

Whisper Words of Wisdom: How Financial Counseling can Reduce Delinquency in Consumer Loans

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ABSTRACT

We study the impact of a simplified financial counseling service provided by text messages, that includes images and videos, to low-income clients of a public bank in Chile. Using a randomized experiment and administrative data, we study the delinquency rates of individuals that received a set of messages about how to prevent and face shocks, and how to face present bias and social comparison. We also randomized the provision of an additional set of messages about concrete and practical options offered by the bank that individuals could take when they are at risk of defaulting. The estimated effect for addition of both types of financial counseling is a reduction in the loan delinquency rates of between 20% and 26%. The intervention also proved to be highly cost-effective allowing for large bank savings. We also find heterogeneous impacts, obtaining larger effects for young individuals, for men, for those with ex-ante higher probability to default, and for low-income individuals.

Keywords: financial inclusion, bank-loan delinquency, financial counseling.

JEL Codes: G21, G41, G51, G53.

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1 Introduction

The financial inclusion of low-income borrowers is limited by their high delinquency rates. Strategies to decrease loan delinquency among low-income borrowers are a significant challenge both in developing and developed economies. Providing financial education has been the classical approach to tackle this issue. However, financial education is an expensive tool, that has low take-up (Bruhn et al., 2014; Lara Ibarra et al., 2019) and its effectiveness is low in changing borrowing behavior (Fernandes et al., 2014; Miller et al., 2015; Kaiser and Menkhoff, 2017). Other approaches have been applied lately to encourage debt repayment based on psychology insights. For example, sending reminders by text messages have proven to be useful to fight limited attention problems resulting in an increase in loan repayment (Cadena and Schoar, 2011). Moreover, recent evidence suggests that the content of the text messages is important. For instance, customizing text messages (Karlan et al., 2015) and including content that appeal to moral behavior (Bursztyn et al., 2019) have proved to be useful to decrease loan delinquency rates.

In this paper, we explore the role that financial counseling provided through text messages has in order to reduce loan delinquency in low-income borrowers of a public bank in Chile. In addition to a simple neutral reminder message, we design two types of financial counseling: cognitive bias counseling and practical counseling. In order to evaluate the impact of financial counseling on loan delinquency, we randomly allocated new consumer loans clients of the bank to three groups as follows: a base group that receives a neutral text message every week reminding the borrower of its due (we call it T0); a treatment group that receives one message every week of the cognitive counseling set (T1); and a treatment group that receives two messages every week, one from each type of counseling set (T2). Since the base group T0 receives a neutral text message, whatever impact we may find is due to the content and not because of the reminder effect associated to the limited attention bias.

For the set of messages that compound the cognitive counseling (T1), we build on prior research in behavioral economics to design text messages that target cognitive biases such as limited attention (Gabaix and Laibson, 2006; Chetty et al., 2009; Kőszegi and Szeidl, 2013; Bordalo et al., 2013), present bias (Meier and Sprenger, 2010; Bertrand and Morse, 2011; ?) and the role of social comparison in financial decision making (Luttmer, 2005; Brown and Gray, 2016). Also, in line with the literature of over-indebtedness drivers (Schicks, 2013, 2014), we designed messages that provide useful information about how to prevent and face shocks at the household level such as job loss, health issues, etc. Furthermore, [following recent evidence that suggest that visual aids are powerful tools to provide financial education (Citas)], we worked with a graphic design and audiovisual team to build short comics and videos that conveys the same ideas of the aforementioned text messages, in order to send them embedded in the SMS.

For the practical counseling to face debt repayment problems (T2), we designed other set of text messages aimed to render information about concrete and practical options that the bank provides to individuals that may be at risk of defaulting. These are such as a grace period options if the borrower loses his job, or customize renegotiation options, that typically low-income clients are not aware off and won't pursue to know because they are afraid of getting in contact with the bank.

The sample of 4,479 individuals we use is composed by new consumer loans clients from the low-income group defined by the bank (on average US\$ 500 monthly income). We restricted the sample to individuals less than 65 years old (retirement age), with a high baseline probability of 30-day loan delinquency ever according to historical information, and that accepted the invitation to participate in the experiment. The aim was to evaluate the financial counseling for those who are more likely to be affected by the treatment; this is those with the higher delinquency rates, who turn out to be mostly men and younger individuals. Then, the randomization was stratified by the baseline probability of loan delinquency level, age and gender, allowing to perform statistical inference of differences between these groups.

To evaluate the financial counseling intervention, we make use of a financial decision as the main outcome: delinquency rates. This is different from most evaluations of financial education programs for example, where sometimes they evaluate financial knowledge, or intermediate outcomes such as attitudes towards savings or paying on time. Instead, we worked with weekly administrative data from the bank. Then, our main outcomes are 30, 60, and 90 days loan delinquency rates.

To maximize the probability of affecting the delinquency rates with the intervention, we attempted to identify those individuals with higher probability to fall into arrears. More precisely, we predicted the baseline 30-days probability of delinquency for each individual using a predictive model calibrated with historical data from the bank (information from individuals provided when applying for the loan and administrative data from the financial system). We invited the individuals with high probability of defaulting, defined as having a greater probability than a certain threshold, to participate in the intervention. The final sample that was intervened corresponds to the individuals that accepted the invitation.

Our estimation results allow us to highlight three main conclusions. First, it is possible to reduce delinquency rates by using a simplified financial counseling through text messages. Moreover, the content of the messages are important. In the short run, by week 12, the treatment group that received the cognitive counseling plus the practical counseling (T2) decreases the probability of 30-day delinquency by 20% on average with respect to the group that received a neutral message (T0). This decrease in the delinquency rate increases to 33% when considering 60-days delays. However, the group that received only the cognitive counseling (T1) does not seem to significantly reduce their delinquency rates in the short run. However, in the long-run there is no significant effect at 30-days delays, but the reduction in 60 and 90-days delays are much larger and significant under both treatments (27% and 29% respectively for T1 and T2).

Second, those who are ex-ante more prone to have higher delinquency rates are more affected by the intervention. In fact, younger individuals, males, and those with lower income are those who benefit the most by the financial counseling. In the long run, by week 24, those individuals below 35-years old exhibit a reduction in delinquency rates at 60-days of 39% when receiving cognitive and financial counseling. Measuring 90-days delinquency rates there is a reduction of 47% probability for this group. In parallel, males show a reduction of 20% in 60-days delinquency rates, and of 26% in 90-days delinquency rates. Also, those low-income individuals show a reduction of 22% in 30-days delinquency rates, 49% in 60-days delinquency rates, and of 41% in 90-days delinquency rates.

Third, the intervention is highly cost-effective, allowing for large bank savings. We use synthetic control group among those who were not invited to participate to compare with the individuals that received any type of message. In the long run, at week 24, we observe a reduction in delinquency rates of between 19% and 23%, driven by the neutral message. In total, we observe that the treated individuals exhibit 35% less unpaid debt considering 30-days delays, implying about ‘savings’ for the bank of about US\$108,000 for the sample intervened.

Our paper contributes to the previous literature in several ways. First, while there is a great body of research in micro-finance that have studied the provision of nudges through text-messages to increase savings and encourage loan repayment (Cadena and Schoar, 2011; Karlan et al., 2015; Akbas et al., 2016; Karlan et al., 2016; Kast et al., 2018; Bursztyrn et al., 2019), to the best of our knowledge, there is no previous research about providing a comprehensive set of financial counsels by this means. More importantly, our research highlights the importance of carefully designing the content of the messages to obtain better reduction in delinquency rates.

Second, we add to the incipient literature that studies the effect of using audiovisual aids to provide financial education since they involve more the viewers and produce a lasting impression (Carpena et al., 2011; Ambuehl et al., 2014; Heinberg et al., 2014; Lusardi et al., 2017). In particular, in contrast to previous research, we provide short comics and very short videos (less than one minute) that are customized to the local Chilean case. Our results support the relevance of these audiovisual aids, although they seem to need practical additional components.

