

# Personal Communication in an Automated World: Evidence from Loan Repayments

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# Personal Communication in an Automated World: Evidence from Loan Payments

## Abstract

We examine the effect of personal, two-way communication on the payment behavior of delinquent borrowers. We find that borrowers who speak with a randomly assigned bank agent are significantly more likely to successfully resolve the delinquency by a substantial margin relative to borrowers who do not speak with a bank agent. Call characteristics related to the human touch of the call, such as the likeability of the agent's voice, significantly affect payment behavior whereas the surprise element of the call does not. Finally, the effect of personal communication extends beyond the initial delinquency: Borrowers who speak with a bank agent are significantly less likely to become delinquent again. Our findings highlight the value of a human element in interactions between financial institutions and their customers, suggesting that personal communication will continue to play a role despite less costly information transmission being readily available.

JEL-Codes: D140, G110.

Keywords: personal communication, consumer finance, loan repayment, promise keeping, social distance.

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# 1 Introduction

Consumer finance is changing rapidly. Consumer financial services are increasingly provided online, drastically changing the nature of the interaction between financial service providers and their customers. The traditional two-way, face-to-face communication in a bank branch is being replaced by one-way, often automated communication in the form of letters, emails, and text or online messages. In Germany, for example, the number of bank branches dropped by about 40% between 2000 and 2015, and about 60% of bank-customer interactions now take place outside of bank branches (see, Accenture (2015); Deutsche Bundesbank (2016)). While this change in interaction between banks and their customers creates opportunities for faster and less costly provision of financial services, the less personal form of communication could have important consequences. For example, households can increasingly obtain credit instantaneously and often without much personal interaction with the lender. However, it is unclear whether the less personal relationship and communication affects borrowers' behavior, especially when borrowers experience difficulties making timely payments.

To address the importance of the form of communication between banks and their customers, particularly their borrowers, we compare the effect of person-to-person communication to the effect of impersonal, one-way communication on the payment behavior of borrowers who have fallen behind on their monthly loan payments. Specifically, while all borrowers in our sample receive written communication about the missed payment in the form of a letter from the lender with a two-week deadline for payment, “treated” borrowers also speak with a randomly assigned bank agent. During the phone conversation the bank agent informs the borrower about the delinquency and asks the borrower to make the necessary payment within a few weeks after the call. Importantly, the agent does not convey any additional information relative to the bank’s letter nor can the agent change the existing loan terms or accept payment over the phone. Borrowers who fail to pay within the agreed upon time frame receive a similar follow-up call. In contrast, “untreated” borrowers—that is,

chance of reaching borrowers, and Monday, the day with the lowest chance, as one day and assigns borrowers randomly between both days.<sup>1</sup> Even borrowers with multiple call attempts might therefore never receive a call on a Saturday. Since the number of calls itself is likely endogenous, we only exploit variation with respect to the day of the first call. As we explain in detail below, borrowers with a first call on Saturday have the highest overall chance (96%) of speaking with a bank agent, while borrowers with a first call on Monday have the lowest overall chance (43%). All other borrowers have an intermediate overall chance (71%) of speaking with a bank agent.

Our instrumental variable (IV) regressions reveal a significant and substantial difference with respect to payment, default, and loan termination between treated borrowers who speak with a bank agent and untreated borrowers who do not. Specifically, we find that personal communication between a borrower and a bank agent increases the probability of timely repayment by 34.4pp, while decreasing the chance of default and termination by 23.8pp and 12.4pp, respectively. While these estimates are large, it is important to recall that they reflect local average treatment effects (LATEs) and not average treatment effects (ATEs). We indeed find that marginal treatment effects (MTEs) differ across borrowers, with MTEs increasing in absolute value in the unobserved resistance to treatment. That is, borrowers who are hard to reach due to unobservables respond more to treatment than easy-to-reach borrowers. Finally, under additional assumptions, the estimated MTEs imply ATEs, which are approximately half the size of the IV estimates but still statistically significant for all three outcomes and hence consistent with an important effect of personal communication on borrowers payment behavior.

A number of different mechanisms are possibly consistent with our results. First, borrowers might ignore the letter from the bank, for example, by mistaking it for advertising mail or they might find it difficult to process written information relative to spoken content. The

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<sup>1</sup>The bank has since optimized its procedures. The lack of sophistication during our sample period can be explained by the early nature of the early collection call center.

phone conversation with a bank agent would then mainly function as a reminder. Second, borrowers might be aware of the delinquency but might not expect a phone call from the lender. The bank's effort associated with the phone call would then signal the seriousness of the delinquency and make the bank's enforcement intention more salient than a machine-generated letter. It is also possible that the treatment effect is due to the subset of treated borrowers who receive a follow-up call, suggesting that an additional contact with the borrower in the form of personalized monitoring is particularly important. Finally, the phone conversation with a bank agent might add a personal element to the existing payment obligation and the personal communication treatment could motivate treated borrowers to behave in a more trustworthy way. To shed light on the likely mechanism, we first document that the call effect is not limited to borrowers with small outstanding loan amounts who might be most surprised about the bank's collection efforts but holds among borrowers with large outstanding loan amounts as well. Next, for a separate data set of delinquent borrowers, we survey call center agents and ask them to record borrowers' reactions to the phone conversation. We find that borrowers, who - based on agents' assessments - seem surprised about the delinquency or about the bank's phone call are not more likely to make timely payment compared to borrowers who do not appear to be surprised. These results suggest that the call does not mainly serve as a payment reminder or as a means to emphasize the serious nature of the delinquency. When focusing on payment outcomes unaffected by a follow-up call, we find that most of the treatment effect obtains without a possible follow-up call. This suggests that the increased frequency of communication in the form of personalized monitoring is not the main determinant of the observed treatment effects. Finally, we examine whether the personal aspect of a phone conversation with a bank agent increases borrowers' willingness to keep their payment promises. If the human touch of the phone call operates through the borrower's prosocial or trustworthy behavior, the effect should be stronger the lower the social distance between the borrower and the call center agent. Therefore, in our main sample, we compare the call effect between German and non-German borrowers. Consistent with a

possibly larger social distance and hence a reduced activation of prosocial behavior among non-German borrowers who are likely less integrated into German society, we find a smaller effect for non-German borrowers. In the data set corresponding to our follow-up survey, we are able to link individual agents to the borrowers with whom they speak. Even though all agents receive the same communication training, use the same protocol, and convey the same information, we find significant differences in payment behavior across borrowers who speak with different, randomly assigned call center agents. Using voice recordings for some of the agents, we are able to assess the likeability of the agents' voices. The likeability of agents' voices should be irrelevant for the effect of the call on borrowers' payment behavior if calls function only as reminders. However, if the phone conversation operates through borrowers' prosocial behavior, a likeable agent voice could matter as it might lower the perceived social distance and increase borrowers' promise-keeping behavior. We indeed find that the likeability of agents' voices significantly increases the probability of payment, consistent with the personal nature of the call playing an important role in its effect on borrowers' payment behavior.

In two extensions, we analyze possible long-term effects of the phone conversation and extend our analysis to a different type of loan at the same bank. First, examining the persistence of the effects of personal communication beyond the initial delinquency, we find that talking to a bank agent does not only reduce the short-term probability of loan termination, but it also reduces the probability of a future delinquency and loan termination. These results further confirm that the treatment effect extends beyond alerting borrowers to the current delinquency as well as monitoring timely repayment. Last but not least, we provide evidence in support of the external validity of our results by showing that similar treatment effects obtain in a sample of bank customers who have their primary checking account with the bank and become delinquent with respect to their overdraft credit lines.

Our study contributes to research on the importance of the human element in bank lending, in particular with respect to the relationship and the communication between banks

and their customers. Berg (2015) documents the value of human risk assessment in the case of mortgage lending decisions, while Agarwal, Amromin, Ben-David, Chomsisengphet, Piskorski, and Seru (2017) provide high-level evidence that institution-specific human capital related factors are an important determinant of loan renegotiations. Other studies have highlighted the importance of bank relationships in screening and monitoring borrowers (see, Petersen and Rajan (1994) and, for an overview, Kysucky and Norden (2016)) as well as serving as an incentive for borrowers to make timely payments (see, Puri, Rocholl, and Steffen (2017); Agarwal, Chomsisengphet, Liu, and Souleles (2018)). The relationship between a bank and its customers is naturally shaped by individual bank agents. Drexler and Schoar (2014), for example, show that severing the relationship between a borrower and her loan officer reduces the borrower's future loan access at the bank, while Schoar (2012) and Karlan, Mortin, and Zinman (2015) highlight the importance of the personal nature of the relationship between loan officers and borrowers for loan repayment. Our study provides evidence that personal, two-way communication with a delinquent borrower significantly affects the probability that the delinquency is resolved and that default and loan termination are avoided. Similar to the role of borrower-bank relationships, the form of communication acts as a non-contractual factor on loan repayment behavior. However, in our setting the bank does not collect any new information about the borrower nor does the bank renegotiate the existing loan terms as part of the phone conversation with the borrower. Finally and importantly, in the case of our main sample of POS loans, the effect of reducing moral hazard obtains in the absence of any existing meaningful relationship between the bank and borrower.

Our findings are also related to several papers that examine the effectiveness of treatments and interventions designed to improve the payment behavior of retail borrowers. Cadena and Schoar (2011) and Medina (2021) show that simple reminders of upcoming payments can lower delinquencies and late fees, in some cases as effectively as economic incentives in the form of refunds or future rate reductions. However, Karlan, Mortin, and Zinman (2015) find



that simple reminders are only effective if they include the name of a loan officer that is known to the borrower. Moulton, Collins, and Loibl (2015) provide evidence that first-time home buyers in the U.S. who receive quarterly financial coaching experience significantly lower mortgage delinquencies than comparable borrowers who do not receive coaching. Finally, in a setting similar to ours as it focuses on the recovery and default of already delinquent borrowers, Bursztyn, Fiorin, Gottlieb, and Kanz (2019) find that among delinquent credit card borrowers in Indonesia, text messages emphasizing moral or credit-reputation-based incentives significantly increase repayment and, for high risk borrowers, significantly reduce default. We show that the form of communication can make a significant difference with respect to loan outcomes of delinquent borrowers that is comparable in size to other economic or behavioral interventions.

A large body of theoretical as well as experimental research argues and shows that human behavior towards other humans is at least partly prosocial, i.e., altruistic, fair, and trustworthy (see, for example, Rabin (1993); Fehr and Schmidt (1999); Akerlof and Kranton (2000); Battigalli and Dufwenberg (2007); Andreoni and Bernheim (2009)). However, compliance and promise-keeping behavior seems significantly less prevalent in the interaction between humans and institutions or machines, even if these machines are equipped with human features, such as pre-recorded voice messages (Haran (2013); Melo, Marsella, and Gratch (2016)). Our findings provide important field evidence consistent with prosocial and promise-keeping behavior, which is elicited partly through personal, two-way communication as opposed to machine-generated, one-way communication and increases as the perceived social distance decreases.

Finally, our paper is related to recent research on the impact of technology and new communication formats on consumer finance. For example, D’Acunto, Prabhala, and Rossi (2019) document that robo-advising can reduce behavioral biases, while Carlin, Jiang, and Spiller (2018) show that access to online advice, particularly in video form, improves financial decision making. Berg, Burg, Gombovic, and Puri (2020) show that digital footprints

have the potential to improve access to credit for the unbanked by overcoming information asymmetries between lenders and borrowers. Our findings do not cast doubt on such improvements, but our results suggest that retaining or adding a human element in the communication, for example, between lenders and borrowers might increase customers' willingness to honor an existing financial obligation. Our results therefore suggest that costly personal communication will likely continue to play a role even if much less costly information transmission is readily available.

## **2 Institutional Setup and Data**

### **2.1 Institutional Setup: POS Loans and Early Collection**

Our main data of POS loans are from a large German bank. The bank is among the top 5 largest retail banks in Germany and among the top 10 largest retail banks in Europe, serving over 10 million retail customers in Germany through a Germany-wide network of over 1,000 bank branches. It offers a wide range of retail banking products, such as checking and savings accounts, brokerage and investment services, and consumer loans and mortgages. The bank is also one of the top 5 POS loan providers in Germany, underwriting sales financing for several national and international retail chains in Germany. A POS loan is a form of installment credit that is originated at the time of the purchase of certain durable items, such as furniture, appliances, or electronics.<sup>2</sup> Because POS loans are offered through a retailer as part of a sales transaction (but underwritten by a financial institution, such as a bank), most POS borrowers have no other relationship with the POS lender.

Based on a survey by the German Association of Credit Banks, in 2012 about 40% of adults in Germany used at least one form of uncollateralized consumer financing, with 28% having at least one installment loan, excluding car loans, and 26% using some form of

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<sup>2</sup>Car financing through a car dealer can also be considered POS financing. However, car financing is not part of our data set.

revolving credit. Among borrowers with installment loans, 68% have traditional personal consumer loans, typically from a bank, while 30% (or 8.4% of all adults) use POS loans to finance the purchase of non-car durables. According to the survey, average initial POS loan amounts are between EUR 600 to 800 for purchases of electronics and EUR 1,900 for purchases of appliances and furniture, with average maturities between 18 and 24 months. Based on data for several European countries (Eurofinas (2013); Deloitte (2019)), POS loans, which have similar characteristics across Europe, account for about 52% of all new installment and revolving credit contracts per year. While U.S. consumer finance has traditionally been dominated by revolving credit in the form of credit cards, which account for as much as 85% of U.S. outstanding consumer credit in 2015, POS lending has been the fastest growing form of consumer lending in recent years (McKinsey & Company (2020)), reflecting borrowers' growing preference to borrow at the point of sale at interest rates that are often heavily subsidized by merchants.

As one of the leading POS lenders in Germany, the bank uses lending and collection processes that are similar to those of other providers in Germany as well as Europe, especially since the 2008 Consumer Credit Directive of the European Union has harmonized consumer lending across Europe. According to the bank, about 8% of POS borrowers become delinquent with respect to their POS loan. Two weeks after a borrower misses a payment, the bank sends a payment request to the borrower in the form of a machine-generated letter that is sent via regular postal mail (see Appendix Figure A1 for a sample letter). The letter informs the borrower about the delinquency and ask the borrower to pay the outstanding amount within two weeks. Once the loan is 45 days past due, the bank's in-house advanced collection department attempts to reach the borrower to accelerate the collection process and, if necessary, to make loan modifications. The loan is in default once the delinquency exceeds 90 days. At that point, the bank typically terminates the loan and might sell the loan or engage a third-party for collection.

A few years before our sample period, the bank introduced an additional step into the

early collection efforts for all its retail lending products, including POS loans. The bank started operating an additional and separate in-house call center to reach out to borrowers with payments that are overdue for at least 20 days. Similar to the machine-generated letter that is still sent out to delinquent borrowers at day 15 of the delinquency, the phone call notifies the borrower of the delinquency and asks the borrower to pay within 45 days of the delinquency (see Figure 1 for an overview). The bank considers the phone call a “customer care call” and does not pressure or threaten the borrower nor does the bank offer any loan modifications during this early stage of the collection process.

The call center agents are bank employees who receive a largely fixed salary. Variable compensation, at most 10% of agents’ fixed salary, is based on overall customer satisfaction and team performance. Agents usually speak accent-free German, and calls are very standardized as agents follow highly pre-scripted protocols. Employees are trained to interact professionally with customers even if a customer may be frustrated. Anecdotal evidence from surveys conducted by the bank as well as from our on-site visit suggests that customers’ reactions to the bank’s customer care calls are overwhelmingly positive.

