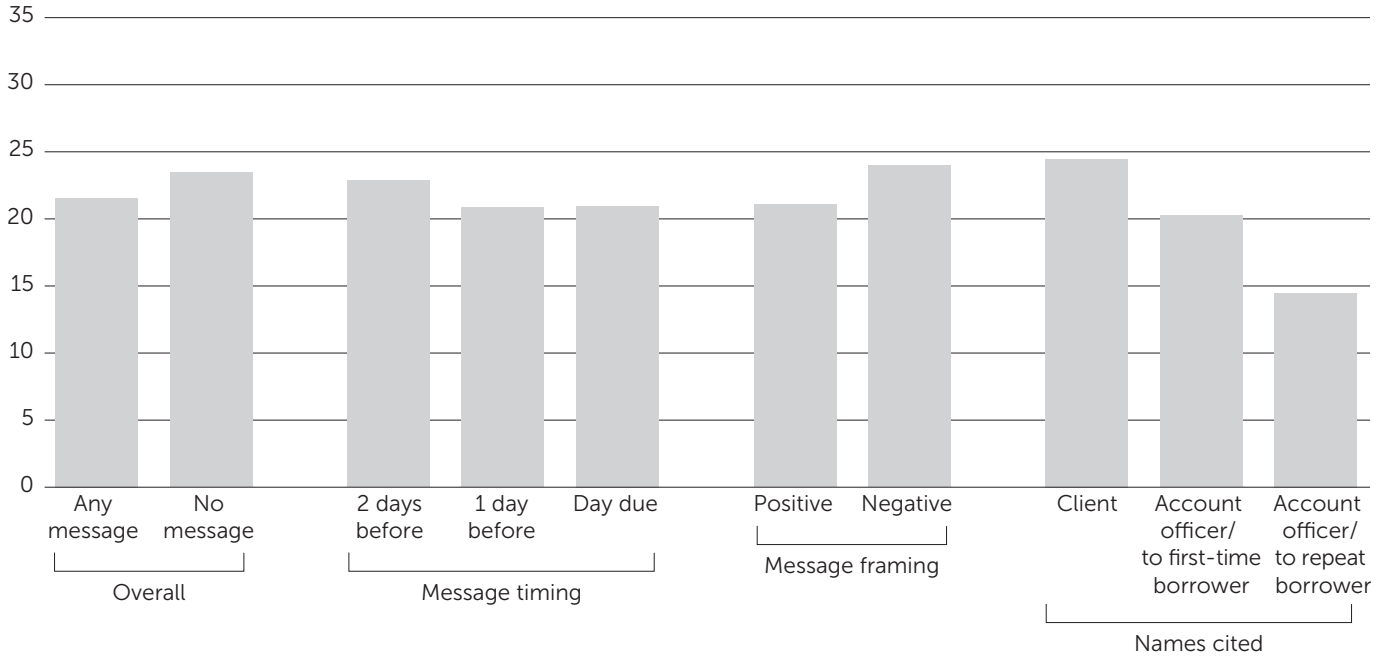
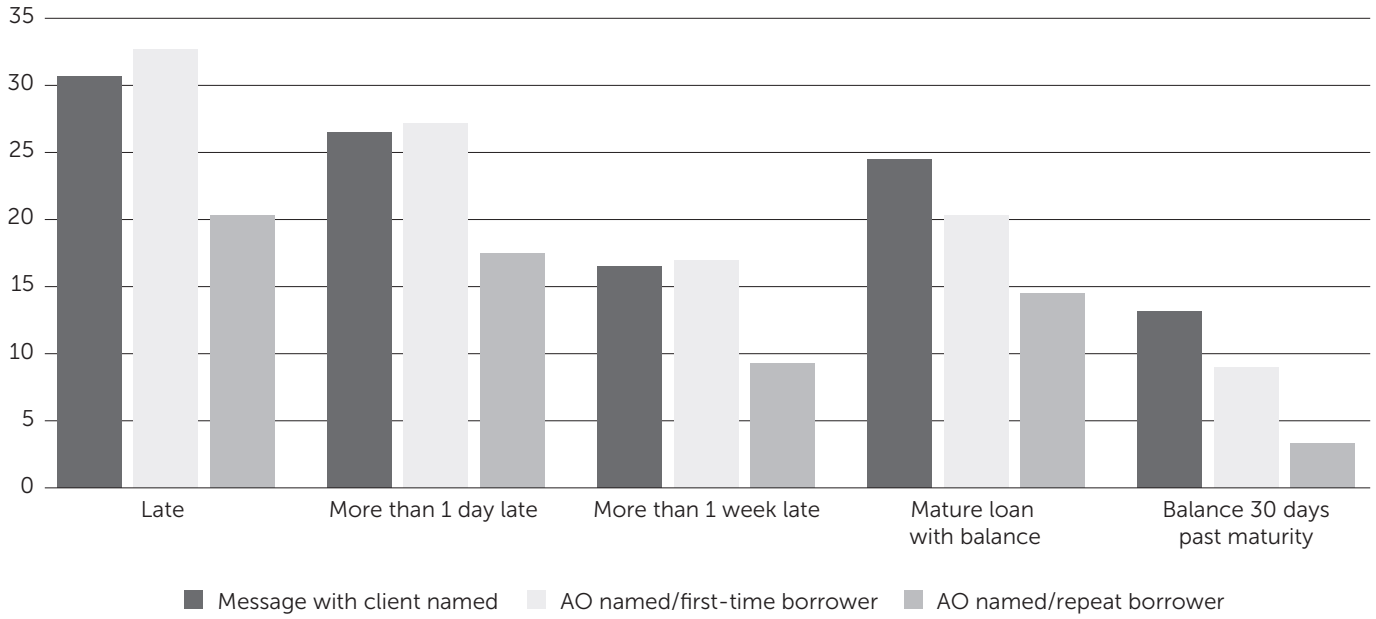


Figure 2. Comparison of account late-payment status, by message category



It is also interesting to consider how technological innovations interact with local institutions. For example, it seems intuitive to expect that, at least to some extent, economies of scale would favor a technological approach such as ICT in larger, transnational, transaction-based institutions over smaller, more local, relationship-based institutions. However, our results suggest that low-touch messaging strategies and high-touch interactions can combine in important ways. They also suggest that, when used strategically, well-crafted ICT-based innovations can actually support relationship lending and the smaller institutions that rely on it.