Third, our results shed light on the importance of customizing the text messages according to individuals’ characteristics. The heterogeneous effects found in terms of age, gender and the baseline probability of defaulting, suggest that there is room to increase tailoring the text messages in order to be more effective.

Overall, this work shows that there is some space for an inexpensive and cost-effective way to provide sound financial counseling that reduces the loan delinquency rate what benefits both the individual and the bank. Exploring more variations of financial counseling could improve not only individuals well-being through more financial inclusion, but also reduce banks’ cost while serving low-income groups.

Although our study contributes to a better understanding of how low-income individuals could react to simplified financial counseling, it is not exempt of limitations. We were restricted to use administrative data only, so that we could observe the individual’s financial behavior within the bank and in the financial system as a whole, but we were completely blind about other sources of credit. We were not allowed to use other sources of information such as household surveys, so that we could not gather information about the use of other financial tools, both formal and informal, that could affect treatments results. In fact, treated individuals could have crowded-out other credits. Also, other household members financial information was not available to help explaining treated individuals decisions and the effectiveness of the intervention. Nevertheless, this study calls attention to new research possibilities that certainly require complementary sources of information to deepen the understanding of the simplified financial counseling.

The paper is divided into seven sections. After this introduction, we discuss the experimental design in Section 2. We then present the administrative data and the variables used in the study in Section 3. We present the empirical strategy in Section 4. We analyze the results about the content of the messages in section 5. We study the results as whole and cost-benefit analysis in section 6. Finally, we conclude in Section 7.

2 Implementing a simplified financial counseling using text messages: The intervention and experimental design

As we mentioned before, despite the efforts of public and private initiatives, formal financial education is an expensive tool that has not yet shown to be consistently effective in affecting borrowing behavior (Fernandes et al., 2014; Miller et al., 2015; Kaiser and Menkhoff, 2017). In fact, financial education has proven to be effective to improve financial knowledge and financial awareness, but not in changing financial behavior significantly and consistently. On the other hand, financial counseling has been widely used by job-counselors within firms and in other contexts by social workers (student loans) and clinical psychologists, with some evidence of its effectiveness (Collins and Schmeiser, 2013; Moulton et al., 2015; Barr et al., 2019; Roll and Moulton, 2019). The main difference between financial education and financial counseling is that the latter is customized to address the problem the individual is currently facing (Collins and O’rourke, 2010; Lander, 2018). However, providing tailor-made counseling is also expensive. With this in mind, we designed a provision of what we call ‘simplified financial counseling’. Its aim is to affect individuals’ attitudes and behavior but with a low-cost intervention that can be easily scale-up.

In this intervention, we attempt to mimic an in-person financial counseling by sending weekly text messages by SMS. We designed a set of messages based on the main drivers of default and psychology insights about self-control problems and social comparison that we call *cognitive financial counseling*. We also developed a set of messages what we call *practical financial counseling* with information about practical and concrete options offered by the bank to face shocks and delays.

Our approach differs from classical financial education in several ways. First, our focus is in providing financial counseling rather than teaching financial concepts such as compound interest, inflation, and diversification. There is evidence that even if individuals are able to learn this concepts they may have problems to applied them in their financial decisions (Lusardi, 2011). In contrast, our approach is based in recent evidence that indicates that individuals tend to benefit from rules of thumb (Drexler et al., 2014).

Second, a common problem with financial education programs is the low take-up. We reduce the cost of take-up by sending messages by SMS. In order to maximize the probability of the messages to be read, we conducted focus groups to obtain qualitative information about the best timing to send the messages.

Third, in line with financial counseling, we customized the messages to the specific context of low-income clients. In the case of the *cognitive financial counseling* we designed messages that consider what we know about the drivers of financial behavior in this population. For

instance, it has been documented that the main reasons to report falling into arrears is due to income and/or expenses shocks (Álvarez and Ruiz-Tagle, 2016). Income shocks come from unemployment or a drop in independent income. Expenses shocks could come from unexpected out of pocket health expenditure and other household expenses. Therefore, our messages contain specific wording related with these topics.

Moreover, we build on the abundant literature that has shown the important role of cognitive biases on low-income individuals' financial decisions. For instance, poor people are often left with little attentional capacity, what has been linked with less saving and over-borrowing (Shah et al., 2012; Mani et al., 2013). As it has been shown by the literature, the provision of text messages can work as reminders that help individuals meet their obligations. Additionally, evidence suggests that present bias, that is, overweighting short-term versus long-term rewards, is critically connected to financial decisions (Gathergood, 2012; Meier and Sprenger, 2010; Gathergood and Weber, 2017; Kuchler and Pagel, 2020). Therefore, we designed messages that consider this common bias promoting saving on a daily basis.

Finally, our cognitive financial counseling also has messages that considers social comparison as driver of financial decisions. In fact, there is abundant evidence that indicates that peers influence individuals' levels of consumption and indebtedness (Bertrand and Morse, 2016; Agarwal et al., 2019; Bricker et al., 2020). This means, that individuals could be motivated to get over indebted in order "to keep up with the joneses", what may increase the likelihood of falling into arrears.

In parallel, the messages of the *practical financial counseling* were designed considering the information gap that individuals encounter in their relationship with the bank. In fact, in the process of designing the interventions, we had meetings with different banks agents, including those that have frequent face contact with the clients. This allowed us to identify what sort of information was particularly relevant to reinforce for the clients. In fact, the bank agents highlighted that individuals usually do not know who to turn to at the bank when they have problems. Moreover, clients lack information about the options they have to reschedule their credit or even have a grace period in cases of job-loss, sickness, or other shocks. Also, most of the clients have insurances related with their credits, but few of them are aware of its coverage. Overall, many of this misinformation seems to be driven by the fact that individuals do not feel attracted to go to the bank seeking for help. Hence, the practical financial counseling we designed was heavily based on what we learned from these interviews.

2.1 Description of the intervention

The intervention consists in the provision of financial counseling through text messages aimed to reduce consumer loan delinquency in low income individuals. Specifically, we designed two sets of financial counseling: cognitive and practical. Following prior literature that recommends to customize text messages (Karlan et al., 2015), we open every message with the name of the individual we are addressing. Moreover, there is evidence that using exemplars have a greater impact in marketing communication campaigns both in Chile and in other countries (Uribe et al., 2013; Krämer and Peter, 2020). Therefore, all our messages are written as if they come from an individual that had a credit in the past with the bank and is sharing his learning experience. Actually, the week before the intervention counseling begins we sent an introductory message from this fictional character, indicating that he will be sharing with them the lessons from his personal experience (See Appendix A).

As mentioned before, the cognitive financial counseling is focused on providing information about how to prevent and face shocks, and how to face different cognitive biases and social comparison that may lead to bank loan delinquency. Regarding the former, we designed 5 messages indicating that our character benefited from saving every month, making a budget, and faced shocks by reducing or postponing expenses in non-essential, sell used goods, and/or used some of his savings. In order to face present bias, we included 3 messages where the character indicated the importance of thinking before buying, rather than act on the impulse. Finally, we include 2 messages where the character indicates that it has been more beneficial for him to keep track of his finances rather than keeping up with the joneses (See Appendix A).

Moreover, following recent literature that indicates that visual aids and videos may be more appealing (Carpena et al., 2011; Ambuehl et al., 2014; Heinberg et al., 2014; Lusardi et al., 2017), we designed 4 comics and 6 videos that cover the same main ideas of the text messages. We worked with graphic design offices, where special emphasis was put on conveying the main messages easily with short and self-explanatory comics (equal or less to six charts) and videos (less than one minute), portraying typical situations low-income individual may face, and using characters with whom they relate (See Appendix A).