Each borrower is called once per day at most. Borrowers who are not reached on a given day are generally, but with an important exception that we will discuss in detail below, called again the next day. The process continues for about two weeks and up to ten call attempts. The process stops when the borrower is reached by a call center agent or when the borrower makes the outstanding loan payment.

Calls are made between 8 a.m. and 7 p.m. on weekdays and between 9 a.m. and 1 p.m. on Saturdays. Each day, the call center manager determines the sequence in which different loan product groups, such as POS loans, overdrafts, or mortgages, are processed. However, the order in which individual borrowers within a given product group are called is randomly determined through an auto-dialer. Importantly, the loan amount, the days in delinquency, or other loan- or customer-specific characteristics do not influence the order in which the auto-dialer selects borrowers on a given day. Finally, borrowers and call center agents are

randomly matched via the auto-dialer.

When call center agents reach a borrower by phone, they introduce themselves and inform the borrower about the delinquency even though borrowers, having already received the bank's letter, should be aware of the delinquency. They then ask borrowers to pay the overdue amount (see Appendix A2 for a stylized sample call). While the default time period is two-weeks, borrowers can propose a shorter and, if within the 45-day payment target, a longer period. Agents are instructed and trained not to intimidate or threaten borrowers but to maintain a friendly and professional attitude in these customer care calls. Importantly, agents are not authorized to accept payment over the phone, agree on any kind of credit deferral, or change the general payment schedule. After the call, borrowers receive a confirmation letter with payment instructions. Borrowers who are reached but fail to pay within the agreed period enter the call center process again. If reached again before day 45, the call center agent will ask for payment by day 45.

Untreated borrowers, i.e., those who are not reached within the initial two-week period, are expected to pay within the two-week period communicated in the initial letter by the bank. If they are still delinquent 35 days after the beginning of the delinquency, they receive a second letter from the bank with the request to pay the outstanding amount within one week.

Finally, all borrowers who do not pay within 45 days of delinquency, regardless of whether they have been reached by an agent or not, are transferred to the advanced collection department that has substantially more discretion to negotiate a repayment schedule with the borrower or to terminate the loan.

While the overall debt collection process followed by the bank in our sample is similar to the process of other banks in Germany and other countries, including the U.S. (Consumer Financial Protection Bureau (2017)), details of the early collection process differ across lenders and countries. Calling delinquent borrowers during early stage collection is a common practice in the U.S. as well as in many emerging markets (International Finance Corporation

(2012); Consumer Financial Protection Bureau (2017)). However, German banks, including the bank in our study, introduced early collection calls only in the last decade. Indeed, the main data set in our study was part of the first review conducted to assess the effectiveness of calling delinquent borrowers relatively early in the delinquency. Our findings offer some reasons why financial institutions around the world maintain or reintroduce personal elements, even if in an ad-hoc way, in the communication with their customers.

## 2.2 Data

### 2.2.1 Administrative Bank Data

Our main sample consists of POS borrowers who become delinquent for the first time and whose records enter the call center data pool at day 20 of their delinquency, between January and June 2012.<sup>3</sup> We exclude all borrowers who did not provide a phone number at the time of loan application or whose phone numbers are out-of-service or no longer affiliated with the borrower. Furthermore, we only include borrowers with at least one call attempt. Finally, to abstract from any possible effect due to an existing bank relationship, we exclude borrowers who have their main checking account with the bank. Panel A of Table 1 summarizes the characteristics for our sample of 3,448 delinquent POS borrowers. Detailed definitions of all variables are provided in Appendix Table A1. The majority of borrowers are male and German citizens, making up 65% and 80% of borrowers, respectively. Only a small fraction are students (10%) or retired (4%) at the time of the loan application. On average, borrowers are 34 years old. The average initial loan amount is EUR 1,110. The average (median) interest rate is 1% (0%). Indeed, 84% of the POS loans in our sample have an interest rate of 0%, which is common for POS loans. The average loan maturity is about 17 months at origination and delinquency occurs, on average, eight months after origination. The missed

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<sup>3</sup>Borrowers who have filed for personal bankruptcy and borrowers with any ongoing judicial collection efforts against the borrower (“gerichtliches Mahnverfahren”) are excluded from our sample. In the collection process, their files are sent directly to the advanced collection department.

payments that caused the delinquency range between EUR 25 and EUR 558, with a mean (median) amount of EUR 70 (56).

On average, call center agents make 3.24 initial call attempts per borrower. They ultimately reach and speak with 72% of the borrowers in our sample, in which case our treatment variable *Talk* takes on the value of one as opposed to zero. Borrowers with few call attempts are either reached or make payments early in the process and therefore remain unreached. Given the limited scope of agents' actions, most phone conversations are short, with an average (median) duration of about 2.68 (2.19) minutes. We do not have transcripts of the phone conversations, but based on discussions with call center agents as well as our own observations of about 100 calls during a visit to the call center, some calls last longer mainly due to the time it takes to get the relevant person on the phone and due to some borrowers' explaining the circumstances of the delinquency or engaging in small talk.

To assess how delinquent borrowers respond to speaking with a bank agent, we consider three outcomes related to the current delinquency: *Payment*, *Default*, and *Termination: Now*. *Payment* is equal to one if the borrower pays the outstanding amount by the bank's target of 45 days since the initial occurrence and zero otherwise. *Default* is equal to one if the borrower's payment remains overdue for more than 90 days and zero otherwise. Default is an outcome that is particularly important from the bank's perspective as default implies that the bank must recognize impairment losses. Finally, *Termination: Now* is equal to one if the loan is terminated by the bank as a result of the current delinquency and zero otherwise. Once the loan is terminated, the entire loan balance becomes due and the original loan agreement can no longer be restored even if the borrower paid the overdue installment payments. Termination also leads to a persistent negative entry ("hartes Negativmerkmal") in the borrower's credit report.<sup>4</sup> The summary statistics show that 70% of borrowers make

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<sup>4</sup>Given these significant negative consequences for borrowers, a lender can only terminate a loan by law if several conditions are met. In particular, the borrower must have missed at least two payments and the total overdue amount must exceed 10% of the original loan amount. The bank must also send a written notice to the borrower warning that the loan will be terminated if the borrower does not pay within two weeks and that termination will adversely affect the borrower's credit report.

the outstanding payment within the 45 day window, while 24% of borrowers default and 10% have their loans terminated by the bank.

Of the 72% of treated borrowers, about 37% fail to pay within the initially agreed time period, typically one or two weeks after the call and before day 45, and therefore re-enter the call center process. About 70% of them are reached again, so that 25% of treated borrowers receive a follow-up call. To examine the effect of the follow-up call and to better understand the mechanism behind the treatment effect, we examine two alternative payment outcomes: *Payment: Alt. 1* and *Payment: Alt. 2*. Both outcomes abstract from the effect of a possible follow-up call by considering payment outcomes before follow-up calls (*Payment: Alt. 1*) or by assuming that payment probabilities of borrowers with follow-up calls correspond to those of borrowers without follow-up calls (*Payment: Alt. 2*). Both alternative outcomes, therefore, have lower average values (0.58 and 0.67, respectively) than *Payment*.

Finally, we also observe the future payment behavior of borrowers who successfully resolve the initial delinquency until the end of 2014. We can therefore also analyze whether these borrowers become delinquent again and, if so, when and whether the loan was later terminated. The summary statistics show that conditional on resolving the first delinquency, 37% of borrowers become delinquent again 98 days (on average) after the first delinquency. An additional 8% of loans are terminated in the future, resulting in an overall termination probability of 18%.

### **2.2.2 Survey Data**

In order to further examine how a phone call to a delinquent borrower affects the borrower's payment behavior, we conduct a survey among several call center agents about some of their conversations with delinquent borrowers in February 2016. The resulting data set consists of 13 of the 30 call center agents who volunteered to participate in the survey as well as 245 borrowers with whom these agents speak in February 2016. Panel B of Table 1 reports summary statistics for the outcome variable *Payment* as well as for call, loan, and borrower



characteristics of this sample. While all borrowers have recently missed a payment, borrowers are not necessarily delinquent for the first time. Indeed, 36% of borrowers have spoken with a call center agent within the last six months regarding an earlier delinquency. Furthermore, the sample includes installment as well as revolving loans in the form of overdraft lines of credit. In addition, we have information about the participating call center agents' gender and age and an assessment of the likeability of the voice of eight call center agents. Finally, in the survey we ask call center agents to describe whether a borrower was surprised by the delinquency or by the phone call. Based on the call center agents' impression, 40% of the borrowers in this sample appeared surprised about the call and 27% seemed surprised about the delinquency itself.

### **3 The Effects of Personal Communication on Delinquent Borrowers**

#### **3.1 Identification**

To detect a causal effect of personal communication with a bank agent on borrowers' payment behavior, we would ideally carry out an experiment in which we randomly assign the treatment to all delinquent borrowers whose records enter the call center. However, such experimental data are not available to us. Instead, our main variable of interest, *Talk*, reflects whether a given borrower could be reached by a call center agent or not. A simple regression of any of the outcome variables on *Talk* is therefore subject to endogeneity concerns for two reasons. First, omitted variables could be correlated with a borrower's payment behavior as well as with the likelihood of reaching the borrower. For example, some borrowers might be hard to reach by phone and might also be less likely to pay the delinquent amount on time, causing a simple regression estimate to overstate the effect of the phone conversation.<sup>5</sup>

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<sup>5</sup>Given that the bank's phone number is hidden and that unknown calls, i.e., calls without a phone number, were still common in Germany in 2012, it appears unlikely that borrowers who intend not to pay

Second, regression estimates could also suffer from reverse causality as delinquent borrowers who make the necessary payments *before* they are reached by a call center agent are no longer called by the call center. In those cases, *Talk* equals zero because these borrowers have already paid the outstanding amount, causing a simple regression estimate to understate the effect of the phone conversation.

To avoid endogeneity concerns due to omitted variables and reverse causality, we exploit (i) significant variation in the chance of reaching a borrower by phone across different days of the week as well as (ii) random assignment of calls to borrowers to certain days of the week. Figure 2 shows the fraction of daily call attempts that resulted in a conversation with a borrower for all days during our sample period for all 11,186 call attempts associated with the 3,448 borrowers in our sample. While on average only 22% of call attempts reach a borrower, there is substantial variation. While some of the variation is related to special events, such as holiday weekends, there is substantial variation across weekdays. The average daily reachability is highest on Saturdays when 64% of call attempts lead to a conversation with a borrower, while the average daily reachability is lowest on Mondays (9%) and intermediate on Tuesdays through Fridays (21%). Importantly for administrative reasons, the bank treats Saturday, which has reduced working hours, and Monday as one day and determines the order in which borrowers are called over the course of this “one day” randomly through an auto-dialer. Therefore, even with ten call attempts, a borrower might never be called on a Saturday or a Monday. However, the overall chance of ever being called on a Saturday or a Monday varies with the day of first call, which is the second day after a borrower’s file enters a call center. As Appendix Figure A3 shows, borrowers with a call center entry on a Thursday have their first call either on Saturday or Monday. If they are not reached during the first call attempt, which is unlikely for those called on Saturday but likely for those called on Monday, the up to nine additional call attempts include *one* more randomly assigned call on

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could easily ignore a phone call from the bank, especially as borrowers in our sample become delinquent for the first time and are likely unaware of the bank’s early collection process. However, a correlation between *Talk* and unobserved payment determinants could arise in many other ways.

a Saturday or on a Monday at most. Borrowers with an entry on Monday, Tuesday, Wednesday, or Friday have their first call between Tuesday (for those with an entry on Friday) and Friday (for those with an entry on Wednesday). If unreached on the first call attempt, the up to nine additional call attempts include up to *two* calls that are each randomly assigned to Saturday or Monday. Given the significant differences in daily reachability, borrowers with a first call on Saturday (Monday) should have a higher (lower) overall chance of being reached compared to borrowers first called between Tuesday and Friday. Figure 3 confirms that the overall reachability of borrowers, that is, the average of *Talk*, varies substantially depending on the day that a borrower is first called. For borrowers with a first call on either Saturday, Tuesday through Friday, or Monday, the average values of *Talk* are 0.96; 0.71; and 0.43; respectively.<sup>6</sup>

While the day on which a borrower is first called depends partly on the random assignment between Saturday and Monday, a second source of randomization is the day that borrowers' files enter the call center as calls begin two days after call center entry.<sup>7</sup> According to the bank's policy, files are sent to the call center 20 days after a missed payment and payments are typically due on the first or fifteenth of a month, which are the two default due date options on the POS loan application forms.<sup>8</sup> The day of the week that a given file arrives in the call center is hence determined by the choice of the due date at the time of the loan application and the particular day of the week on which the due date occurs in the month that a borrower misses her payment. It therefore seems unlikely that the day of the week on which borrowers' files arrive in the call center is systematically related to any borrower or loan characteristics. In summary, our identification approach relies on a borrower's chance

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<sup>6</sup>While we observe all call attempts for each borrower, for identification we focus on the day of the first call as the total number of call attempts is likely endogenous.

<sup>7</sup>We confirm that 75% of the first calls in our data are made exactly two days after the entry date, while 99.5% are made between two and four days. When manually checking cases for which the difference between the day of the first call and the entry date is larger than two, we find that differences are explained by public holidays during our sample period (Easter Monday, Ascension of Christ, and Whit Monday).

<sup>8</sup>While applicants can choose another day as their monthly payment date, at least 85% of the loans in our sample can indeed be traced back to a due date on the first or fifteenth of the month, 20 days before the arrival date.

(or risk) of being called on a Saturday (or Monday). This chance varies with the day of the first call, which is determined by two random factors: the day that a borrower's file arrives in the call center, which we argue is de facto random, and the bank's administrative procedure to treat Saturday and Monday as one day with random assignment by an auto-dailer between both days (see Appendix Figure A3 for a summary).

In order to evaluate the random nature of the day of the first call, in Table 2, we provide a three-way comparison of borrower and loan characteristics between those who receive their first call on Saturday, Monday, or another day of the week, i.e., Tuesday through Friday. Column (4) reveals that among the 15 characteristics, only age is significantly different between those who receive their first call on Saturday and those with their first call on Monday. Borrowers who are first called on Saturday are on average about four years older than borrowers first called on Monday. A significant age difference also exists between borrowers with a first call on Saturday and a first call on Tuesday through Friday. In addition, these two sets of borrowers differ in the probability that a borrower is retired (7% vs 3%). Finally, comparing borrowers with a first call on Monday to those with a first call on Tuesday through Friday, we find a significant difference with respect to the probability of living in East Germany (9% vs. 5%). Overall, out of 45 pair-wise comparisons, we find that only four yield a significant difference, which seems consistent with the assignment of the day of the first call indeed being random.

Given the pronounced differences in reachability between Saturday, Monday, and the other days of the week, it might be surprising that the bank does not call more borrowers during the weekend and that the bank does not optimally select the day on which borrowers are (first) called. While increasing the workload for call center agents on the weekend is difficult given Germany's labor market regulation, the bank has since changed its procedures and now optimizes the assignment of borrowers to the day on which they are (first) called. However, the circumstance that in the early years of the call center's existence processes had not been optimized allows us to better identify the effect of personal communication on

delinquent borrowers.