Third, the results shed some light on why some types of messages might or might not influence voluntary repayment decisions. One possibility, postulated in previous studies, is that receiving regular messages helps to mitigate limited attention on the part of the borrower (see references 1–3). Although there are some explanations of our results that could be consistent with this limited-attention interpretation (see the Supplemental Material for details), it seems doubtful that the messages served primarily as reminders because most of the messages we tried had no effect on repayment. Nor does it seem likely that the messages were interpreted as bank intentions to enforce payment. If that were the case, we would expect that receiving any message (all of which mentioned the bank name) would increase repayment relative to receiving no message, but Figure 1A clearly shows our findings of no difference in the repayment rates, regardless of message status. Only the messages including the account officer's name improved repayment.

What explains the effectiveness of the account officer–signed messages? Or, asked more precisely, how do account officer–signed messages trigger increased borrower repayment effort and thereby mitigate moral hazard? Prior work suggests two possible mechanisms.[12,13] Work on relationship-based lending, which builds on multiple customer interactions over time, suggests that inclusion of the account officer's name may signal increased intent to monitor the borrower on this transaction compared with past transactions. Alternatively, work on social obligation and reciprocity suggests that naming the account officer may trigger better behavior from borrowers who have a personal or professional relationship with the account officer.

We have concluded that the most plausible interpretation of our findings hinges on personal relationships between borrowers and account officers. Our results showed that repeat and first-time borrowers responded

to the messages differently. Veteran borrowers may feel indebted, both financially and socially, to their account officer because of their existing relationship. For these borrowers, receiving a personalized message may trigger feelings of obligation, reciprocity, or both (for example, see references 12 and 13) that increase repayment effort. Many previous studies have focused on how information acquired by bank employees can help improve loan performance through enhanced screening, monitoring efforts, or both that help banks better price and enforce loans.[14,15] By contrast, our results suggest that banks can use messaging to improve repayment without obtaining additional information about borrowers. It is important to note that this effect holds whether the underlying mechanism is providing information to the borrower (via signaling), priming a personal relationship between account officer and borrower, or both. We cannot completely rule out the possibility that repeat borrowers could view the new messages as a signal of increased diligence toward enforcement. However, as we discussed earlier, our overall results suggest that borrowers, on average, did not interpret the messages as a bank's intention to enforce payment.

Our results include some important caveats. In most cases, we did not conclude that there was an effect. However, this does not mean we can confidently say there was no effect: In many cases, the precision of our estimate is low, which means that although we did not conclude that the effect was big, we also cannot rule out the possibility that the effect was big. However, we are able to confidently state that the message that mentions the account officer by name generates a bigger effect than the other messages do. In addition, our study design only examined messaging effects on a single loan per client, and we cannot say whether borrowers may become more or less sensitive to messages over multiple loan cycles. We found no evidence that message effects change over time as clients cumulatively receive more messages, unlike other literature reporting studies that found effects that increase over time.[16–19]

Also, it is not yet clear how these findings may be extrapolated to other settings. In contrast to our results, the only previous loan repayment messaging study we know of reported that an SMS image of the borrower's bank did increase repayment, on average (see reference 1). Is this difference due to differences between the two studies in borrower characteristics? In credit market characteristics? In ICT market characteristics? In lender practices? These questions highlight the need for formulating and testing different theories about the mechanisms underlying messaging effects. It will be important to test such theories in a variety of lending scenarios with different populations of borrowers to develop a broad understanding of what types of messages work, on whom, and why.

Implications for Microfinance Policy and Development

Our findings, although preliminary, highlight several important considerations relevant to efforts to improve microfinancing enterprises. First, human interactions between the account officer and the client are a critical asset within the microfinance industry. These relationships can help mitigate credit market inefficiencies, such as repayment failures, and should be maintained even as informal and quasi-formal financial institutions become more formalized, technology-driven, and automated.

Second, a single strategy, such as specific wording of a text message, may not work equally in all circumstances or for all customers. Some of this apparent variability could be due to difficulty in defining precisely the intervention at hand; it is possible that the borrowers in our study interpreted pieces of information in the messages differently than we intended, which is similar to a lesson reported in an article by Bertrand, Karlan, Mullainathan, Shafir, and Zinman.[20] Further studies, such as testing messages with similar purposes but different wording, would help bolster the validity of the outcomes we report.[21,22]

Third, and closely related, the successful application and scaling of behavioral insights will require a more developed understanding of what works, when it works, what does not work, and why. In terms of messaging for behavior change, a key next step will be systematic, randomized, and theory-driven testing to develop an evidence base in multiple contexts and environments.[23] We see many benefits to exploring this intervention further. Conversations with bank management indicate that loan repayment improvements such as those seen here would produce cost savings that greatly exceed the cost of messaging. Text messaging may be an efficient and inexpensive way to enhance existing bank–client relationships and improve timely loan repayment.

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supplemental material

- http://behavioralpolicy.org/vol-1-no-2/karlan
- Methods & Analysis
- Additional References

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