On the other hand, we designed a Practical Counseling that consists of text messages providing information about concrete and practical options individuals could take when they face shocks or when they are at risk of defaulting. Following the qualitative information we raised from speaking with the bank agents, we included 2 messages that indicated how to reach the appropriate bank department to handle their doubts when facing difficulties to pay. Also, we included 8 messages that highlighted different options that the bank offers to individuals when in risk of defaulting, such as, pay the minimum amount of the installment, renegotiate the loan, calling a grace period due to job loss or health problem, and make use of the insurance benefits associated to their loans, among others.

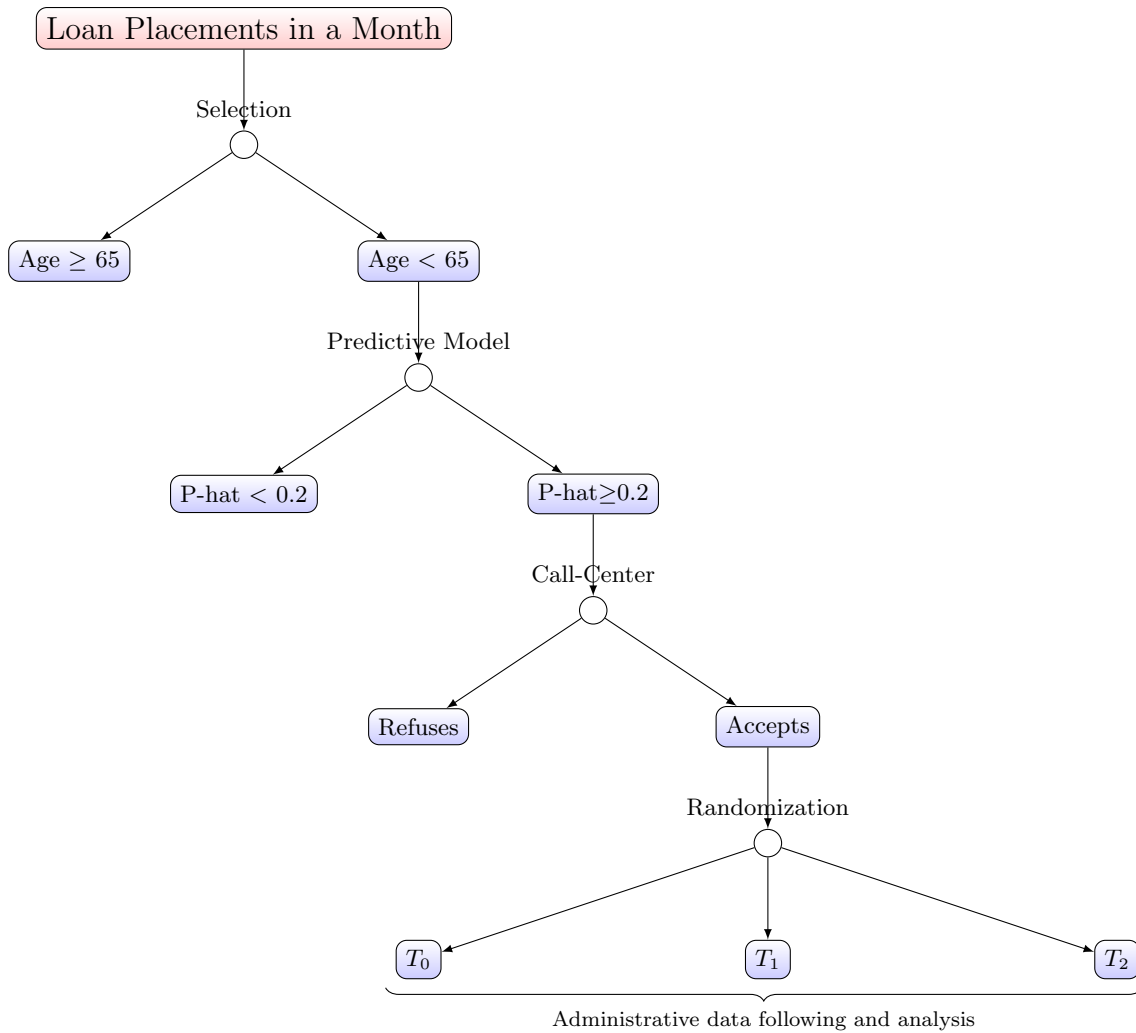
The process of design and validation of this messages included working along a multidisciplinary team, that included social workers, mass communication academics and professionals, current financial education leaders at private banks, experts in financial education at the school level, psychologist and different workers from the bank. Afterwards, we performed in-depth interviews with a sample of actual BancoEstado costumers with the same characteristics from the population in study, to check if both the cognitive and practical counseling were considered appropriate to reach the goals of this research. In Appendix B there is a summary of the results of this qualitative work. Overall, the reception was good and only minor changes were suggested.

2.2 The experimental design

The field experiment was implemented for a sub sample of the universe of consumer loan clients from the low income segment of Chile’s public bank *BancoEstado*, in the Metropolitan Region. We first study the universe of individuals that started a loan between 2012-2018. This group is compound of 42% females, mostly between 25 and 54 years old. Only 26% of the individuals have more than secondary education. 82% have less than US\$850 (we provide a comprehensive description of this target population using the bank information for the period 2012-2018 in Appendix C).

The intervention was conducted in seven sequential monthly waves, coinciding with the bank’s monthly consumer loan placements from January 2019 to July 2019. For each one of the monthly samples, the intervention followed the structure shown in Figure 1. As a first step, from each cohort of bank’s new consumer loan clients we excluded those people aged 65 or older, to count with a sample that presents higher loan-delinquency prevalence so that the treatments could have larger effect on them (for more details on this selection criterion, see Appendix C). Secondly, and with the same purpose, we estimated a delinquency predictive model using BancoEstado administrative information for the period 2012-2018. This allows us to identify and select, ex-ante, those individuals whose probability of falling into loan delinquency is higher (those with a predicted delinquency probability equal or higher to 0.2). The description of this predictive model, an out of sample prediction exercise and the selection threshold criterion are detailed in Appendix D.

Figure 1: **Intervention’s Structure**



Notes: Authors’ own elaboration.

Third, and after selecting the sample based on the predictive model, people were phone called to obtain their informed consent to participate. In this stage, all the relevant information

about the study was shared: objectives, potential benefits, potential risks, confidentiality, researchers information and participants' rights (and afterwards the same information was sent by e-mail to those who accepted). Finally, the individuals that accepted to participate were randomly assigned between three different treatment groups and then the weekly messages sending started. Once the treatments began, individuals debt payment behavior was started to be analyzed using bank's weekly administrative data.

Regarding the experiment design, the allocation was carried out to three different groups that receives messages as follows:

- T0: Receives a neutral informative reminder once a week.
- T1: Receives one message every week of the cognitive counseling set.
- T2: Receives two messages every week, one from the cognitive counseling set and one from the practical counseling set.

Besides, all participants receives first (at 'week 0') a message that introduces the message sender from a first-person and testimonial perspective (see Appendix A). The reason why the base group receives a neutral text message is to be able to distinguish between a reminder effect and a content effect. If we do not send any message to the base group, the impacts of T1 and T2 would be mixed between both effects (reminder and content). Since the base group receives a neutral reminder text message, any impact we may find would be due to the content and not because of the reminder effect associated to the limited attention bias.

The random allocation of individuals to the three possible groups was applied in a 2 to 1 proportion between the neutral message group and each of the financial counseling treatment groups. This in order to increase the power of each of the hypothesis (by needing fewer observations in each treatment group to detect an effect). Besides, in order to be able to perform statistical inference to explore potential heterogeneous impacts of the treatments we stratified the randomization according to age (18 to 35 years old and 36 to 64 years old), gender (men and women), the predicted 30-day delinquency baseline probability (six groups according to estimated distribution on BancoEstado 2012-2018 information) and individual's financial system history in last 12 months (without debt, with debt but without 30-day delinquency and with debt and 30-day delinquency).