### 3.2 Results from IV Regressions

In order to identify the effect of personal communication between a bank agent and a delinquent borrower, *Talk*, on borrower *i*'s payment behavior, we employ a linear instrumental variable (IV) regression:

$$Y_i = \alpha + \gamma \text{Talk}_i + \beta X_i + L + M + \mathcal{E}_i. \quad (1)$$

We measure the outcome,  $Y_i$ , to the current delinquency with three indicator variables: *Payment*, *Default*, and *Termination: Now*. In addition to *Talk*, these outcomes depend on observable loan and borrower characteristics,  $X_i$ , as well as location and month fixed effects,  $L$  and  $M$ . Since the decision to speak with a bank agent is likely endogenous, we employ *First Call Saturday* and *First Call Monday* as instruments for *Talk*. As explained above, the day of the first call attempt is randomly determined and therefore unrelated to unobservable borrower characteristics. However, borrowers with a first call on Saturday, 6.4% of our sample, have a higher chance of speaking with a bank agent, while borrowers with a first call on Monday, 6.1% of our sample, have a lower chance of speaking with a bank agent compared to borrowers with a first call between Tuesday and Friday.

In Table 3, we report results for the first stage of our IV estimation. In particular, we use a linear probability model and regress *Talk* on both instruments, borrower and loan characteristics, as well as location and month fixed effects. Consistent with the evidence in Figure 3, Column (1) of Table 3 shows a significant positive effect of *First Call on Saturday* and a significantly negative effect of *First Call on Monday* on *Talk*. Both effects are sizeable as they increase and decrease the probability of a phone conversation by 23.8pp and 26.0pp, respectively. In Column (2), we report corresponding results for only those borrowers whose files arrive in the call center on Thursday and who are first called on Monday or Saturday.

That is, we exploit only the random assignment between Saturday and Monday but ignore all other observations. While the sample is much smaller, results again reveal that being first called on Saturday increases the likelihood of a phone conversation with a bank agent by 52.0pp relative to being first called on Monday. Finally, for both regressions the  $F$ -test statistics is substantially above 10, reducing concerns about weak instruments (Stock and Yogo (2005)).

In Columns (1) through (3) of Table 4, Panel A, we report the Two-Stage Least Squares (2SLS) regression results for the three main outcomes for our full sample, the sample underlying the results in Column (1) of Table 3. The point estimates for *Talk* are significantly positive for *Payment* and significantly negative for *Default* and *Termination: Now*. In particular, we find that speaking with a bank agent increases timely repayment by 34.4pp, while decreasing default and termination by 23.8pp and 12.4pp, respectively. Several loan and borrower characteristics display significant associations with the payment outcome. Borrowers who pay a positive interest rate, for example 10% p.a., are less likely to repay within 45 days (-6.7pp) and more likely to experience default (+12pp) and loan termination (7.1pp) compared to the majority of borrowers with 0%-interest rate loans. Borrowers with loans that have been in existence longer seem to be more likely to repay and less likely to default. Male borrowers seem to be slightly less likely to repay and more likely to see their loans terminated, while payment outcomes seem to improve with age for all relevant age-levels.<sup>9</sup> Finally, we observe a substantial deterioration in repayment for the two borrowers who are unemployed.

For comparison, we also report the OLS estimates in Columns (4) to (6) of Panel A. In absolute terms, the OLS coefficient estimates are smaller than the corresponding 2SLS estimates for all three outcomes. This difference could suggest that OLS results are more impacted by a downward bias due to reverse causality compared to an upward bias due to omitted variables. However, we also note that 2SLS estimates represent local average treat-

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<sup>9</sup>Note that *Age squared* is defined as  $Age^2/100$ .

ment effects (LATE) but not necessarily average treatment effects (ATE). Before discussing heterogeneous treatment effects in detail below, we first address possible concerns about the assumption that the day of the arrival of a borrower’s file in the call center is de facto random. In Panel B of Table 4, we report results for the smaller sample of only those borrowers whose records enter the call center on a Thursday and whose first call therefore occurs on a Saturday or Monday, as determined entirely randomly by an auto-dialer. For compactness, we report coefficient estimates only for *Talk*, the main variable of interest. However the same control variables as in previous tables are included throughout. While the effects sizes of *Talk* are a bit smaller in absolute terms, *Talk* continues to have a substantial impact on borrowers’ payment behavior.

### **3.3 Heterogeneous Treatment Effects**

It is important to keep in mind that the 2SLS estimates reflect local average treatment effects (LATE), which are the treatment effects of the “compliers,” i.e., those borrowers for whom the instruments change whether or not they speak with a bank agent, but not of those borrowers who speak (or do not speak) with the bank agent independently of the instruments (Imbens and Angrist (1994)). If treatment effects differ across borrowers, the 2SLS estimates likely differ from the average treatment effect (ATE) as compliers are a subset of borrowers. Treatment effects can differ due to observable as well as unobservable differences across borrowers. For example, an important observable difference across borrowers could be the interest rate borrowers pay. Borrowers with 0%-interest rate loans might respond to the personal communication treatment differently than borrowers who pay a high interest rate, given that the latter might be more financially constrained. Similarly, treatment effects might differ by borrowers’ unobservable resistance to treatment. For example, borrowers who are easier to reach might also benefit more from a conversation with a bank agent.

In order to shed light on the extent of heterogeneous treatment effects across borrowers, we allow the effect of observable as well as unobservable loan and borrower characteristics

to vary with  $Talk$ , which we abbreviate with  $T \in \{0, 1\}$ , such that:

$$Y_i = \alpha + \gamma Talk_i + \beta_T X_i + L + M + \mathcal{E}_{T,i}. \quad (2)$$

While  $\beta_{T=1} - \beta_{T=0}$  captures heterogeneous treatment effects due to observable differences,  $E[\mathcal{E}_{T=1,i} - \mathcal{E}_{T=0,i} | U_i = u]$  reflects different treatment effects due to unobserved resistance to treatment  $U_i$ . Specifically,  $U_i$  indicates a quantile of the distribution of unobserved resistance,  $V_i$ , in the underlying selection model, i.e.,  $Talk_i = \mathbb{1}\{f(X_i, Z_i) > V_i\}$ , and is by construction bounded by the 0/1 interval.<sup>10</sup>

We apply the local instrumental variable method by Heckman and Vytlacil (1999, 2001, 2005) and estimate marginal treatment effects (MTEs) that characterize the treatment effect for a borrower with observable characteristics  $X_i$  and unobservable resistance to treatment,  $U_i$ . That is,

$$MTE(X_i = x, U_i = u) = \gamma + x(\beta_{T=1} - \beta_{T=0}) + E[\mathcal{E}_{T=1,i} - \mathcal{E}_{T=0,i} | U_i = u].$$

To estimate  $E[\mathcal{E}_{T=1,i} - \mathcal{E}_{T=0,i} | U_i = u]$ , we use a parametric second order polynomial approximation as well as a more flexible semi-parametric approximation.<sup>11</sup> All standard errors are bootstrapped with 100 repetitions, accounting for clustering by location.

### 3.3.1 Observable Differences

We first consider different treatment effects due to observable differences across borrowers.

Table 5, Panel A reports the corresponding results.<sup>12</sup> For each outcome and each estimation

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<sup>10</sup>That is, a borrower speaks with a bank agent if the treatment probability given by the propensity score  $P(X_i, Z_i)$  exceeds the quantile,  $U_i$ , of the distribution of resistance levels corresponding to the borrower's level of resistance,  $V_i$ . That is,  $Talk_i = 1$  if  $P(X_i, Z_i) > U_i$ . For a detailed discussion, see Cornelissen, Dustmann, Raute, and Schoenneberg (2016).

<sup>11</sup>See Andresen (2018) for details. We employ the *mtefe* estimator of Andresen (2018) with a linear probability model as selection and modified to allow for assumed MTEs as well as for bootstrapped clustered standard errors.

<sup>12</sup>As before, we include month and location fixed effects. However, we do not allow for differential impact for treated and untreated borrowers with respect to these fixed effects. We also do not allow the effect of



method (“polynomial” and “semi-parametric”), we report estimates for  $\beta_{T=0}$  as well as  $\beta_{T=1} - \beta_{T=0}$ . While  $\beta_{T=0}$  indicates the effect of a given characteristic on the outcome,  $\beta_{T=1} - \beta_{T=0}$  tests whether the effect of a phone conversation differs for specific borrower or loan characteristics, similar to an interaction with *Talk*. Results for *Payment* in Columns (1) and (2) suggest that estimates are similar for both estimation procedures. Furthermore, only the  $\beta_{T=1} - \beta_{T=0}$  estimates for *Age*, *Age squared*, and *Retired* are statistically significant, suggesting that older borrowers and retired borrowers “benefit” less from a phone conversation with a bank agent. When considering *Default* and *Termination: Now*, we find that, in particular, borrowers with longer maturity loans benefit more from *Talk* relative to borrowers with shorter loans. Finally, we do not find a significant or consistent differential treatment effect for interest rates, countering concerns that treatment effects of *Talk* mainly reflect the behavior of borrowers with 0%-interest rate loans but not those with positive interest rate loans. We therefore conclude that there is only limited evidence of heterogeneous treatment effects based on observable differences.

### 3.3.2 Unobservable Differences

We next could consider heterogeneous treatment effects due to unobservable differences. Specifically, in Figure 4, we report MTEs, evaluated for a borrower with average observable characteristics, over the range of unobservable resistance to treatment,  $U_i$ . We again report results for the “polynomial” (blue line) and “semi-parametric” (orange line) approximation approach as well as bootstrapped standard errors. Given that  $U_i$  represents quantiles of the resistance to treatment, the unit interval represents 100% of the borrowers in our sample. However, since we do not observe treated and untreated borrowers with low (below 40%) or very high (above 95%) probabilities of treatment, we can only estimate MTEs for borrowers with  $0.40 < U_i < 0.95$  (solid lines).

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*Unemployed* to vary by treatment status as only very few borrowers (0.1%) are unemployed, causing difficulty with our bootstrapping procedure.

Panel A of Figure 4 shows the marginal treatment effects on *Payment* for borrowers with different unobserved resistance to treatment. Consistent with the positive effect of a phone conversation on borrowers’ payment behavior, both approaches reveal overall positive MTEs. Both MTE lines are increasing as resistance to treatment increases. That is, borrowers who are more “reluctant” to speak with a bank agent due to unobserved characteristics show a higher increase in their likelihood of payment due to the phone conversation compared to borrowers who are less reluctant to speak with a bank agent. Such negative selection into treatment counters the possible concern that those who stand to “benefit” from the conversation are more likely to select to speak with a bank agent. It suggests instead that borrowers who are harder to reach due to unobserved characteristics are more likely to improve their payment behavior.

Panels B and C of Figure 4 report the corresponding results for *Default* and *Termination: Now*. Consistent with our 2SLS results, the marginal treatment effects are generally negative. As in Panel A, we observe that those with the largest unobserved resistance to treatment benefit more from the phone conversation than those with lower levels of resistance.

### 3.3.3 Average Treatment Effects

The results in Figure 4 suggest important variation of the effect of *Talk* across borrowers with different unobserved resistance to treatment. The heterogeneity of marginal treatment effects implies that our 2SLS estimates, which represent the marginal treatment effects of compliers, differ from the average treatment effects of a randomly selected borrower. That is, while the 2SLS estimates are weighted averages of *some* MTEs, average treatments effects are equally-weighted averages of *all* MTEs over the entire 0/1 interval of unobserved resistance to treatment.<sup>13</sup> While we are not able to estimate MTEs for about 40% of borrowers with  $U_i < 0.40$ , inspection of Figure 4 suggests that MTEs are reasonably close to zero as  $U_i$

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<sup>13</sup>Appendix Figure A4 compares the (rescaled) weights used to calculate the local average treatment effects related to the 2SLS estimates as well as the equal weights used to calculate the average treatment effects.

approaches 0.40. Since it seems unlikely that a phone conversation with a borrower who has missed a payment could reduce the probability of repayment or increase the probability of default or termination, we assume that MTEs are zero for  $U_i < 0.40$ . While this assumption rules out marginal treatment effects that have the opposite effect relative to the intended effect for borrowers with low resistance to treatment, it is a conservative assumption in the sense that our assumption also rules out any intended effects for these borrowers. For the 5% of borrowers with  $U_i > 0.95$ , we assume that the MTEs are equal to the MTEs at  $U_i = 0.95$ . With these assumptions (shown as the non-solid lines in Figure 4), we can calculate ATEs for our sample by averaging all MTEs over the entire 0/1 interval of unobserved resistance to treatment. We report the resulting ATEs in Panel B of Table 5. While all ATEs are statistically significant, their absolute size is substantially smaller than the 2SLS estimates reported above. That is, for the average borrower, personal communication with a bank agent increases *Payment* by between 16.6 and 20.1pp, while it decreases *Default* by 10.5 to 14.0pp and *Termination: Now* by 7.1 to 6.3pp. To understand the sensitivity of the ATE calculation to the assumption that MTEs are zero for  $U_i < 0.40$ , we can consider the impact of alternative assumptions. For example, if we assume that in the case of *Payment* MTEs for  $U_i < 0.40$  are 0.10 instead of zero, the ATE would increase by 0.04 ( $=0.40 \times 0.10$ ).

Finally, the estimated ATEs seem broadly in line with evidence from similar interventions in retail credit markets (see Appendix Table B1 for an overview and Appendix B for a detailed discussion). In a setting reasonably closely related to ours, given a focus on delinquent as opposed to all borrowers, Bursztyn, Fiorin, Gottlieb, and Kanz (2019) find effects sizes for moral as well as reputational incentive treatments, especially among higher risk borrowers, that are in absolute terms similar to ours. Other studies, such as Cadena and Schoar (2011), Moulton, Collins, and Loibl (2015), Karlan, McConnell, Mullainathan, and Zinman (2016), and Medina (2021), that evaluate the effect of reminders, financial incentives, or financial coaching on non-delinquent borrowers find smaller ATEs in absolute terms but similar effects relative to the baseline probability of the control group. Overall, our estimation of MTEs as

well as our assumptions about the MTEs of borrowers with low and extremely high resistance to treatment yield ATEs that seem plausible given the related literature.

In summary, we document substantial heterogeneity in marginal treatment effects across borrowers with more or less unobserved resistance to treatment. The MTE curves suggest that borrowers with more unobserved resistance to treatment experience larger treatment effects compared to borrowers with lower resistance. Heterogeneous marginal treatment effects also suggest that the 2SLS estimates represent treatment effects specific to the set of compliers. Indeed, with additional assumptions, we find that the average treatment effects are smaller than our 2SLS estimates, highlighting the importance of investigating marginal treatment effects.

## 4 Mechanism

The bank's main objective when calling delinquent borrowers is to obtain payment within 45 days and to avert default and loan termination. While the personal communication with a bank agent appears to significantly contribute to these objectives, several different mechanisms potentially explain the payment behavior of borrowers who speak with a bank agent relative to the behavior of those who do not speak with a bank agent. First, the results may be driven by borrowers who have not paid attention to the bank's earlier letter and for whom the phone call therefore acts as a reminder. Similarly, the call from the bank could make the bank's enforcement process more salient as borrowers may be surprised by the banks' reaction to even a small delinquency. It is also possible that the personalized monitoring in form of a follow-up call for some treated borrowers is an important part of the observed treatment effect. Finally, the personal communication with an individual bank agent might change the nature of the existing obligation from a payment commitment towards an impersonal financial institution to a commitment towards an individual, thereby triggering prosocial behavior due to, for example, self-image or social image concerns. To

better understand to which extent these different mechanisms are at work, we examine cross-sectional variation in our main sample, two alternative intermediate payment outcomes, as well as results from our survey of call center agents.