Regarding the contents sent each week and the sending days for each treatment we proceeded as follows. For the set of all messages that constitutes the Cognitive Counseling, we defined 4 possible orders that were randomly assigned among the individuals that receive this messages, within each treatment group. Each one of these formats follows a structure that alternates messages between the 4 different objectives of the cognitive counseling set (prevent shocks, face shocks, reduce impulsive purchases and reduce social comparison) and that places initially more importance to the audiovisual messages (2 to 1 proportion at the beginning and then 1 to 2). On the other side, for the messages that conform the Practical Counseling set, we defined also 4 possible formats that follows a random order and assigned them randomly to the participants of the second treatment group. Finally, sending days were randomly assigned within the week days and the deliver hour was framed between 6pm and 8pm, as suggested by the previous qualitative field work with BancoEstado's clients (see Appendix B). The only restriction that was imposed was that those receiving two messages a week (second treatment group) received them with 2 or 3 days of differences (e.g. Monday and Wednesday or Tuesday

and Friday).

2.3 The implementation of the intervention

In the first row of Table 1 we present the total number of consumer loan placements in BancoEstado’s Emerging Segment in the Metropolitan Region for each one of the seven cohorts considered for this study (15,257 individuals). After the selection based on age and on the predictive model, the 74% of the sample with higher loan-delinquency probability passed to the invitation process (row 3, 11,125 individuals). From the individuals of this group, 45% accepted to participate in the experiment, which corresponds to 4,479 people (rows 4 and 8). For each wave, the sample of participants was randomly assigned to the three possible groups (rows 5, 6 and 7), according to the procedure described above.

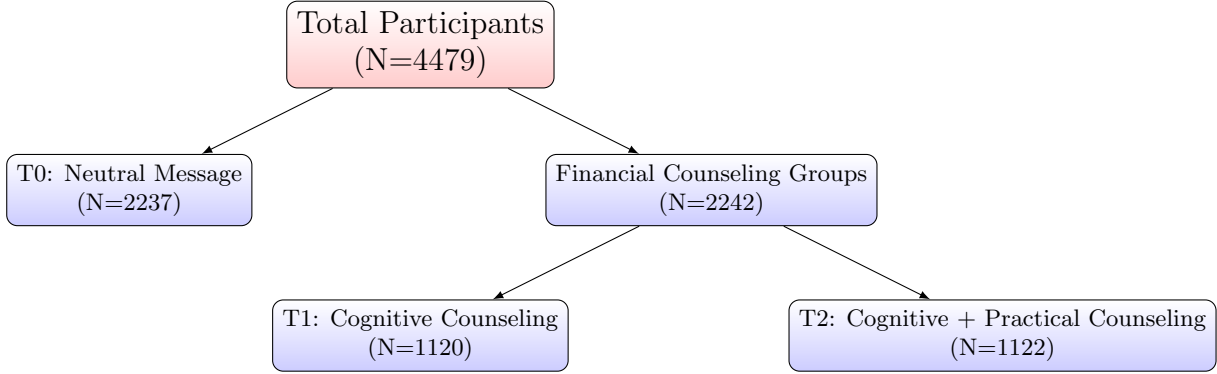
Table 1: **Loan Placements by Month, Selection and Assignment**

Sample	Month of loan placements							Total
	January	February	March	April	May	June	July	
Total	2500	1789	1731	2058	1929	2492	2758	15257
Age <65	2391	1717	1646	1951	1815	2336	2594	14447
$P\text{-hat} \geq 0.2$	1760	1300	1227	1510	1443	1815	2073	11125
Accepts	774	596	529	683	736	832	329	4479
T0	386	298	264	341	368	416	164	2237
T1	194	149	132	171	184	208	82	1120
T2	194	149	133	171	184	208	83	1122
Accumulated	774	1370	1899	2582	3318	4150	4479	

Notes: Authors’ own calculations. Since October 18th the Call-Center was suspended due to the social conflict occurring in Chile. The contact process for the sample of loan placements of July was interrupted and it was decided to consider for the intervention only those people that have accepted to participate before this. That’s why the July participant sample is smaller than the rest.

Regarding the participant sample, we summarize the random allocation in the intervention groups in Figure 2. From the total of 4,479 individuals that accepted to participate in the experiment, 2,237 were assigned to the neutral message group and 2,242 to the financial counseling treatment groups. From the latter, 1,120 participants were assigned to the first treatment (only cognitive counseling) and 1,122 to second one (both cognitive and practical counseling).

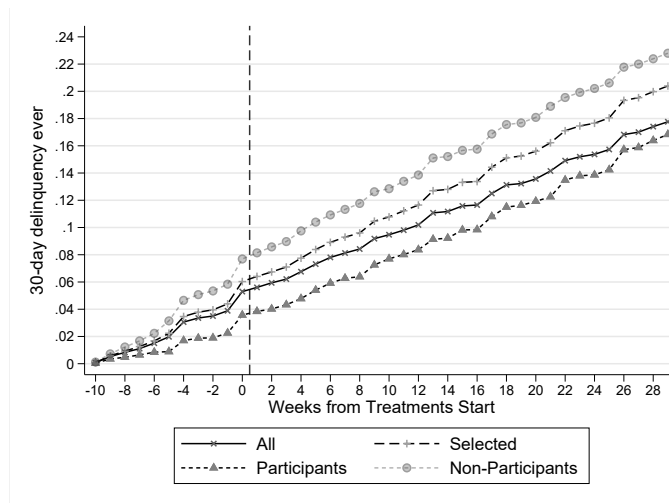
Figure 2: **Participants Assignment**



Notes: Authors' own elaboration.

We present in Figure 3 the 30-day delinquency ever rate according to the different samples mentioned in Table 1. The observation period starts 10 weeks before the actual date of the first message (vertical dashed line), and continues until week 30 after the beginning of the treatment. It can be noted that the sample selected to be invited effectively has a greater prevalence than the initial sample (0.053 vs 0.061 at week 0, and 0.114 vs 0.131 at week 15). However, those who accepts to participate have loan-delinquency rates lower than the initial sample (0.036 at week 0) indicating that participation acceptance was not fully random. On the other hand, selected individuals that refused to participate or that we were not able to contact show a 30-day loan delinquency rate much higher than the participant sample (0.076 at week 0). These patterns suggest that whatever treatment impact that we may find in reducing 30-day delinquency rates on the participant sample could be interpreted as a lower bound effect for the whole universe of individuals, as we are intervening a group with lower default rates than the non participants. The 60-day and 90-day delinquency rates exhibit similar patterns (see Appendix E).

Figure 3: **30-day loan delinquency ever, by Sample Selection and Participation**



Notes: Authors' own calculations.

To explore the acceptance decision, we model the decision to participate in the experiment by estimating a probit model for the selected sample using as dependent variable a binary variable equal to 1 for participants (0 otherwise) and as independent variables the wide set of covariables mentioned above. The results are shown in Table 2. A number of individual characteristics appear to be statistically significant. We observe larger probability to participate for those above 30 years old (except those above 60). Also, the more educated individuals have higher participation probability (compared to the base category of less than complete secondary education). Interestingly, those with longer run credits and with larger installments are associated with higher probability of participation. Finally, those without delinquency in the financial system in the last 12 months are also more likely to participate. Although there could be unobservable characteristics that are playing a role at the moment of the participation decision, we notice that those more likely to participate are also less prone to be delinquent as age, education, and healthier financial history are also associated with lower delinquency rates. We come back to this issue later in section 4 when studying the neutral message effect.

Table 2: Modelling Participation

Controls	Dep. Variable = Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
Men	0.04 (0.02)	-0.00 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.00 (0.03)	0.01 (0.03)
30-39 years	0.19*** (0.03)	0.13*** (0.03)	0.10*** (0.03)	0.10*** (0.03)	0.10*** (0.03)	0.10*** (0.03)
40-49 years	0.18*** (0.03)	0.14*** (0.03)	0.11*** (0.03)	0.11*** (0.04)	0.12*** (0.04)	0.11*** (0.04)
50-59 years	0.12*** (0.04)	0.11*** (0.04)	0.08* (0.04)	0.09** (0.04)	0.10** (0.04)	0.08** (0.04)
60-64 years	0.12* (0.07)	0.14** (0.07)	0.06 (0.07)	0.08 (0.07)	0.09 (0.07)	0.06 (0.07)
Secondary Education		0.19*** (0.06)	0.13** (0.06)	0.13** (0.06)	0.13** (0.06)	0.13** (0.06)
Incomplete Technical Education		0.21*** (0.08)	0.13* (0.08)	0.12 (0.08)	0.13 (0.08)	0.13 (0.08)
Complete Technical Education		0.29*** (0.08)	0.23*** (0.08)	0.22*** (0.08)	0.23*** (0.08)	0.22*** (0.08)
Incomplete Tertiary Education		0.21*** (0.08)	0.14* (0.08)	0.13 (0.08)	0.14* (0.08)	0.14* (0.08)
Complete Tertiary Education		0.29*** (0.09)	0.20** (0.09)	0.19** (0.09)	0.20** (0.09)	0.19** (0.09)
Postgraduate		-0.41 (0.63)	-0.56 (0.61)	-0.54 (0.61)	-0.55 (0.61)	-0.58 (0.61)
Without Educational Information		-0.07 (0.07)	-0.04 (0.07)	-0.04 (0.07)	-0.01 (0.07)	-0.01 (0.07)
286-570 US\$ Income Group		0.15*** (0.03)	0.05 (0.03)	0.03 (0.04)	0.03 (0.04)	0.01 (0.04)
571-855 US\$ Income Group		0.17*** (0.03)	0.04 (0.04)	0.02 (0.04)	0.04 (0.04)	0.01 (0.04)
Number of Loan Installments			0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Ln(Installment Value)			0.12*** (0.03)	0.10*** (0.03)	0.08*** (0.03)	0.09*** (0.03)
Interest Rate			0.05 (0.06)	0.05 (0.06)	0.03 (0.06)	0.04 (0.06)
With Debt and no Delinquency in FS (last 12m)				0.13*** (0.03)	0.14*** (0.03)	0.12*** (0.03)
With Debt and Delinquency in FS (last 12m)				0.10 (0.08)	0.10 (0.08)	0.09 (0.08)
Has Children					-0.03 (0.03)	-0.03 (0.03)
Has Savings					-0.08 (0.06)	-0.10 (0.06)
Without Savings Information					-0.14** (0.06)	-0.15** (0.06)
Has vehicles					0.00 (0.03)	-0.00 (0.03)
Has properties					0.07 (0.05)	0.07 (0.05)
30-day delinquency at week 0						-0.45*** (0.06)
Constant	-0.38*** (0.03)	-0.62*** (0.06)	-2.15*** (0.42)	-1.96*** (0.42)	-1.68*** (0.44)	-1.67*** (0.44)
Observations	11,125	11,125	11,125	11,125	11,125	11,125

Notes: Authors' own calculations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2.4 The administrative data and balance testing of the treatments groups

We worked with BancoEstado administrative data which contains socioeconomic and complementary information the individuals provide when applying for the loan, their previous information in the financial system, the records of their requested loan's characteristics, and the individuals' weekly payment behavior. For a comprehensive description of these data sources, see Appendix C.

Table 3: **Descriptive Statistics**

	Statistics				
	N	Mean	SD	Min	Max
<i>Sociodemographic:</i>					
Men	4479	.57	.49	0	1
Age	4479	37.58	10.92	18	64
<i>Educational level:</i>					
Primary education	4479	.04	.19	0	1
Secondary education	4479	.69	.46	0	1
Incomplete technical education	4479	.05	.22	0	1
Complete technical education	4479	.06	.23	0	1
Incomplete tertiary education	4479	.04	.20	0	1
Complete tertiary education	4479	.04	.19	0	1
Postgraduate	4479	.00	.01	0	1
Without information	4479	.08	.28	0	1
<i>Income group</i> (in US\$ 2019 Dollars):					
1-285	4479	.22	.41	0	1
286-570	4479	.37	.48	0	1
571-855	4479	.41	.49	0	1
<i>Loan characteristics:</i>					
Loan value (in US\$ 2019 Dollars)	4479	4064	3393	144	47267
Installment value (in US\$ 2019 Dollars)	4479	152	92	14	1223
Ln[Installment value]	4479	4.84	.67	2.67	7.11
Credit Length (months)	4479	36.06	13.19	6	60
Interest rate	4479	2.15	.37	.69	2.96
Loan to income ratio	4479	.31	.22	.03	3.33
<i>Financial system history</i> (last 12 months):					
Without debt	4479	.29	.46	0	1
With debt, without 30-day delinquency	4479	.68	.47	0	1
With debt and 30-day delinquency	4479	.03	.16	0	1
<i>Complementary information:</i>					
Has children	4479	.28	.45	0	1
Doesn't have savings	4479	.05	.21	0	1
Has savings	4479	.57	.49	0	1
Has vehicles	4479	.23	.42	0	1
Has properties	4479	.06	.25	0	1
<i>30-day delinquency predicted probability:</i>					
P-hat	4479	.39	.14	.20	.87

Notes: Authors' own calculations.

The descriptive statistics of the participant population are presented in Table 3. In the sample 57% are men , the mean age is 38 years old, and in terms of education, 69% have completed

secondary. It's worth mentioning that the universe is constituted of low income individuals, where 22% earns less than US\$ 285 per month, 37% between US\$ 286 and US\$ 570 and 41% between US\$ 571 and US\$ 855.

Regarding loan characteristics, the average consumer loan has a value of US\$ 4064, with a monthly installment to pay of US\$ 152, an interest rate of 2.15% and a duration of 36 months. It should be noted that the monthly installment value represents on average almost a third of the individual's monthly income.

The information from the financial system (other than the bank) shows that 29% of the participants have no other formal debt during the last 12 months previous to getting their consumer loan, while 71% had at least one (of which 3% fell in 30-day delinquency). Besides, BancoEstado provided us a series of complementary information indicating that 28% of the participants have at least one child, 57% have some savings, 23% have at least one vehicle, and 6% have at least one physical property.

Finally, the baseline probability of 30-day loan delinquency estimated using the predictive model described above ranges between 0.2 and 0.87, with an average of 0.39. As pointed before, we will consider the different strata of this variable in order to perform heterogeneous analysis for individuals with low, medium and high probability of default.

In order to check for the balance between the intervention groups, we present in Table 4 the mean value of their baseline characteristics (columns 1 to 3) and different p-values of treatment assignment regressions, controlling for strata (columns 4 to 7). We compared the characteristics among each pair of groups and jointly between the three of them. Also, in the last three rows of the table we present the p-values of testing whether the variables jointly predict the allocation in any treatment group, pair by pair (T1 vs T0, T2 vs T0 and T1 vs T2).

It can be observed that there is balance along the intervention groups for almost all the characteristics of the individuals with at least 95% of confidence, except for having completed tertiary education and for having any savings. Specifically, the second treatment group reports 1.7 percentage points less of tertiary education than the neutral message group and 4.1 and 5 percentage points more of having any savings than the neutral message group and the first treatment group, respectively. It should be mentioned that we only stratified across a small group of variables, but we are testing balance in a wider group, so it's plausible for these three differences to occur by chance. However, the tests to predict classification into the treatment groups (last three rows) suggest there is enough balance across them.