#### **4.1 Payment Reminder and Attention to the Bank’s Enforcement Process**

At the time of the delinquency, the outstanding loan balance varies substantially across borrowers. Borrowers with a large outstanding loan balance are likely aware of their outstanding loan and therefore might not be surprised about receiving a phone call from the bank. Borrowers with small outstanding loan balances, however, might be particularly surprised about the bank’s collection efforts and might perceive the bank’s phone calls as a signal about the seriousness of the delinquency. We therefore compare the effect of *Talk* between borrowers with a below median outstanding amount, i.e., less than EUR 466, and borrowers with an above median outstanding amount. Table 6 reports 2SLS regression results for both subsamples and all three outcomes. We do not find any significant differences in the coefficient estimates for *Talk* between the two subsamples, suggesting that the effect of *Talk* is unlikely due to borrowers who are surprised by the bank’s attention to even small delinquencies. If anything, the size of the coefficient estimate is larger for borrowers with higher outstanding loan amounts.

Next, we make use of the responses of our survey of call center agents. As part of the survey, we ask agents to note after each phone call whether the borrower seemed surprised about the delinquency and/or about receiving a call from the bank. Specifically, agents react to a statement such as “The customer was surprised about the delinquency” by selecting a number between 1 and 5, where 1 corresponds to “Do not agree at all” and 5 to “Strongly agree.” We form two corresponding indicator variables, *Surprise: Delinquency* and *Surprise: Call*, which equal one if agents select 4 (“Agree”) or 5 (“Strongly Agree”) and 0 otherwise. For 27% of borrowers in the survey sample, agents report that the borrowers seem surprised about the delinquency, while 73% of borrowers do not appear surprised about the delinquency, likely

because they have already been informed about the delinquency by regular mail. It is possible that at least some of the effect of *Talk* is due to the reaction of those borrowers who have not paid attention to the letter and for whom the phone call might act as a reminder of an existing, overdue, payment obligation. Even though our surprise measure comes from a small sample and relies on agents' assessments, we test this possibility with an OLS regression with *Payment* as the outcome variable. We do not have information on defaults or termination for the survey sample. We do not use an IV regression, given that all borrowers in our survey sample speak with a bank agent.<sup>14</sup> Given that our survey sample differs slightly from our main sample, we include additional control variables, such as the type of loan, whether or not the borrower has spoken with a call center agent during the past six months, and whether the call is the first call or a possible follow-up call. Column (1) of Table 7 reveals that borrowers who are reached by phone and who appear to be surprised about the delinquency have a payment probability that is only 2.4pp higher compared to borrowers who do not seem surprised about the delinquency, which is statistically insignificant. In Column (2), we exclude follow-up calls and find a small negative but statistically insignificant effect. While these results are inconsistent with *Talk* representing a reminder effect, we cannot rule out that at least some of the borrowers who seem surprised about the delinquency actually know about the delinquency but pretend not to know as they might be embarrassed.

It is also possible that borrowers are aware of the delinquency itself, but are reminded of the importance of a timely payment as the call might make the banks' collection efforts more salient. We therefore test whether the borrower's surprise about receiving a phone call affects her payment behavior, using the full survey sample in Column (3) and the subset excluding follow-up calls in Column (4) of Table 7. We again find only small and statistically insignificant differences in the payment behavior between borrowers who seem surprised about the phone call and those who do not.

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<sup>14</sup>We account for standard errors being correlated at the agent level. Since the number of clusters in our sample is small (13 agents), we use the wild bootstrap-*t* approach with 1,000 repetitions and report *p*-values (see, Cameron, Gelbach, and Miller (2008)). Significance levels are generally similar for standard errors that are robust to double-clustering at the location and agent level.

Overall, we do not find any evidence consistent with the hypothesis that the call functions as a reminder or highlights the bank’s commitment to collecting overdue payments.

## 4.2 Personalized Monitoring through Follow-up Calls

While all treated borrowers speak with a bank agent, some receive a follow-up call. The follow-up call occurs when a borrower agrees to pay the delinquent amount, which in most cases is within one or two weeks of the phone call, but then fails to make the payment. In this case, the borrower’s file re-enters the early collection call center’s process and, if reached, the borrower is reminded of the outstanding payment and asked to make payment by day 45. For these borrowers, who represent about 25% of all treated borrowers, treatment therefore consists of two phone calls with the second phone call being triggered by the borrower’s failure to pay as initially agreed.

To understand to which extent the treatment effect is due to the follow-up call, which provides borrower-specific monitoring of the repayment agreement and increases the intensity of the personal communication, we consider the outcome *Payment: Alt. 1*. For untreated borrowers, the outcome equals *Payment* and reflects the effect of the initial letter as well as of the follow-up letter to borrowers who are still delinquent at day 35. However, for treated borrowers, it reflects the outcome based on the bank’s initial phone call. That is, for treated borrowers, *Payment: Alt. 1* is one if a borrower pays as agreed within a few weeks but zero if the borrower does not pay and the borrower’s case re-enters the call center process for a potential follow-up call. Assuming that no payment is made at all by treated borrowers who fail to pay as initially agreed, represents a conservative assumption and should constitute a lower bound for the treatment effect in the absence of a follow-up call. An alternative approach is to assume that all treated borrowers whose records re-enter the call center repay with the same probability as the subset of borrowers who are not reached for a follow-up call. In *Payment: Alt. 2*, we implement this approach. Specifically, for the subset of treated borrowers who fail to repay as initially agreed and who are not reached for a follow-up call,

we regress *Payment* on all independent variables except for *Talk* from Panel A of Table 4. We then use the predicted payment outcome for all treated borrowers who fail to repay as initially agreed, whether or not they are reached for a follow-up call. In summary, both *Payment: Alt. 1* and *Payment: Alt. 2* eliminate the effect of a follow-up call. *Payment: Alt. 1* assumes that no payment will be made by those who fail to pay as initially agreed, while *Payment: Alt. 2* assumes that repayment patterns for these borrowers mimics the payment behavior of those who are not reached for follow-up call.

Panel A of Table 8 summarizes the average payment outcomes for different subsets of borrowers. For treated borrowers, the comparison highlights the focus on the initially agreed payment by *Payment: Alt. 1* as well as the assumption underlying *Payment: Alt. 2* that treated borrowers with a follow-up call pay with the same probability as those not reached for a follow-up call.<sup>15</sup>

In Panel B of Table 8, we report the corresponding 2SLS estimates. In Column (1), we report the baseline result for *Payment* from Table 4 Panel A for comparison. Column (2) reports results for *Payment: Alt. 1*. Even under this conservative assumption, we find a significant treatment effect of *Talk* of 0.223, about 65% of the size of the treatment effect in Column (1). In Column (3), we report results for *Payment: Alt. 2*. We find a significant effect of *Talk* of 0.310, about 90% of the effect in Column (1). These results are consistent with a positive but modest effect of follow-up calls on payment outcomes. Specifically, the follow-up call seems to account for between 10% and at most 35% of the full treatment effect. We therefore conclude that the effect of *Talk* is not mainly due to increased communication or the personalized monitoring of timely repayment.

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<sup>15</sup>Differences in *Payment: Alt. 2* between both groups are due to differences in observables that predict payment.



### 4.3 Prosocial Behavior and Promise Keeping

The personal communication with an individual bank agent might change the nature of the existing financial obligation from impersonal (a payment commitment to a remote financial institution) to a more personal commitment (a payment commitment to an individual), increasing prosocial behavior like promise-keeping. To test the possible role of prosocial behavior, we build on prior research showing that prosocial behavior towards other humans decreases with social distance ((e.g, Hoffman, McCabe, and Smith (1996); Conrads and Lotz (2015)). Since social distance is likely larger between people of different cultural or ethnic backgrounds, we examine in a first step to which extent the effect of *Talk* differs between German borrowers and non-German borrowers who live in Germany. While we find no significant difference in the payment behavior between both groups in our main results, it is possible that borrowers who are foreign residents in Germany perceive a larger social distance between themselves and the call center agents compared to German borrowers. In Table 9, we report 2SLS estimates of the effect of *Talk* for both subsamples. The results reveal that in absolute terms, the effect of *Talk* is between 10.8pp (*Termination: Now*) and 34.5pp (*Default*) larger for German borrowers compared to non-German borrowers. However, the difference is statistically significant only for *Default*.<sup>16</sup> While this result is consistent with increased prosocial behavior due to the phone conversation, we cannot rule out an alternative explanation, e.g., foreign borrowers struggle to understand the call center agent on the phone.

To gain more insights into the personal dimension of the phone call, we again employ our survey data. While our survey data set has only 245 observations, one advantage of this data set is a unique identifier for 13 agents who speak to borrowers in our survey data set. Since all call center agents use the same protocol and convey the same information, it is not clear that agent effects on borrowers' payment behavior should vary across agents. However, when regressing *Payment* on twelve agent fixed effects while controlling for loan

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<sup>16</sup>These subsample results are consistent with the corresponding estimates for  $\beta_{T=1} - \beta_{T=0}$  in Table 5, which also suggest that non-German borrowers might benefit less from speaking with a bank agent compared to German borrowers.

and borrower characteristics, we find jointly significant agent fixed effects ( $p$ -value = 0.00). Since agents are randomly assigned to borrowers by an auto-dialer, this finding suggests that some agent characteristics cause differences in borrowers’ payment behavior.<sup>17</sup>

While agent fixed effects reflect many possible agent characteristics, we observe agents’ gender and age as well as the likeability of the voice of eight agents who provided us with a recording of the standard opening of their calls to delinquent borrowers.<sup>18</sup> Each recording is analyzed by six to seven undergraduate students at Goethe University in Frankfurt/Main, Germany. Students rate each voice recording between 1 (“Not At All Likeable”) and 5 (“Very Likeable”). We construct the variable *Likeable Voice* as the fraction of raters that rate an agent’s voice as 4 (“Likeable”) or 5 (“Very Likeable”). *Likeable Voice (adjusted)* represents the version of *Likeable Voice* that has been adjusted for rater fixed effects.<sup>19</sup> While 53% of raters consider an agent’s voice (very) likeable on average, there is dispersion across agents. Since all call center agents have been selected by the bank based on their communication skills and receive ongoing communication training, there should be no material difference in agents’ ability to communicate effectively. If calls function only as reminders, differences in the likeability of agents’ voices should be irrelevant. However, a likeable voice could lower the perceived social distance between a borrower and the bank agent and increase borrowers’ prosocial behavior, thereby affecting *Payment*.

Using the subset of 135 observations from our survey sample for which we have data

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<sup>17</sup>In Appendix Table A2, we repeat the same regression for several loan and borrower characteristics (Panel A). We find jointly significant agent fixed effects only for borrowers’ age. Since we have verified the randomization through the auto-dialer with multiple bank representatives, we believe that this result is accidental. Moreover, we find no evidence that the assignment to a specific agent (Panel B) or to agents based on agent gender or age (Panel C) is associated with borrower or loan characteristics.

<sup>18</sup>We do not know why some agents decided to provide us with a voice recording while others did not. However, it is important to note that agents do not know the payment outcomes associated with the borrowers they have spoken with. A written agreement between the bank and the employees’ council (“Betriebsvereinbarung”) prevents the bank from analyzing call outcomes at the level of the individual agent. Indeed, comparing *Payment* between agents with and without recordings, we find a slightly lower average for the group with recordings (0.79) compared to the group without recordings (0.85).

<sup>19</sup>We first convert each rating into an indicator, which is one for ratings of four and five, and zero otherwise. We then form the average of this indicator for each rater and subtract it from each indicator. *Likeable Voice (Adjusted)* is the average of the adjusted indicators across raters, which we form for each agent.

about agents' voices, we find that 84.5% of borrowers who speak to one of the four agents with a likeable voice (i.e., *Likeable Voice* > 0.50) pay within 45 days, while only 71.6% of borrowers who speak with the remaining four agents pay within 45 days. Table 10 provides corresponding evidence from OLS regressions, controlling for agents' age and gender as well as loan, call, and borrower characteristics. While agents' age and gender do not have a significant effect, Column (1) of Table 10 suggests that a one standard deviation increase in *Likeable Voice* is associated with a 4pp increase in the probability of payment. In Column (2), we employ the rater adjusted likeability measure and find very similar results.

While our results based on agent characteristics are from a rather small sample and should therefore be interpreted with caution, the results seem to suggest that the personal dimension rather than the informational, reminder-like, or signaling-related characteristics of the conversation with a bank agent seems to determine the success of the treatment. An increase in promise-keeping behavior due to personal interaction would be consistent with a large experimental literature that has highlighted prosocial behavior caused by deeply rooted preferences for fairness and altruism, guilt aversion, and social image concerns. Of course, we cannot rule out that borrowers mistakenly assume that individual call center agents will be personally involved with decisions regarding borrowers' current or future loans and that borrowers behave in a more trustworthy way, expecting call center agents, especially those who appear friendly and likeable, to reciprocate in the future (He, Offerman, and Ven (2017)). However, even in this case, the personal dimension of the interaction with the borrower would still be essential.

## 5 Extensions

### 5.1 Persistence of the Treatment Effect

For the borrowers in our main sample, we observe all loan-related payments until August 2014, about two and a half years after the initial delinquency. We are therefore able to observe most of the loans until maturity. Our main three outcome variables, *Payment*, *Default*, and *Termination: Now*, reflect the outcome of the initial delinquency. However, we are also able to observe whether a borrower becomes delinquent again and whether the loan is ultimately terminated before maturity. While 10% of loans are terminated as a consequence of the initial delinquency, 18% of all loans are terminated by August 2014. To understand whether the effect of *Talk* is persistent and therefore also affects the outcome of future delinquencies, in Table 11, Panel A, we examine the effect of *Talk* on *Termination: Overall*, an indicator variable that equals one if a loan is terminated at any point before maturity and zero otherwise. For comparison, we report the effect of *Talk* on *Termination: Now* from Table in Column (1). Column (2) reports the corresponding 2SLS estimate for *Termination: Overall*. The effect of *Talk* almost doubles when we consider the overall probability of the loan being terminated as opposed to the probability of termination directly following the initial delinquency. As revealed by the *F*-test for coefficient equality, the effect of *Talk* is also statistically significantly larger for *Termination: Overall* compared to *Termination: Now*. This result suggests that personal communication between does not only decreases the probability that the loan is terminated directly following the initial delinquency but also reduces payment difficulties during the remaining term of the loan.

In Panel B of 11, we explore the payment behavior following the initial delinquency in more detail. We observe that 37% of the 3,092 borrowers who successfully resolve the initial delinquency fall behind on their payments at least once again and, on average, do so about 98 days after the initial delinquency. Given that we observe future payment behavior only for borrowers who have resolved the initial delinquency, our IV approach is no longer valid since

the sample is selected on recovery from the first delinquency, making our instruments endogenous. Instead, we report OLS estimates of the effect of *Talk* on future payment outcomes. To assess any potential endogeneity bias, we follow Oster (2019) and compare the degree of selection on unobservables relative to observables. Specifically, we report the magnitude of unobservables relative to observables that is needed for the unobservables to explain our results. This magnitude is captured by the parameter  $\delta$ . Oster (2019) suggests that values of  $\delta$  less than one indicate concerns about possible endogeneity (for recent applications, see, for example, Gorodnichenko and Weber (2016) or Hagendorff, Lim, and Nguyen (2021)).<sup>20</sup> Column (1) suggests that for borrowers who resolve the initial delinquency *Talk* significantly reduces the probability of a future delinquency by 7.9pp. A value of 1.97 for  $\delta$  suggests that this effect is unlikely explained by unobservables. In Column (2), we examine the effect of *Talk* on the amount of time until the next delinquency. The estimate suggests that treated borrowers who resolve the initial delinquency but become delinquent again do so about 29 days later compared to untreated borrowers. However,  $\delta$  is only 0.81 and does not allow us to rule out endogeneity. Finally, in Column (3), we directly examine the probability that the loan is terminated after a successful recovery from the first delinquency. Consistent with the results in Panel A, we find that *Talk* significantly reduces *Termination: Later* by 4.9pp and with  $\delta$  of 2.85, endogeneity is less of a concern.