All these variables were included as controls in the main regression specification in order to rule out the possibility of any pre-treatment differences. It is worth to highlight that the results are robust to these variables exclusion.

Table 4: Variable Means and Tests of Differences between Treatment Groups

Variables	T0	T1	T2	Regression p-values			
	(N=2237)	(N=1120)	(N=1122)	T1=T0	T2=T0	T1=T2	T1=T2=T0
<i>Strata variables:</i>							
Men	.57	.57	.57	.99	.92	.92	.99
Age	37.62	37.74	37.35	.49	.40	.19	.42
Without debt in FS	.29	.30	.30	.47	.70	.77	.76
With debt, without 30-day delinquency in FS	.68	.67	.68	.65	.99	.70	.89
With debt and 30-day delinquency in FS	.03	.02	.02	.49	.31	.78	.55
30-day delinquency predicted probability	.39	.39	.39	.11	.84	.12	.21
<i>Educational level:</i>							
Primary education	.04	.05	.03	.17	.59	.10	.22
Secondary education	.68	.68	.71	.95	.05	.10	.12
Incomplete technical education	.05	.05	.05	.50	.81	.71	.79
Complete technical education	.06	.06	.06	.74	.65	.92	.89
Incomplete tertiary education	.04	.05	.04	.50	.69	.81	.78
Complete tertiary education	.04	.04	.02	.55	.02	.11	.05
Postgraduate	.00	.00	.00	1.00	.10	.16	.22
Without information	.09	.08	.08	.72	.27	.52	.55
<i>Income group (in US\$ 2019 Dollars):</i>							
1-285	.21	.23	.22	.10	.57	.34	.25
285-570	.37	.35	.38	.25	.73	.19	.38
571-855	.41	.41	.40	.89	.35	.49	.63
<i>Loan characteristics:</i>							
Ln(installment value)	4.84	4.83	4.82	.97	.38	.46	.65
Credit Length (months)	36.14	36.15	35.82	.83	.56	.48	.76
Interest rate	2.15	2.13	2.15	.19	.76	.16	.31
Loan to income ratio	.32	.32	.31	.63	.18	.11	.25
<i>Complementary information:</i>							
Has children	.28	.26	.28	.15	.84	.15	.27
Doesn't have savings	.05	.05	.04	.85	.88	.77	.96
Has savings	.57	.56	.61	.52	.02	.01	.03
Has vehicles	.23	.24	.23	.85	.68	.60	.86
Has properties	.07	.07	.06	.92	.44	.45	.69
<i>p-value of F-test:</i>							
T1 vs T0	.96						
T2 vs T0	.66						
T1 vs T2	.63						

Notes: Authors' own calculations.

3 Does the content of the financial counseling messages matter for reducing delinquency rates?

To address the effectiveness of the content of financial counseling on top of a simple message that acts as a reminder, we compare the delinquency rates of the neutral message group (T0) versus the group that receives cognitive financial counseling (T1) and versus the groups that receives both cognitive and practical financial counseling (T2). We have three main measures of delinquency rates: 30-days delays, 60-days delays, and 90-days delays.

The empirical strategy is based on the random allocation of individuals to the treatment groups. The main regression is presented in equation (1):

$$y_i^t = \beta_0 + \beta_1 T1_i + \beta_2 T2_i + \delta y_i^0 + S_i + \gamma X_i + \varepsilon_i^t, \quad \forall t \geq 1 \quad (1)$$

Here, y_i^t is the outcome variable (30-day, 60-day, and 90-day delinquency ever) of individual i week t . This is a binary variable that equals 1 from the day the individual falls into 30-day, 60-day or 90-day delay, and remains as 0 if the individuals has payed all installments on time.

In this manner, it represents the probability of default for each group.

$T1_i$ and $T2_i$ are dummy variables that indicate if individual i belongs to the Cognitive Counseling group (T1) or to the Cognitive + Practical Counseling Group (T2), respectively. The comparison group is the one that received the neutral message (T0). y_i^0 is the baseline value of the dependent variable at week 0 (before treatment start), S_i are strata fixed effects (sex, age, delinquency probability and financial history) and X_i is a vector of additional individual time invariant control variables (educational level, income group, loan characteristics, complementary information).

We first center our attention at two points in time, week 12 and week 24, since the complete set of messages takes 10 weeks to be fully delivered. We present the estimation results of equation (1 for the outcome at 30, 60, 90 days delay in Table 5. The row T0 shows the level of delinquency rate for the group with neutral message, so that at week 12 they exhibited 8.5% 30-days delinquency rate, 4.6% 60-days delinquency rate, and 2.2% 90-days delinquency rate. The delinquency rates are lower for longer period delays as expected. At week 24 we naturally observe larger delinquency rates: 12.9%, 8.2%, and 5.5%, for 30, 60, and 90-days delinquency rates respectively. The more time goes on, the larger the proportion of individuals that fall into arrears and end up with delinquency.

We now move into analyzing the effect of the treatments. In the second row of Table 5 we can observe that the cognitive financial counseling, T1, does not seem to have an effect on top of the neutral message in reducing defaults. However, the results of the treatment T2 of cognitive financial counseling plus practical financial counseling does have significant impacts in reducing delinquency. Our estimations at week 12 indicate -1.7 percentage points less of 30-days delinquency and -1.5 percentage points less of 60-days delinquency. These are sizable effects, meaning a 20% and 32.6% reduction in delinquency rates from the level of the T0 group. Also, our estimations at week 24 indicate -2.2 percentage points less of 60-days delinquency and -1.6 percentage points less 90-days delinquency, although the latter has lower statistical significance. These are also sizable effects, meaning a 26.8% and 29.1% reduction in delinquency rates from the level of the T0 group.

Table 5: **Message content results overview**

Delinquency rates reduction:	at week 12			at week 24		
	(1)	(2)	(3)	(4)	(5)	(6)
Counseling Type	30 days	60 days	90 days	30 days	60 days	90 days
<i>T0: Neutral (level)</i>	0.085	0.046	0.022	0.129	0.082	0.055
T1: Cognitive	-0.004	0.007	0.007	0.016	0.002	0.004
T2: Cognitive + Practical	-0.017**	-0.015**	-0.002	0.007	-0.022**	-0.016*
Number of observations	4479	4479	4479	4479	4479	4479
% Reduction of T2	-20.0%	-32.6%			-26.8%	-29.1%

Notes: *level* in row T0 indicates the delinquency rate level.

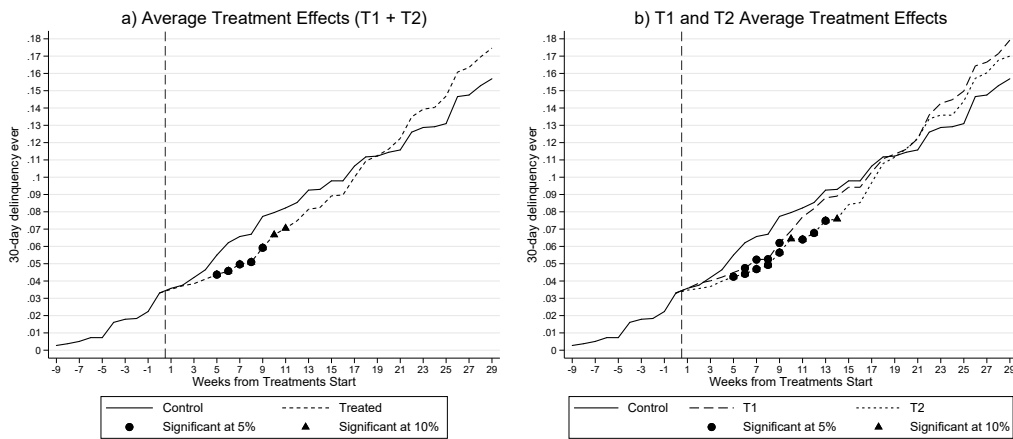
** significant at 5%, * significant at 10%

Although the point estimates at weeks 12 and 24 are informative, the weekly trends are also

relevant to analyze the evolution of the treatment trends. First, we study the treatment impact on the initial outcome of interest, which is 30-day delinquency ever. We show the results until the 29th week of treatment, as we count with a the complete sample of individuals who have been treated at least that long (as the treatment implementation was conducted in sequential waves according to the monthly loan placements cohorts).

In Figure 4a we present the impact on 30-days delinquency rate of the assignment to any financial counseling treatment group (T1 or T2), whereas in Figure 4b we separate this effect according to each treatment arm, following equation (1). When analyzing the treatment effect as a whole, there is a statistically significant reduction in loan delinquency that ranges between 1.1 and 1.8 percentage points, from the 5th to the 11th week since the treatment started. Once we separate between the treatment arms (on the right), it is observed that the impact is mainly driven by the sum of cognitive and practical counseling T2, reducing 30-day loan delinquency between 1.2 and 2.0 percentage points from week 5 to week 14. However, we cannot reject the null hypothesis of both coefficients being equal from each other.

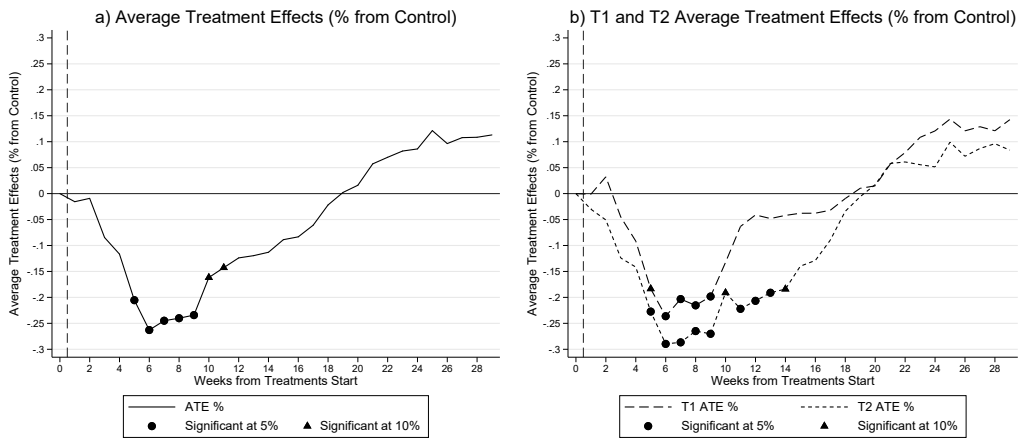
Figure 4: **Average Treatment Effects on 30-day delinquency ever**



Notes: Authors' own calculations.

Another way of looking at the results is to consider the relative effect on the delinquency rate. This is, the reduction in delinquency rate as a percentage of the delinquency rate of the neutral message group. In Figure 5 we show the same results from Figure 4, but presented in terms of percent from the neutral message group's 30-day delinquency level, to give them a relative order. This indicates that the average treatment effect of both treatments altogether (T1 + T2) exhibit a loan-delinquency reduction of 20-26% between week 5 and 9 (see Figure 5a). For the sum of cognitive and practical counseling, T2, the decrease in 30-day default is of 23-29% during the same period and it remains statistically significant with a reduction of 19-21% until week 14. On the other hand, the cognitive counseling by itself, T1, implies a decrease of 18-24% in 30-day delinquency, only during weeks 5 to 9 (see Figure 5b).

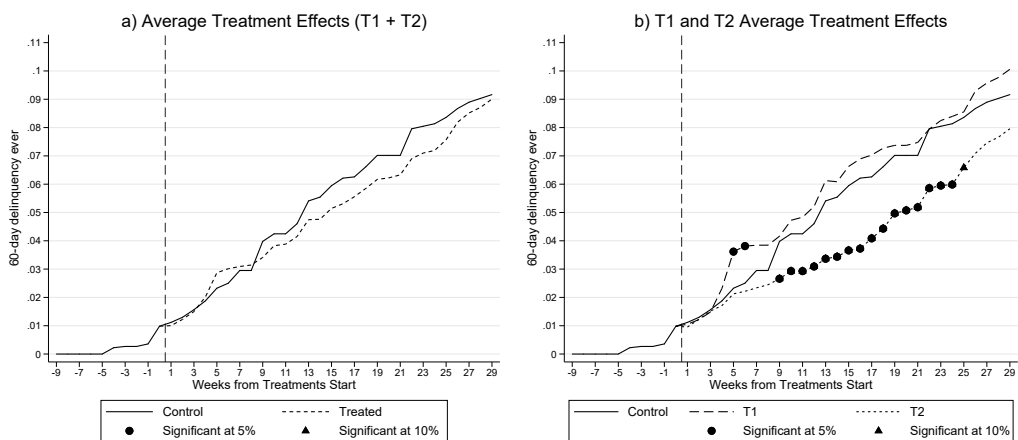
Figure 5: Average Treatment Effects on 30-day delinquency ever as % from Neutral Message Group



Notes: Authors' own calculations.

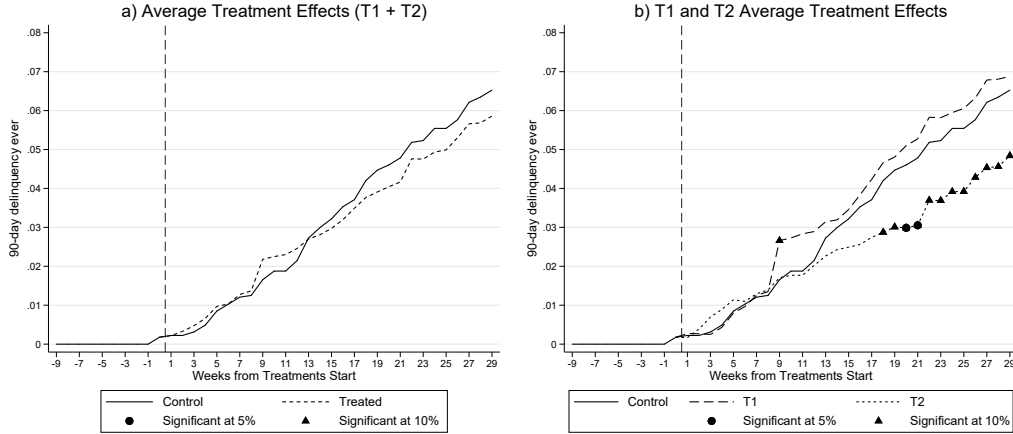
When looking at the impact of the treatment at 60-days delinquency, we observe two main patterns. First, there is no significant effect of the overall treatment (T1 + T2) in any week (Figure 6a). Second, there is a large and significant effect of T2 from week 9 until week 26, with a reduction in delinquency rate of about 20% (from 8.2% to 6.6% at week 26; Figure 6b). A similar pattern is observed for 90-days delinquency rates: although there is no significant effect when analyzing both treatments T1 and T2 altogether, there is a significant and large effect from T2 reducing delinquency rate. In fact, T2 reduces 90-days delinquency rates in 26% (from 6.5% to 4.8% at week 26; see 7b)

Figure 6: Average Treatment Effects on 60-day delinquency ever



Notes: Authors' own calculations.