Taken together, the results in Table 11 suggest that the treatment effect of *Talk* extends beyond alerting borrowers to the current delinquency and has a persistent effect on borrowers' payment behavior such that the probability of a future delinquency and loan termination is significantly reduced.

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<sup>20</sup>In our application, we set  $R_{max}$  to one, resulting in the most conservative estimates of  $\delta$ . Furthermore, observables include a large set of borrower and loan characteristics as well as location fixed effects, while we consider time fixed effects as part of the baseline specification.

## 5.2 External Validity

Our main results focus on installment loans distributed at the point-of-sale. While POS loans provide a well-defined, internationally comparable, and growing form of consumer credit, to what extent our findings apply to other loans and borrowers is an open question.

To study the importance and impact of personal, two-way communication on non-POS borrowers' payment behavior, we provide evidence from borrowers who have exceeded their overdraft facilities. Overdraft facilities allow retail borrowers to withdraw a particular amount over and above their checking account balance. The amount is typically determined by the account holder's monthly salary. The bank charges interest on the part of the facility that is used in a given month. Differently from the U.S. (see, e.g., Stango and Zinman (2014)), there are no additional fees associated with the use of the overdraft facility. A borrower becomes delinquent when she exceeds the overdraft limit. At that point, the interest rate that the borrower has to pay typically increases substantially. In Germany and other European countries, such as Italy and Sweden, overdraft facilities are the dominant form of revolving credit for consumers, with 16% of surveyed German adults in 2012 reporting that they use an overdraft facility to borrow money, while only 10% report using a credit card to borrow money.

Differently from a POS loan, an overdraft facility requires an existing bank relationship as overdraft facilities are linked to a borrower's main checking account, typically the account to which salary payments are transferred by the employer. As a large German bank, the lender whose data we use has a substantial presence in retail banking in Germany and therefore is a major provider of overdraft credit. The early collection process for borrowers who have exceeded their overdraft limit is similar to the one for POS loans.

Our sample contains 2,499 overdraft borrowers whose records enter the call center for the first time between January and June 2012 by exceeding their credit line and remaining delinquent for at least 20 days such that their records are sent to the early collection call

center. The summary statistics in Appendix Table A3 suggest that, on average, delinquent borrowers have a credit line of EUR 1,008, which they have exceeded by EUR 167.34, on average. Consistent with the existence of an established relationship between the bank and these borrowers, we observe that the repayment at day 45 is more likely and default and termination are less likely compared to the sample of POS loans.

In Table 12, we apply the same IV estimation as in Table 4 to test the effect of personal communication on delinquent borrowers' payment behavior in the context of overdraft credit. We find that *Talk* increases timely payment by 20.4pp, while *Talk* decreases default and termination by 15.3pp and 12.2pp, respectively. While the point estimates suggest effect sizes for *Payment* and *Default* that are smaller than the corresponding 2SLS estimates for the POS sample, standard errors are relatively large. Indeed, all three estimates are significant only at the 10% level.

Overall, these additional results are consistent with personal touch playing an important role in the communication between the bank and its delinquent borrowers that is not limited to POS borrowers without an existing bank relationship but extends to borrowers with an existing bank relationship.

However, a general caveat of our study is that all of our results reflect the treatment effect for borrowers whose files are sent to the early collection call center but exclude borrowers whose files do not enter the call center, as is the case for borrowers who have filed for personal bankruptcy as well as borrowers with any ongoing judicial collection efforts against them. It is likely that treatment effects would be lower for these borrowers if they were included in the bank's early collection process.

## 6 Conclusion

At a time when interactions between financial institutions and their retail customers become increasingly automated and impersonal, we examine the importance of personal communication between a large bank and its customers. Our results, which are based on comparing the payment behavior of delinquent borrowers who speak with a randomly assigned bank agent to the payment behavior of delinquent borrowers who do not speak with a bank agent, suggest that personal communication significantly increases the likelihood of successfully resolving the delinquency by a substantial margin.

Detailed data for a small sample of phone conversations and bank agents point to the human element of the communication, such as the likeability of the agent’s voice, being an important element of the call’s effect rather than the call serving as a reminder or a signal about the bank’s monitoring and enforcement efforts.

The setting of our study does not allow us to rule out that a robocall, i.e., an automated call delivering a recorded message, could affect borrowers’ payment behavior in a similar way as calls by “live” bank agents do. However, recent experimental evidence by Maréchal and Gesche (2020) suggests that the presence of an actual human being might be critical.

As the interaction and communication between financial institutions and their customers evolve, our findings highlight the value of retaining or reintroducing a human element in this interaction and suggest that personal communication will likely continue to play a role even if much less costly information transmission is readily available.



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Figure 1: Timeline

This figure describes the bank's response to delinquent loans over time (in days). Day zero is the day on which the borrower misses a regular loan payment and becomes delinquent.

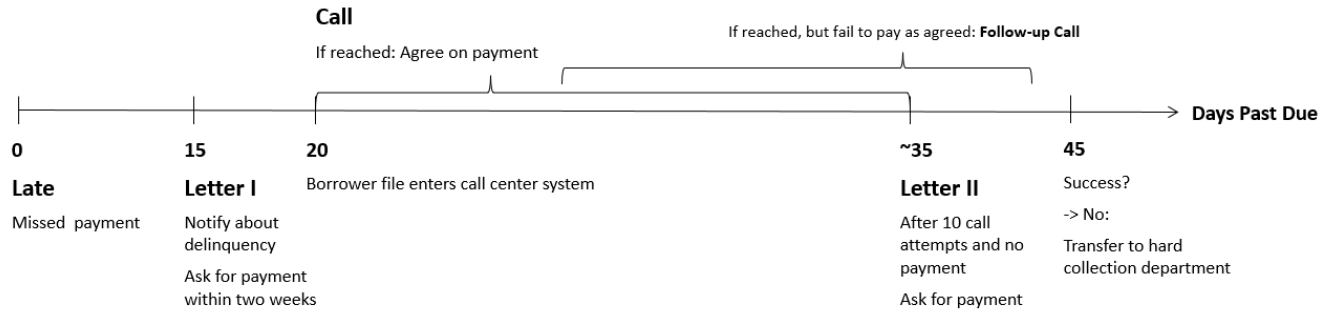


Figure 2: Daily Reachability

This figure shows the reachability for each day during our sample period of January to June 2012. The daily reachability is calculated as the ratio of the number of calls in which a borrower is reached to all calls that are placed during a given day. Days with no call attempts (e.g., Sundays and public holidays) are excluded from the figure. Gaps mean that no borrower from our main sample of 3,448 POS borrowers is reached that day.

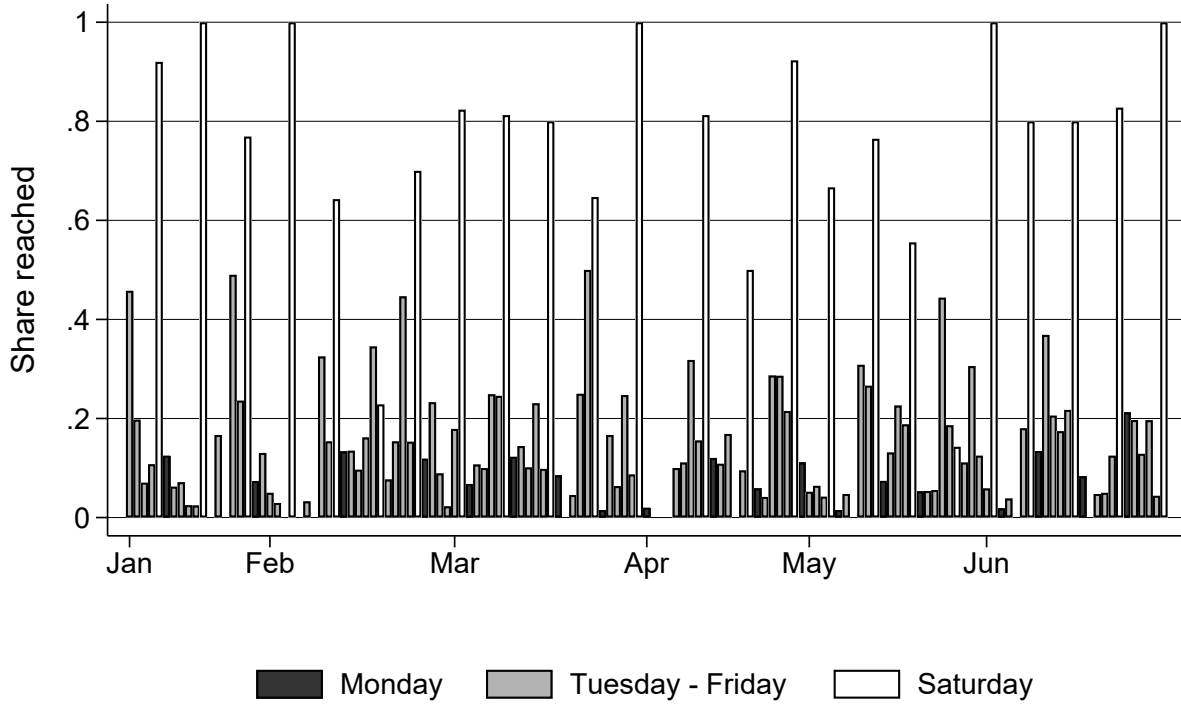


Figure 3: Overall Reachability by Day of the First Call

This figure shows the average of *Talk* by the day of the first call attempt, calculated across all 3,448 POS borrowers in our main sample.

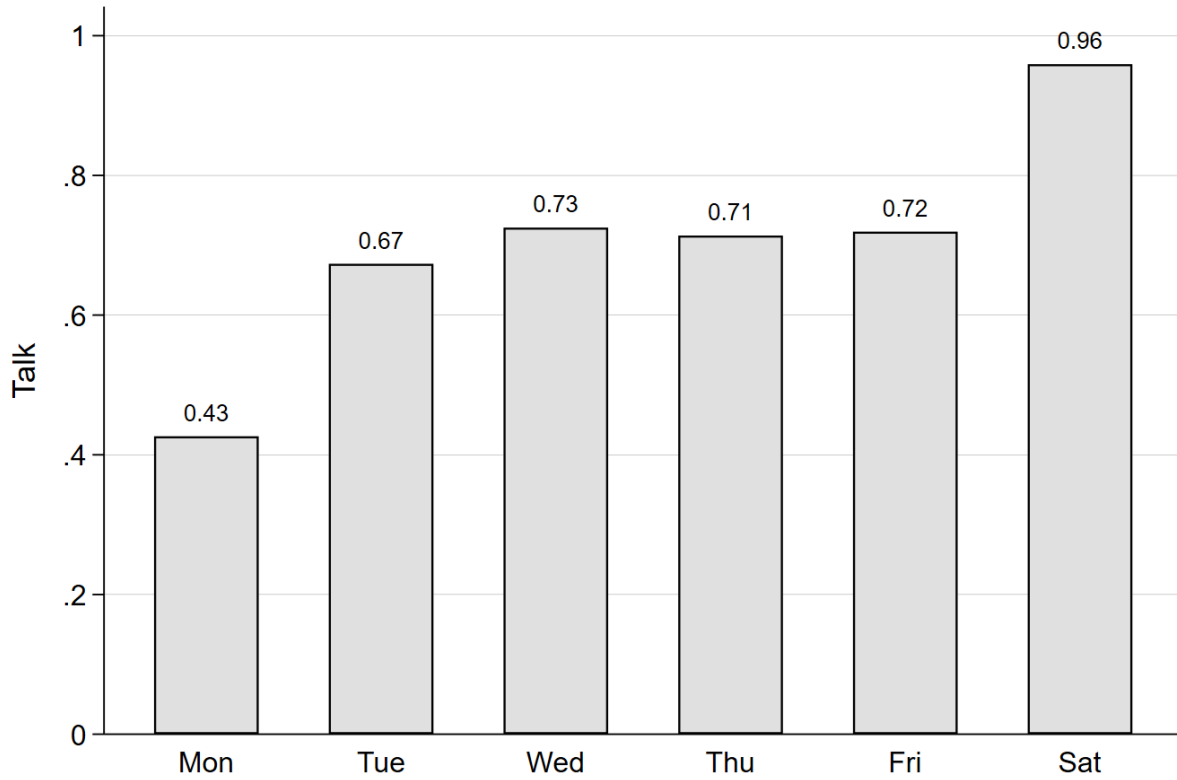




Figure 4: Marginal Treatment Effects

This figure shows estimated marginal treatment effects (MTEs) over the range of unobservable resistance to treatment across the 0/1 interval for *Payment* (Panel A), *Default* (Panel B), and *Termination: Now* (Panel C) for the main sample of POS borrowers. The blue line shows MTE estimates from a parametric second order polynomial approximation. The orange line shows MTEs estimates from a semi-parametric approximation. Bootstrapped standard errors are shown corresponding to the 95% confidence interval. MTEs below the resistance level of 0.40 and above 0.95 are imposed, not estimated.

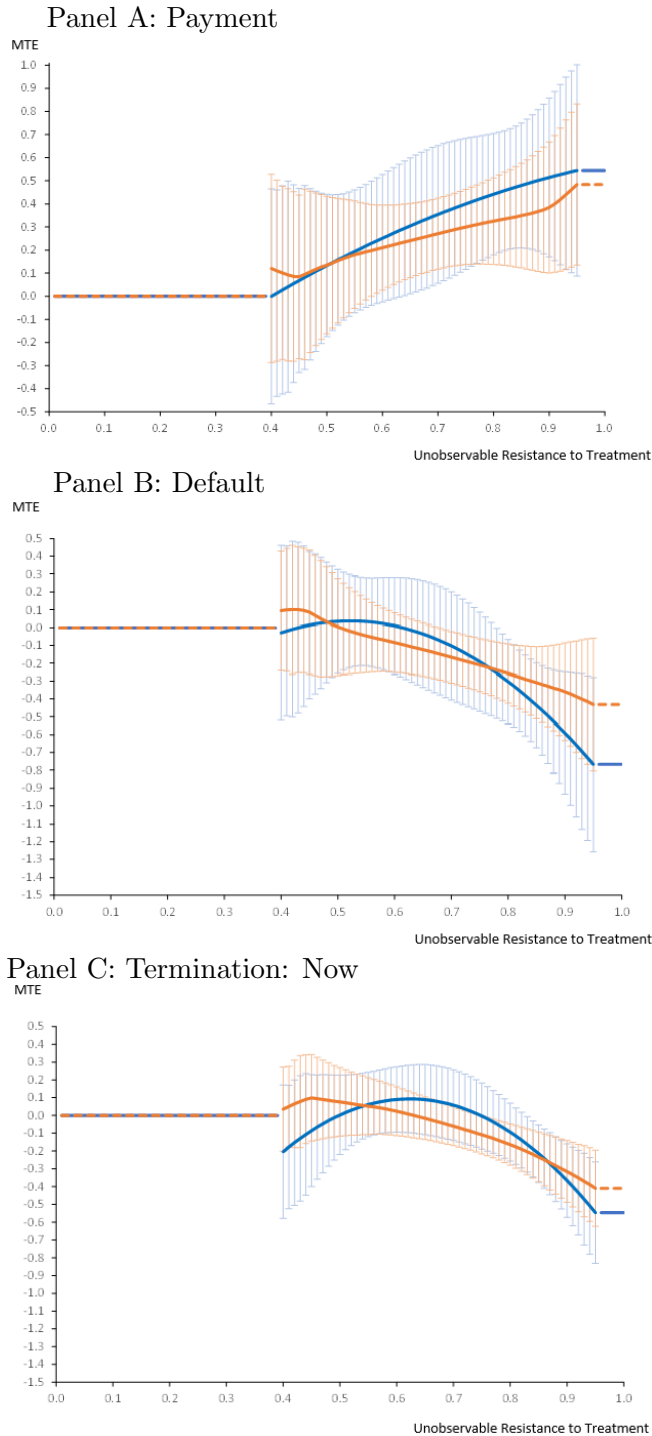


Table 1: Summary Statistics

This table reports summary statistics for our main sample of delinquent POS borrowers (Panel A) as well as for our survey sample (Panel B). All variables are defined in Appendix Table A1.

Panel A: Main Sample						
	N	Mean	Median	SD	Min	Max
<i>Borrower Characteristics</i>						
Male	3,448	0.65	1	0.48	0	1
Age	3,448	33.78	30	12.16	18	75
Non-German	3,448	0.20	0	0.40	0	1
Student	3,448	0.10	0	0.31	0	1
Retired	3,448	0.04	0	0.18	0	1
Unemployed	3,448	0.00	0	0.02	0	1
<i>Loan Characteristics</i>						
Installment (in EUR 000's)	3,448	0.07	0.06	0.05	0.03	0.56
Initial Amount (in EUR 000's)	3,448	1.11	0.76	1.21	0.15	17.30
Interest Rate	3,448	0.01	0	0.03	0	0.13
Repayment Term (in months)	3,448	16.88	12	12.38	1	82
Time since Origination (in months)	3,448	8.28	6	7.76	0	66
Outstanding Loan Amount (in EUR 000's)	3,448	0.71	0.47	0.92	0.03	15.14
<i>Call Characteristics</i>						
Number of Call Attempts	3,448	3.24	3	3.05	1	10
Talk	3,448	0.72	1	0.45	0	1
Call Duration (in minutes)	2,432	2.68	2.19	1.71	0.53	18.68
<i>Payment Behavior</i>						
Payment	3,448	0.70	1	0.46	0	1
Default	3,448	0.24	0	0.43	0	1
Termination: Now	3,448	0.10	0	0.30	0	1
Payment Alt. 1	3,448	0.58	1	0.49	0	1
Payment Alt. 2	3,448	0.67	1	0.43	-0.23	1.25
Termination: Later	3,092	0.08	0	0.28	0	1
Termination: Overall	3,448	0.18	0	0.38	0	1
Future Delinquency	3,092	0.37	0	0.48	0	1
Time to Next Delinquency (in days)	1,140	97.57	57	112.01	1	815

Table 1 (continued): Summary Statistics

Panel B: Survey Sample						
	N	Mean	Median	SD	Min	Max
<i>Borrower Characteristics</i>						
Male	245	0.67	1	0.47	0	1
Age	245	40.98	38	15.95	18	87
Delinquency Last 6M	245	0.36	0	0.48	0	1
<i>Loan Characteristics</i>						
Delinquent Amount (in EUR)	245	820	360	1,195	25	6,046
Installment Loan	245	0.12	0	0.33	0	1
<i>Call Characteristics</i>						
First Call	245	0.80	1	0.40	0	1
Call Duration (in minutes)	245	2.23	1.68	1.80	0.02	10.26
<i>Payment Behavior</i>						
Payment	245	0.82	1	0.39	0	1
<i>Agent Assessment</i>						
Surprise Delinquency	245	0.27	0	0.44	0	1
Surprise Call	245	0.40	0	0.49	0	1
<i>Agent Characteristics</i>						
Male Agent	13	0.63	1	0.51	0	1
Age Agent	13	34.23	36	10.22	21	46
Likeable Voice	8	0.53	0.57	0.16	0.33	0.86
Likeable Voice (adjusted)	8	-0.04	-0.04	0.14	-0.18	0.25

Table 2: Random Assignment: Differences in Characteristics by Day of First Call

This table reports mean borrower and loan characteristics separately for those who receive their first call on a Saturday (Column (1)), Monday (Column (2)), or another day of the week (Column (3)). Columns (4) - (6) report  $p$ -values corresponding to mean difference tests with Sidak correction for multiple comparisons. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) First Call Saturday (N=220)	(2) First Call Monday (N=212)	(3) First Call Other Day (N=3,016)	(4) $p$ -val. (1)-(2)	(5) $p$ -val. (1)-(3)	(6) $p$ -val. (2)-(3)
Male	0.61	0.60	0.65	1.00	0.489	0.401
Age	37.84	33.86	33.48	0.002	0.000	0.961
Non-German	0.18	0.15	0.21	0.873	0.580	0.117
Student	0.09	0.13	0.10	0.319	0.808	0.463
Retired	0.07	0.05	0.03	0.562	0.004	0.318
Unemployed	0.00	0.00	0.00	1.00	0.971	0.973
North Germany	0.22	0.16	0.20	0.347	0.890	0.407
East Germany	0.05	0.09	0.05	0.204	1.00	0.042
South Germany	0.38	0.37	0.40	0.988	0.885	0.654
West Germany	0.35	0.38	0.34	0.863	0.998	0.612
Installment	0.07	0.07	0.07	0.971	0.989	0.893
Initial Amount	1.11	1.06	1.12	0.971	1.00	0.903
Interest Rate	0.01	0.01	0.01	0.853	0.808	0.997
Repayment Term	16.33	15.72	17.00	0.940	0.818	0.372
Time since Origination	7.61	7.35	8.40	0.980	0.381	0.165

Table 3: First Stage

This table reports coefficient estimates from a linear probability model of *Talk* on two instrumental variables, *First Call Saturday* and *First Call Monday*, for the main sample of POS borrowers. In Column (1), all borrowers are included. In Column (2), only borrowers whose first call attempt occurs on a Saturday or Monday are included. All regressions include borrower and loan characteristics as well as location and month fixed effects. Standard errors are clustered at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Talk	(2) Talk
First Call Saturday	0.238*** (0.018)	0.520*** (0.047)
First Call Monday	-0.260*** (0.037)	
Installment	0.036 (0.260)	-0.317 (0.720)
Initial Amount	0.013 (0.015)	0.059* (0.031)
Interest Rate	-0.239 (0.316)	-1.040 (0.937)
Repayment Term	-0.000 (0.001)	-0.002 (0.004)
Time since Origination	-0.005*** (0.001)	-0.001 (0.004)
Male	0.021 (0.016)	-0.010 (0.050)
Non-German	-0.021 (0.018)	-0.009 (0.069)
Age	0.009** (0.005)	0.037** (0.015)
Age squared	-0.009 (0.006)	-0.045** (0.019)
Student	0.064** (0.027)	0.143 (0.098)
Retired	0.072 (0.053)	0.261* (0.156)
Unemployed	-0.210 (0.383)	
Month FE	Yes	Yes
Location FE	Yes	Yes
Observations	3,448	432
Adjusted $R^2$	0.038	0.334
$F$ -statistic	155.92	121.27

Table 4: Talk Effect on Repayment Behavior

This table reports the effects of *Talk* on *Payment*, *Default*, and *Termination: Now* estimated by Two-Stage Least Squares (2SLS, Columns (1) - (3)), as well as Ordinary Least Squares (OLS, Columns (4) -(6)) estimations. Panel A report results for the full sample of POS borrowers. Panel B reports 2SLS results for the sub-sample of POS borrowers whose first call occurs on a Saturday or Monday. All regressions include borrower and loan characteristics as well as location and month fixed effects. Standard errors are clustered at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: All Borrowers						
	(1)	(2)	(3)	(4)	(5)	(6)
	Payment	Default	Termination: Now	Payment	Default	Termination: Now
	2SLS	2SLS	2SLS	OLS	OLS	OLS
Talk	0.344*** (0.089)	-0.238*** (0.077)	-0.124*** (0.046)	0.201*** (0.021)	-0.121*** (0.016)	-0.072*** (0.015)
Installment	-0.133 (0.312)	0.246 (0.298)	-0.039 (0.168)	-0.125 (0.305)	0.239 (0.292)	-0.042 (0.168)
Interest Rate	-0.666* (0.375)	1.201*** (0.350)	0.712*** (0.263)	-0.711* (0.382)	1.238*** (0.350)	0.728*** (0.262)
Initial Amount	0.009 (0.016)	-0.006 (0.015)	0.002 (0.009)	0.011 (0.016)	-0.008 (0.015)	0.002 (0.009)
Repmt. Term	-0.002 (0.001)	0.005*** (0.001)	0.001 (0.001)	-0.002 (0.001)	0.005*** (0.001)	0.001 (0.001)
Time s. Orig.	0.003** (0.001)	-0.008*** (0.001)	-0.006*** (0.001)	0.002** (0.001)	-0.007*** (0.001)	-0.005*** (0.001)
Male	-0.033** (0.015)	0.023 (0.014)	0.016* (0.010)	-0.030** (0.015)	0.021 (0.015)	0.015 (0.010)
Non-German	0.030 (0.021)	-0.013 (0.018)	-0.016 (0.010)	0.027 (0.021)	-0.010 (0.020)	-0.015 (0.011)
Age	0.018*** (0.005)	-0.017*** (0.005)	-0.009** (0.004)	0.020*** (0.004)	-0.018*** (0.005)	-0.010*** (0.004)
Age squared	-0.017*** (0.006)	0.015*** (0.006)	0.009* (0.005)	-0.019*** (0.005)	0.016*** (0.006)	0.009* (0.005)
Student	0.015 (0.031)	-0.004 (0.025)	-0.003 (0.017)	0.024 (0.030)	-0.011 (0.024)	-0.006 (0.017)
Retired	-0.050 (0.057)	0.064 (0.052)	-0.017 (0.037)	-0.040 (0.057)	0.056 (0.053)	-0.020 (0.037)
Unemployed	-0.573*** (0.100)	0.161 (0.384)	0.324 (0.351)	-0.601*** (0.054)	0.184 (0.350)	0.335 (0.340)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,448	3,448	3,448	3,448	3,448	3,448

Table 4 (continued): Talk Effect on Repayment Behavior

Panel B: First Call Saturday or Monday

	(1)	(2)	(3)
	Payment	Default	Termination: Now
	2SLS	2SLS	2SLS
Talk	0.278*** (0.102)	-0.165* (0.091)	-0.088* (0.046)
Controls	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Observations	432	432	432

Table 5: Heterogeneous Treatment Effects

This table reports results from the estimation of marginal treatment effects (MTEs). Panel A reports the effect of observable borrower and loan characteristics for untreated borrowers,  $\beta_{T=0}$ , as well as the differential effect between treated and untreated borrowers,  $\beta_{T=1} - \beta_{T=0}$ , on *Payment*, *Default*, and *Termination: Now* estimated by local IV (Heckman and Vytlacil (1999, 2001, 2005)). Results in Columns (1), (3), and (5) are based on a second order polynomial MTE model. Results in Columns (2), (4), and (6) are based on a semi-parametric MTE model. The effect of *Unemployed* as well as the location and month fixed effects are assumed constant between treated and untreated borrowers. Panel B reports average treatment effects (ATEs) for a borrower with average observable characteristics. Columns (1), (3), and (5) are based on a second order polynomial MTE model. Columns (2), (4), and (6) are based on a semi-parametric MTE model. All standard errors are bootstrapped with 100 repetitions and account for clustering at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Heterogeneous Treatment Effects due to Observable Characteristics

	Payment		Default		Termination: Now	
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_{T=0}$						
Interest Rate	-0.974 (1.919)	-0.923 (1.920)	0.423 (1.803)	0.049 (1.831)	1.048 (1.123)	0.721 (1.123)
Initial Amount	0.070 (0.076)	0.069 (0.075)	-0.051 (0.065)	-0.051 (0.065)	-0.039 (0.039)	-0.043 (0.040)
Repmnt. Term	-0.012* (0.007)	-0.011 (0.007)	0.017*** (0.006)	0.017*** (0.007)	0.010** (0.005)	0.010** (0.005)
Time s. Orig.	0.008 (0.008)	0.008 (0.007)	-0.014** (0.007)	-0.014** (0.007)	-0.014*** (0.005)	-0.013*** (0.005)
Installment	-1.206 (1.312)	-1.196 (1.306)	1.499 (1.413)	1.461 (1.442)	0.284 (0.824)	0.288 (0.827)
Male	0.067 (0.095)	0.083 (0.095)	-0.021 (0.085)	-0.052 (0.081)	0.030 (0.055)	0.004 (0.055)
Non-German	0.158 (0.121)	0.170 (0.121)	-0.199 (0.124)	-0.219* (0.125)	-0.117 (0.080)	-0.126 (0.079)
Age	0.076*** (0.029)	0.082*** (0.028)	-0.032 (0.027)	-0.038 (0.025)	-0.003 (0.016)	-0.019 (0.016)
Age squared	-0.089** (0.036)	-0.095*** (0.036)	0.036 (0.034)	0.043 (0.031)	0.003 (0.021)	0.023 (0.020)
Student	0.090 (0.233)	0.130 (0.231)	0.131 (0.176)	0.115 (0.177)	0.027 (0.133)	-0.014 (0.133)
Retired	0.792** (0.364)	0.822** (0.376)	-0.315 (0.310)	-0.352 (0.316)	0.013 (0.245)	-0.068 (0.250)



Table 5 (continued): Heterogeneous Treatment Effects

	Payment		Default		Termination: Now	
	(1)	(2)	(3)	(4)	(5)	(6)
$\beta_{T=1}-\beta_{T=0}$						
Interest Rate	0.446 (2.838)	0.331 (2.841)	1.149 (2.599)	1.676 (2.640)	-0.497 (1.621)	-0.044 (1.616)
Initial Amount	-0.089 (0.095)	-0.086 (0.094)	0.073 (0.082)	0.074 (0.084)	0.061 (0.053)	0.065 (0.054)
Repmnt. Term	0.014 (0.009)	0.013 (0.010)	-0.017** (0.008)	-0.017** (0.008)	-0.013** (0.007)	-0.013** (0.007)
Time s. Orig.	-0.007 (0.010)	-0.007 (0.010)	0.009 (0.009)	0.009 (0.009)	0.012* (0.006)	0.011* (0.006)
Installment	1.505 (1.637)	1.500 (1.627)	-1.815 (1.653)	-1.782 (1.698)	-0.510 (0.997)	-0.511 (1.004)
Male	-0.141 (0.128)	-0.160 (0.126)	0.060 (0.111)	0.102 (0.106)	-0.020 (0.070)	0.014 (0.070)
Non-German	-0.175 (0.163)	-0.193 (0.163)	0.256 (0.161)	0.284* (0.163)	0.142 (0.109)	0.154 (0.108)
Age	-0.077** (0.038)	-0.084** (0.038)	0.018 (0.038)	0.026 (0.034)	-0.012 (0.021)	0.009 (0.020)
Age squared	0.095** (0.047)	0.102** (0.046)	-0.024 (0.046)	-0.033 (0.042)	0.011 (0.027)	-0.014 (0.025)
Student	-0.107 (0.322)	-0.152 (0.319)	-0.191 (0.250)	-0.170 (0.249)	-0.052 (0.178)	0.001 (0.178)
Retired	-1.050** (0.437)	-1.083** (0.449)	0.458 (0.387)	0.502 (0.391)	-0.053 (0.289)	0.047 (0.294)
$\beta = \beta_{T=0} = \beta_{T=1}$						
Unemployed	-0.564 (0.365)	-0.541 (3.349)	0.220 (0.440)	0.193 (8.644)	0.378 (0.508)	0.353 (4.235)
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,448	3,448	3,448	3,448	3,448	3,448

Panel B: Average Treatment Effects (ATE)

	Payment		Default		Termination: Now	
	(1)	(2)	(3)	(4)	(5)	(6)
Average Treatment Effects	0.201*** (0.053)	0.166*** (0.046)	-0.140*** (0.049)	-0.105** (0.049)	-0.071** (0.035)	-0.063** (0.030)



Table 7: Borrowers' Surprise about the Delinquency or the Call

This table reports the effects of *Talk* on *Payment* estimated by OLS regression for the survey sample. In Columns (1) and (3) all borrowers are included. In Columns (2) and (4) we exclude follow-up calls from the regression. Given the small size of the sample and the absence of time variation, neither month nor location fixed effects are included. All variables are defined in Appendix Table A1. *p*-values are presented in parentheses and account for clustering at the agent level using a wild bootstrap-*t* approach with 1,000 repetitions (see, Cameron et al. (2008) and Menger (2015)). \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	Payment			
	(1) All	(2) First Call only	(3) All	(4) First Call only
Surprise: Delinquency	0.024 (0.498)	-0.012 (0.822)		
Surprise: Call			0.039 (0.470)	0.012 (0.836)
Delinquent Amount	-0.026 (0.416)	-0.038 (0.262)	-0.028 (0.382)	-0.038 (0.252)
Installment Loan	-0.209** (0.032)	-0.091 (0.104)	-0.208** (0.036)	-0.094* (0.072)
Male	-0.041 (0.458)	0.023 (0.604)	-0.041 (0.404)	0.019 (0.636)
Age	-0.012 (0.122)	-0.013* (0.078)	-0.012 (0.102)	-0.012* (0.086)
Age squared	0.000 (0.102)	0.000* (0.060)	0.000* (0.080)	0.000* (0.056)
Delinquency Last 6M	-0.094 (0.300)	-0.097 (0.282)	-0.095 (0.300)	-0.096 (0.270)
First Call	0.131* (0.078)		0.131* (0.064)	
Call Duration	-0.014 (0.354)	-0.027 (0.124)	-0.014 (0.306)	-0.028 (0.100)
Constant	1.051*** (0.000)	1.200*** (0.000)	1.061*** (0.000)	1.190*** (0.000)
Observations	245	196	245	196
Adjusted $R^2$	0.082	0.039	0.084	0.039

Table 8: Follow-up Calls

Panel A of this table reports averages for *Payment* as well as two alternative outcome variables, *Payment: Alt. 1* and *Payment: Alt. 2*, for subsets of delinquent POS borrowers. For untreated borrowers (Talk=0), both alternative payment outcomes equal *Payment*. For treated borrowers (Talk=1), *Payment: Alt. 1* is one if a borrower pays as agreed during the initial call, but zero otherwise. *Payment: Alt. 2* instead assumes that treated borrowers who do not pay as initially agreed repay at the probability predicted by the subset that are not reached for a follow-up call. Panel B reports the effects of *Talk* on *Payment*, *Payment: Alt. 1*, and *Payment: Alt. 2* estimated by estimated by Two-Stage Least Squares (2SLS) estimations. All regressions include borrower and loan characteristics as well as location and month fixed effects. Standard errors are clustered at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Average Payment Outcomes				
Subset of Borrowers	N	Payment	Payment: Alt. 1	Payment: Alt. 2
Untreated Borrowers (Talk=0)	950	0.55	0.55	0.55
Treated Borrowers (Talk=1)	2,498	0.75	0.59	0.72
<i>thereof</i> : Fail to Pay as Agreed	914	0.44	0	0.33
- Reached for Follow-up Call	631	0.49	0	0.34
- Not Reached for Follow-up Call	283	0.31	0	0.31

Panel B: Talk Effect without Follow-up Call			
	(1)	(2)	(3)
	Payment	Payment Alt. 1	Payment Alt. 2
Talk	0.344*** (0.089)	0.223** (0.106)	0.310*** (0.095)
Controls	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Observations	3,448	3,448	3,448

Table 9: Talk Effect by Nationality

This table reports the effects of *Talk* on *Payment*, *Default*, and *Termination: Now* estimated by Two-Stage Least Squares (2SLS) estimations, separately for German and Non-German POS borrowers. All regressions use *First Call Saturday* and *First Call Monday* as instruments and include borrower and loan characteristics as well as location and month fixed effects. *p*-values of tests of the equality of coefficient estimates between both sub-samples are reported. Standard errors are clustered at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Payment	Payment	Default	Default	Term.: Now	Term.: Now
	<i>German</i>	<i>Non-German</i>	<i>German</i>	<i>Non-German</i>	<i>German</i>	<i>Non-German</i>
Talk	0.388*** (0.097)	0.189 (0.158)	-0.320*** (0.087)	0.025 (0.186)	-0.156*** (0.053)	-0.048 (0.106)
<i>p</i> -value of the test: Talk <sup><i>German</i></sup> = Talk <sup><i>Non-German</i></sup>		0.135		0.016		0.124
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Location FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,745	703	2,745	703	2,745	703

Table 10: Agent Characteristics and Payment

This table reports the effect of *Likeable Voice* and *Likeable Voice (adjusted)* on *Payment* estimated by OLS regression for the survey sample excluding borrowers, for whom voice recordings are not available. Given the small size of the sample and the absence of time variation, neither month nor location fixed effects are included. All variables are defined in Appendix Table A1. *p*-values are presented in parentheses and account for clustering at the agent level using a wild bootstrap-*t* approach with 1,000 repetitions (see, Cameron et al. (2008) and Menger (2015)). \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
	Payment	Payment
Likeable Voice	0.248*	
	(0.092)	
Likeable Voice (adjusted)		0.261**
		(0.040)
Male Agent	0.188	0.175
	(0.134)	(0.150)
Age Agent	0.001	0.002
	(0.708)	(0.406)
Delinquent Amount	-0.077***	-0.079***
	(0.002)	(0.002)
Installment Loan	-0.331***	-0.335***
	(0.002)	(0.002)
Male	-0.054	-0.057
	(0.230)	(0.176)
Age	-0.018	-0.018
	(0.104)	(0.122)
Age squared	0.000	0.000
	(0.138)	(0.114)
Del. Last 6M	-0.135	-0.137
	(0.232)	(0.232)
First Call	0.132***	0.129**
	(0.008)	(0.036)
Call Duration	-0.018	-0.019
	(0.538)	(0.556)
Constant	0.916***	1.059***
	(0.000)	(0.000)
Observations	135	135
Adjusted $R^2$	0.169	0.169

Table 11: Long-term Effects of Talk

This table reports effects of *Talk* on different outcome variables for the main sample of POS borrowers. Panel A reports the effects of *Talk* on *Termination: Now* and *Termination: Overall* estimated by Two-Stage Least Squares (2SLS) estimations with *First Call Saturday* and *First Call Monday* as instruments. The table also reports the  $p$ -value of a test of the equality of the coefficient estimates for *Talk* in Columns (1) and (2). Panel B reports OLS estimates of the effect of *Talk* on *Future Delinquency*, *Time to Next Delinquency*, and *Termination: Later*. We follow Oster (2019) and compare the degree of selection on unobservables relative to observables. Specifically, we report the magnitude of unobservables relative to observables that is needed for the unobservables to explain our results ( $\delta$ ). All regressions include borrower and loan characteristics as well as location and month fixed effects. All variables are defined in Appendix Table A1. Standard errors are clustered at the location level. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Loan Termination

	(1)	(2)
	Termination: Now	Termination: Overall
Talk	-0.124*** (0.046)	-0.235*** (0.069)
$p$ -value of the test: $Talk^{Now} = Talk^{Overall}$		0.021
Controls	Yes	Yes
Month FE	Yes	Yes
Location FE	Yes	Yes
Observations	3,448	3,448

Panel B: Conditional Outcomes

	(1)	(2)	(3)
	Future Delinquency	Time to Next Delinquency	Termination: Later
Talk	-0.079*** (0.019)	28.554*** (6.868)	-0.049*** (0.011)
Controls	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Observations	3,092	1,140	3,092
$R^2$	0.097	0.213	0.079
$\delta$ (Oster, 2019)	1.97	0.81	2.85

Table 12: External Validity: Evidence from Overdraft Lines of Credit

This table reports the effects of *Talk* on *Payment*, *Default*, and *Termination: Now* estimated by Two-Stage Least Squares (2SLS) estimation for a sample of borrowers who are delinquent on their overdraft lines of credit associated with their checking account. All regressions use *First Call Saturday* and *First Call Monday* as instruments and include borrower and overdraft characteristics as well as location and month fixed effects. Standard errors are clustered at the location level. All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

	(1) Payment	(2) Default	(3) Termination: Now
Talk	0.204* (0.110)	-0.153* (0.090)	-0.122* (0.072)
Delinquent Amount	-0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Amount Credit Line	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Male	-0.026** (0.011)	0.025*** (0.008)	0.011* (0.006)
Non-German	-0.005 (0.015)	0.004 (0.014)	0.007 (0.009)
Age	0.001 (0.003)	-0.003 (0.003)	-0.000 (0.002)
Age squared	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Student	0.010 (0.018)	-0.010 (0.013)	-0.006 (0.009)
Retired	0.008 (0.033)	-0.005 (0.024)	0.004 (0.015)
Unemployed	-0.026 (0.045)	0.014 (0.033)	0.009 (0.017)
Month FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
Observations	2,499	2,499	2,499



Internet Appendix: Personal Communication in an Automated  
World: Evidence from Loan Repayments

## A Additional Figures and Tables

Figure A1: Sample Letter

This figure presents a sample letter that is sent to all delinquent borrowers on day 15 of the delinquency (see Letter I in Figure 1). The lender is referred to as “XY Bank.”

Hans Mustermann	XY Bank
Musterstraße 23	
12345 Musterstadt	
	Monday, 5th March 2012
Your account number: 105 1234567	
Dear Mr. Mustermann -	
The balance on your consumer loan account does not conform to the terms of the loan agreement. Currently, the account is in arrears with <b>EUR 175</b> .	
Please use the following bank account to pay the outstanding arrears until the <b>19<sup>th</sup> of March</b> :	
XY Bank	
Account Number: 7654321	
Bank Code / Routing Number: 54089312	
You may receive dunning letters, which inform you about the overdue payment, until the full repayment of arrears. In case these arrears are repaid by the above date, no further action is required.	
Please act now, because this is the only way to avoid the commencement of dunning proceedings.	
In the future, please contact our employees on time, before you get into payment difficulties. Experience has taught us that a short call is often sufficient to find a solution.	
Kind regards.	
XY Bank	
This is a machine generated letter without a signature.	

## Figure A2: Sample Call Transcript

This figure presents the transcript of a stylized sample phone conversation between a call center agent (A) and a delinquent borrower (B). The lender is referred to as “XY Bank”.

**Agent (A):** Hello my name is Fritz Mueller and I am calling from XY Bank. Do I speak to Mr Hans Mustermann?

**Borrower (B):** Yes, you do.

**A:** Could you please tell me your birth date and your zip code for verification?

**B:** 01.05.1963 and my zip code is 12345

**A:** Perfect, thank you. I am calling, since the actual balance on your consumer loan account does not conform to the terms of agreement. Currently, the account is in arrears with EUR 175. We are very interested to find a joint solution. How do you intend to repay the amount outstanding?

**B:** Yes, sorry. This month it did not work out as planned. I have already planned to settle the balance. At the beginning of next month, once my paycheck comes in, I will be able to transfer the money.

**A:** All right, that's within two weeks then.

**B:** Yes.

**A:** You will receive a letter with the information on which account to transfer the outstanding arrears within two weeks.

**B:** Ok, thank you.

**A:** Perfect. Thanks for your time and have a nice day.

Figure A3: Day of First Call

This figure shows schematically how the day of the first call is determined and the possible number of calls on Saturdays and on Mondays as a function of the day of the first call.

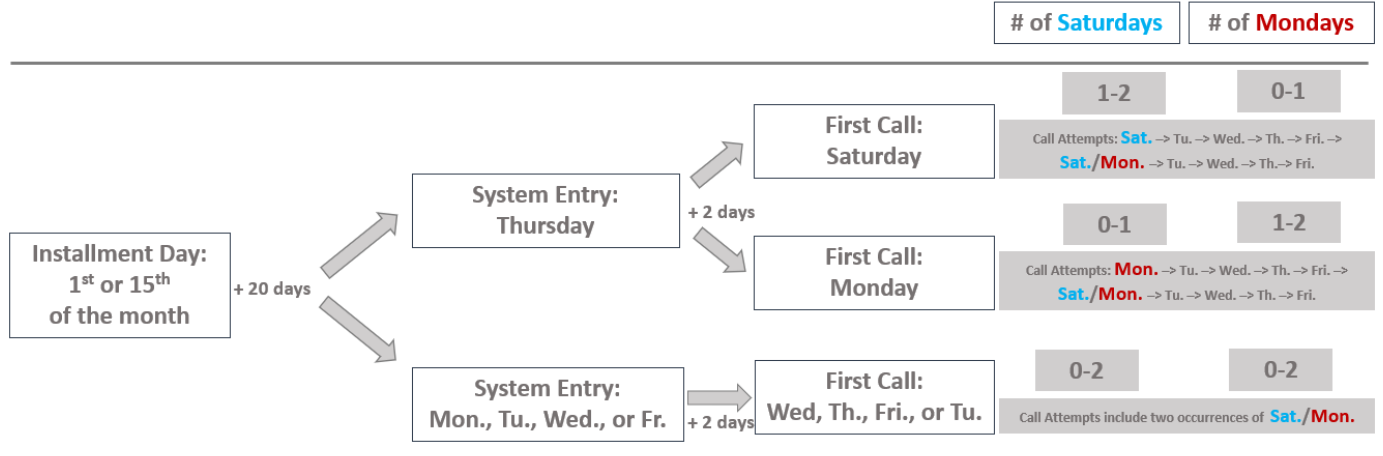


Figure A4: Weights: LATE vs. ATE

This figure presents the weights associated with different levels of unobservable resistance to treatment for the calculation of local treatment effects (LATEs) related to the 2SLS estimates (solid grey line) as well as for the calculation of average treatment effects (ATEs) (non-solid black line).

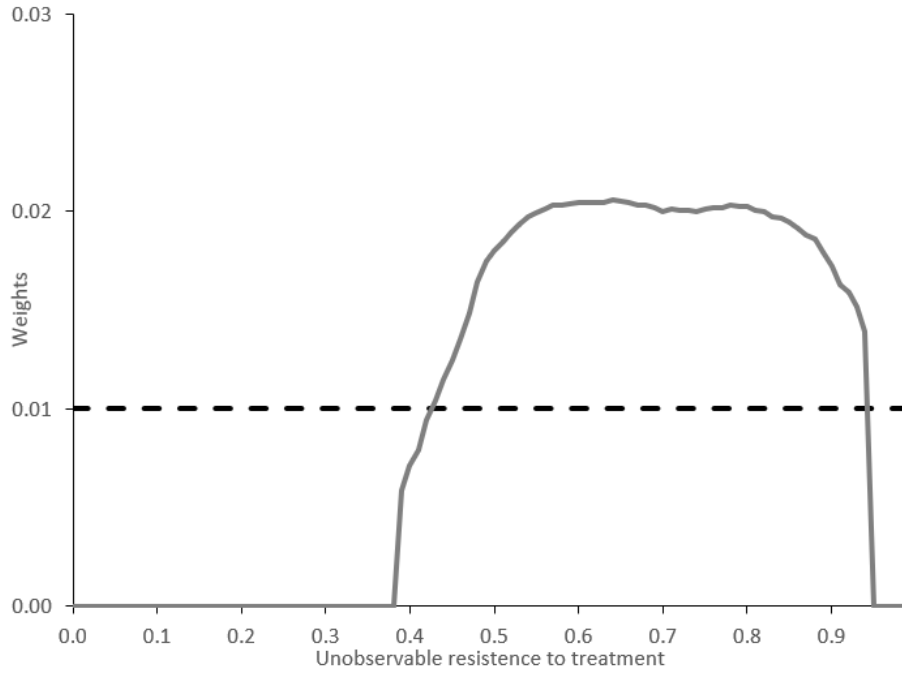


Table A1: Variable Descriptions

Variable	Description
Age	Age of the borrower.
Age Agent	The age of the call center agent speaking with a borrower.
Call Duration	The duration of the phone call, in minutes.
Default	An indicator variable that equals one if the borrower's payment is overdue for more than 90 days and zero otherwise.
Delinquent Amount	The amount of the borrower's shortfall, in thousands. For POS borrowers it equals the installment amount. For overdraft borrowers, it equals the amount that the credit line is overdrawn.
Delinquency Last 6M	An indicator variable, which is one if the borrower was delinquent (more than 20 days) during the previous six months and zero otherwise.
East Germany	An indicator variable that equals one if the borrower lives in the East of Germany (i.e., Brandenburg, Berlin, Saxony, Saxony-Anhalt, Thuringia), and zero otherwise.
First Call	An indicator variable, which is one if this is the first phone call related to the current delinquency and zero in case of a follow up call.
First Call Monday	An indicator variable that equals one if the first call attempt is on a Monday and zero otherwise.
First Call Saturday	An indicator variable that equals one if the first call attempt is on a Saturday and zero otherwise.
Future Delinquency	An indicator variable that equals one if a borrower becomes delinquent for a second time, after resolving the first delinquency, and zero otherwise.
Initial Loan Amount	The borrower's full initial loan amount, agreed upon at origination, in thousands.
Installment	The monthly loan installment, which equals the borrower's shortfall amount, measured at the beginning of the collection period, in thousands.
Interest Rate	The borrower's interest rate of the consumer loan, agreed upon at origination.
Likeable Voice	The fraction of six to seven raters that rate an agent's voice as 4 ("Likeable") or 5 ("Very Likeable") and zero otherwise.

Table A1 (continued): Variable Descriptions

Variable	Description
Likeable Voice (adjusted)	We first convert each rating into an indicator, which is one for ratings of four and five, and zero otherwise. We then form the average of this indicator for each rater and subtract it from the indicator. Likeable Voice (Adjusted) is the average of the adjusted indicators across raters, which we form for each agent.
Male	An indicator variable that equals one if the borrower is male and zero if female.
Male Agent	An indicator variable that equals one if the agent is male and zero if female.
Non-German	An indicator variable that equals one if the borrower is a German resident but not a citizen and zero otherwise.
North Germany	An indicator variable that equals one if the borrower lives in the north of Germany (i.e., Schleswig-Holstein, Mecklenburg-Western Pomerania, Hamburg, Bremen, Lower Saxony) and zero otherwise.
Outstanding Loan Amount	The borrower's outstanding loan amount, measured at the beginning of the delinquency, in thousands.
Payment	An indicator variable that equals one if the borrower resolves the delinquency within 45 days of its initial occurrence by repaying the outstanding amount and zero otherwise.
Payment: Alt. 1	An indicator variable that equals <i>Payment</i> for untreated borrowers. For treated borrowers it is one if a borrower pays as agreed within a few weeks, and zero otherwise.
Payment: Alt. 2	An variable that equals <i>Payment</i> for untreated borrowers. For treated borrowers who fail to repay as initially agreed and who are not reached for a follow-up call, we regress <i>Payment</i> on all independent variables except for <i>Talk</i> and then use the predicted payment outcome for all treated borrowers who fail to repay as initially agreed, whether or not they are reached for a follow-up call.
Repayment Term	Length of the loan measured by the number of total monthly payments.
Retired	An indicator variable that equals one if the borrower is a retiree and zero otherwise.
South Germany	An indicator variable that equals one if the borrower lives in the south of Germany (i.e., Bavaria, Baden-Wuerttemberg) and zero otherwise.

Table A1 (continued): Variable Descriptions

Variable	Description
Student	An indicator variable that equals one if the borrower is a student and zero otherwise.
Surprise: Delinquency	An indicator variable that equals one if an agent selects 4 (“Agree”) or 5 (“Strongly Agree”) on a 1-5 scale answering to the following statement: “The customer was surprised about the delinquency” and zero otherwise.
Surprise: Call	An indicator variable that equals one if an agent selects 4 (“Agree”) or 5 (“Strongly Agree”) on a 1-5 scale answering to the following statement: “The customer was surprised about the call” and zero otherwise.
Talk	An indicator variable that equals one if a borrower speaks with a call center agent on the phone and zero otherwise.
Termination: Now	An indicator variable that equals one if the loan has been terminated by the bank as a result of the current delinquency and zero otherwise.
Termination: Later	An indicator variable that equals one if the loan has been terminated by the bank as a result of a future delinquency and zero otherwise.
Termination: Overall	An indicator variable that equals one if the loan has been terminated by the bank at any point and zero otherwise.
Time since Origination	The number of months since loan origination.
Time until next Delinquency	The number of days between the first and second delinquency (as measured by their entry into the call center system) for borrowers who become delinquent at least twice between January 2012 and August 2014.
Unemployed	An indicator variable that equals one if the borrower is unemployed and zero otherwise.
West Germany	An indicator variable that equals one if the borrower lives in the west of Germany (i.e., Hesse, North Rhine-Westphalia, Rhineland-Palatinate, Saarland) and zero otherwise.



Table A2: Random Assignment of Call Center Agents

This table reports different results on the randomisation of call center agents using the survey sample. Panel A reports  $p$ -values of the the joint significance of agent fixed effects from OLS regressions of loan (Delinquent Amount), borrower (Male, Age), call (First Call) and payment characteristics (Delinquency last 6M) on the remaining loan and borrower characteristics and agent fixed effects using the survey sample.  $p$ -values are bootstrapped with 1,000 repetitions. Panel B reports  $p$ -values of the the joint significance of loan and borrower characteristics from linear probability models predicting the agent that is matched to a given borrower.  $p$ -values account for clustering at the agent level using a wild bootstrap- $t$  approach with 1,000 repetitions (see, Cameron et al. (2008) and Menger (2015)). Panel C reports results from linear regression of the age and gender of the agent that is matched to a given borrower on loan and borrower characteristics.  $p$ -values are presented in parentheses and account for clustering at the agent level using a wild bootstrap- $t$  approach with 1,000 repetitions (see, Cameron et al. (2008) and Menger (2015)). All variables are defined in Appendix Table A1. \*\*\*, \*\*, \* denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Agent Fixed Effects

	(1)	(2)	(3)	(4)	(5)
	Delinquent Amount	Male Borrower	Age Borrower	First Call	Delinquency Last 6M
Controls	Yes	Yes	Yes	Yes	Yes
Agent FE	Yes	Yes	Yes	Yes	Yes
$p$ -value of joint test of Agent FE	0.57	0.50	0.00	0.64	0.75
Observations	245	245	245	245	245

Panel B: Predicting Matched Call Center Agents

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	ID 1	ID 2	ID 3	ID 4	ID 5	ID 6	ID 7	ID 8	ID 9	ID 10	ID 11	ID 12	ID 13
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$p$ -value of joint test of Controls	0.54	0.91	0.25	0.31	0.58	0.91	0.90	0.28	0.67	0.86	0.41	0.14	0.73
Observations	245	245	245	245	245	245	245	245	245	245	245	245	245

Table A2: The Role of Agents in the Process

Panel C: Predicting Agent Gender and Age

	(1)	(2)
	Age Agent	Male Agent
Delinquent Amount	0.00 (0.47)	-0.00 (0.30)
Installment Loan	-1.15 (0.48)	0.03 (0.66)
Male	-0.79 (0.52)	-0.07 (0.25)
Age	0.09 (0.42)	-0.00 (0.85)
Age squared	-0.00 (0.57)	0.00 (0.50)
Del. last 6M	1.17 (0.21)	0.00 (1.00)
First Call	0.67 (0.29)	-0.05 (0.44)
Constant	0.67 (0.29)	-0.05 (0.44)
Observations	245	245
$R^2$	0.01	0.02

Table A3: Summary Statistics: Overdraft Sample

This table reports summary statistics for borrowers who are delinquent for the first time on their overdraft lines of credit. All variables are defined in Appendix Table A1.

	N	Mean	Median	SD	Min	Max
<i>Borrower Characteristics</i>						
Male	2,499	0.60	1	0.49	0	1
Age	2,499	35.01	32	12.84	14	75
Student	2,499	0.27	0	0.45	0	1
Retired	2,499	0.04	0	0.21	0	1
Unemployed	2,499	0.04	0	0.21	0	1
<i>Loan Characteristics</i>						
Delinquent Amount (in EUR)	2,499	167	100	181	25	1,343
Amount Credit Line (in EUR)	2,499	1,008	600	1,201	0	7,300
<i>Call Characteristics</i>						
Talk	2,499	0.69	1	0.46	0	1
Call Duration (in minutes)	1,785	2.52	2.04	1.69	0.25	24.43
<i>Payment Behavior</i>						
Payment	2,499	0.92	1	0.26	0	1
Default	2,499	0.05	0	0.22	0	1
Termination: Now	2,499	0.02	0	0.15	0	1

## B Discussion: Effect Sizes

We discuss the size of the treatment effects in this study in comparison to related studies. For a summary, see Appendix Table B1. While many papers examine credit-related interventions that aim at preventing delinquency and default, only a few papers study treatments targeted at already delinquent borrowers. Similar to our setting, Bursztyn, Fiorin, Gottlieb, and Kanz (2019) use a sample of credit card borrowers in Indonesia who have missed their most recent payment. In particular, the authors study the effect of different incentives on borrowers' probability of recovering from the delinquency within ten days. Differently from our setting, the treatment does not include any follow-up communication. They find that text messages sent to delinquent borrowers emphasizing moral or credit-reputation-based incentives increase the repayment probability by 9pp and 13pp, respectively, or by 28% and 41% relative to the (10-day) repayment probability of untreated borrowers of 32%. For a sub-sample of high risk borrowers, treatment effects are even larger, ranging between 14pp and 19pp or 65% and 73% in relative terms.

Among delinquent POS borrowers in Germany, we find that a short phone conversation with a bank agent with a possible follow-up call has an average treatment effect on the 45-day repayment probability of 17pp to 20pp. While the effect size is slightly larger than those in Bursztyn, Fiorin, Gottlieb, and Kanz (2019) in absolute terms, it is very similar in relative terms, a 29% to 36% increase relative to the (45-day) repayment probability of untreated borrowers of about 56% to 58%.<sup>21</sup>

With respect to default, Bursztyn, Fiorin, Gottlieb, and Kanz (2019) do not find any treatment effects for their full sample. However, they find large effects for the sub-sample of high risk borrowers, captured by a reduction of the default probability by 9pp (moral obligation) and 11pp (credit reputation), relative to a default probability of 13pp for the

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<sup>21</sup>Given the observational nature of our data, we do not have a control sample. For comparison purposes, we calculate the expected outcome in the absence of a phone call ( $p_c$ ) for our sample by solving the relationship between the observed outcome for the full sample ( $p_f$ ), the 72% treatment probability, and the estimated average treatment effect (ATE):  $p_f = 0.28p_c + 0.72(p_c + ATE)$ .

control group. While we find a significant average treatment effect of -10pp to -14pp for all borrowers, its relative size is smaller given a higher overall default rate in our sample.

Looking at future delinquencies, Schoar (2012) finds that among Indian small business borrowers, for borrowers with one previous late payment, a personal contact with a bank agent reduces the probability of a second late payment by between 7pp and 22pp, depending on the intensity of treatment relative to untreated borrowers who receive only a payment reminder in form of a text message and relative to an overall probability of a second delinquency of 31%. We find that treated borrowers are about 8pp less likely to become delinquent again compared to a sample average of 37%. The effect size in our study is therefore similar to the effect size of the low intensity treatment, which consists of a reminder phone call by randomly assigned bank agents.

Our effect sizes can also be compared to those of interventions that occur before, not after, the payment due date. For example, Karlan, Mortin, and Zinman (2015) use a sample of Philippine microloan borrowers and find that personalized payment reminders in the form of text messages reduce the probability of an unpaid outstanding balance 30 days after the maturity of the loan by between 5pp and 8pp or by 36% to 57% relative to the probability of an unpaid balance of 14% among untreated borrowers. Interestingly, they find that only personalized reminders have an effect on the repayment probability, while non-personalized reminders do not. Moulton, Collins, and Loibl (2015) provide evidence from a field experiment with first-time home buyers in the U.S. They find that quarterly contact from a financial coach reduces 90-day mortgage delinquencies by 20% for all borrowers and by 41% for high risk borrowers relative to borrowers who do not receive coaching. Finally, Cadena and Schoar (2011) show that payment reminders as well as economic incentives in the form of refunds or future rate reductions improve repayment behavior among Ugandan micro borrowers by about 30%, while Medina (2021) finds that simple phone notifications sent to Brazilian credit card borrowers about upcoming payments reduce the occurrence of late fees by about 9%.

Overall, our findings provide evidence that personal communication between a delinquent borrower and a bank agent can significantly improve the borrower's immediate and future repayment behavior. The effect sizes are substantial but comparable to what other studies have documented in broadly related settings.

Table B1: Effect Sizes

Outcome	Loan Type	Baseline	Treatment Effect (abs.)	Treatment Effect (rel.)	Authors	Comment
<b>Delinquent Borrowers</b>						
Payment (by day 45)	POS	56 to 58%	+17 to +20pp	+29 to +36%	THIS PAPER	
Payment (by day 10)	Credit Card	32%	+9pp	+28%	Bursztyn et al. (2019)	Moral incentives
Payment (by day 10)	Credit Card	32%	+13pp	+41%	Bursztyn et al. (2019)	Financial incentives
Payment (by day 10)	Credit Card	26%	+14 to +19pp	+65 to +73%	Bursztyn et al. (2019)	High risk borrowers
Default	POS	31 to 34%	-10 to -14pp	-33 to -41%	THIS PAPER	
Default	Credit Card	5%	0pp	0%	Bursztyn et al. (2019)	All borrowers
Default	Credit Card	13%	-9 to -11pp	-69 to -85%	Bursztyn et al. (2019)	High risk borrowers
Future Delinquency	POS	37%*	-8pp	-22%	THIS PAPER	
Future Delinquency	Small bus. loan	31%*	-7pp	-23%	Schoar (2012)	Personal contact: Low intensity
Future Delinquency	Small bus. loan	31%*	-22pp	-71%	Schoar (2012)	Personal contact: High intensity
<b>All Borrowers</b>						
Pay any Late Fees	Credit Card	29%	-3pp	-9%	Medina (2019)	Reminder: Push notification
Perfect Repayment	Microloan	27%	+9pp	+32%	Cadena/Schoar (2011)	Cash back incentive
Perfect Repayment	Microloan	27%	+7pp	+26%	Cadena/Schoar (2011)	Future reduced rate incentive
Perfect Repayment	Microloan	27%	+9pp	+33%	Cadena/Schoar (2011)	Reminder: SMS
Default	Microloan	14%	-5 to -8pp	-36 to -57%	Karlan et al. (2015)	Reminder: Personalized SMS
Ever 90 Days Late	Mortgage	18%	-4pp	-20%	Moulton et al. (2015)	Coaching: All borrowers
Ever 90 Days Late	Mortgage	32%	-13pp	-41%	Moulton et al. (2015)	Coaching: Borr. with prior defaults

\* The numbers reflect the average of the full sample, not of the control group.