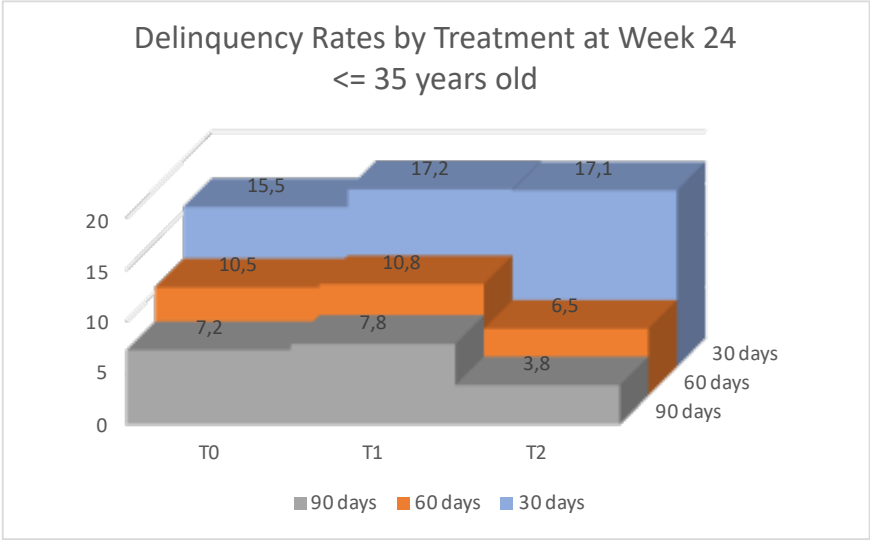
Figure 7: Average Treatment Effects on 90-day delinquency ever



Notes: Authors' own calculations.

We explore the existence of heterogeneous treatment effects by adding to equation (1) interactive terms between the treatment variables and the strata variables (age, baseline 30-day delinquency probability and gender). We had stratified the sample by age, splitting it between those 35 years old or less, and those above 35 years old. We observe that the practical counseling is more effective for the youngest. By week 24, we find a large and significant effect of T2 in reducing delinquency rate from 10.5% to 6.5% for 60-days delays, and from 7.2% to 3.8% for 90-days delays (Figure 8). The graphs with the weekly data are presented in the Appendix F. These are very large effects and clearly indicates heterogeneity of treatment impact of the cognitive plus practical counseling, while no impact can be observed from the cognitive counseling alone.

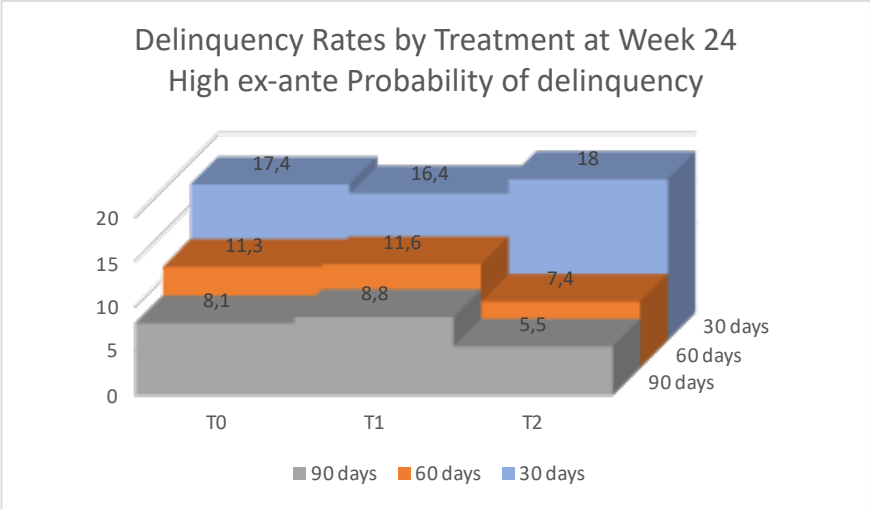
Figure 8: **Delinquency Rates by Treatment at Week 24 for individuals <= 35 years old**



Notes: Authors' own calculations.

We had also stratified the sample by the ex-ante probability of default in three groups: high probability, medium probability, and low probability. Our estimates indicate that the practical counseling is more effective for those with the high ex-ante probability of default. In fact, by week 24, we find a large and significant effect of T2 in reducing delinquency rate from 11.3% to 7.4% for 60-days delays, and from 8.1% to 5.5% for 90-days delays (Figure 9; the graphs with the weekly data are presented in the Appendix F).

Figure 9: **Delinquency Rates by Treatment at Week 24 for individuals with ex-ante Probability of delinquency**

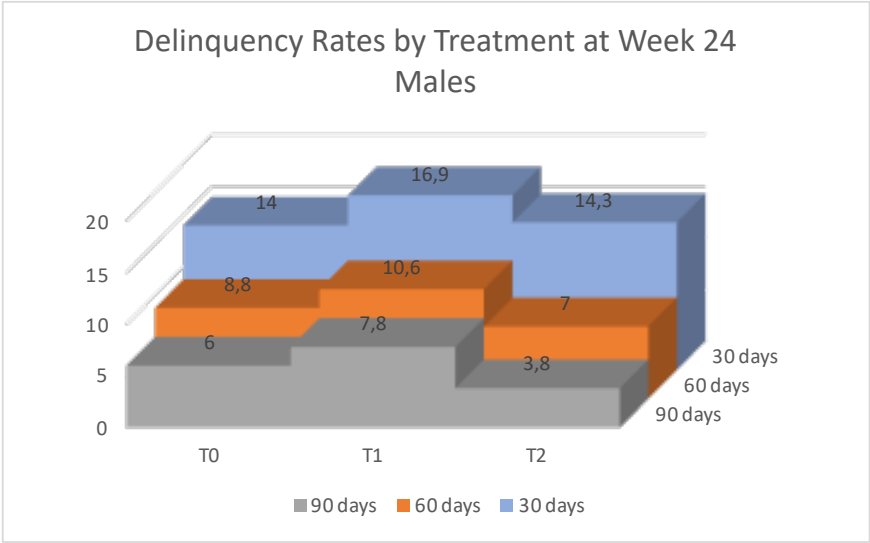


Notes: Authors' own calculations.

Our stratification by gender also allows to compare heterogeneous effects between females

and males. What we observe is larger impacts for males, again driven by the cognitive plus practical counseling (T2). In fact, at week 24 we observe sizable impacts at 60-days delays and 90-days delays for men, with delinquency rates reducing from 8.8% to 7% and from 6% to 3.8% respectively (Figure 10; the graphs with the weekly data are presented in the Appendix F).

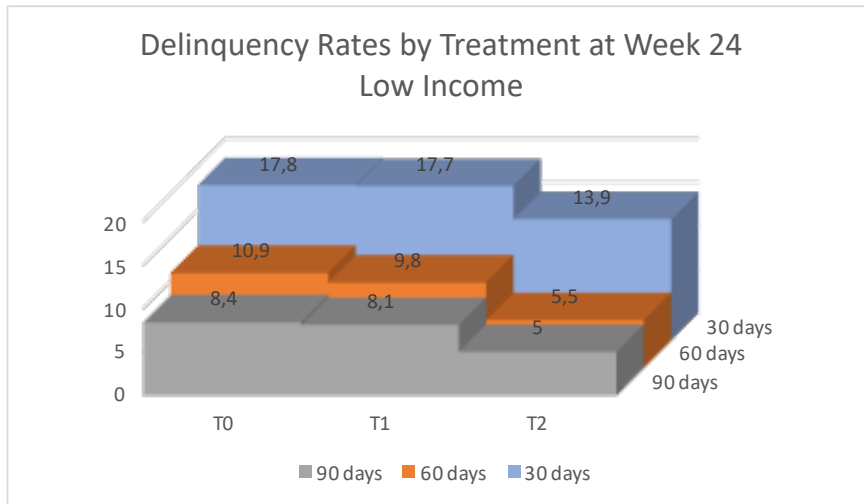
Figure 10: Delinquency Rates by Treatment at Week 24 for males



Notes: Authors' own calculations.

Although we had not stratified by income (we had already 3 strata variables), it is useful to compare heterogeneous effects between low, medium and high income. However, we have to remember that this income classification is within a sample of low-income individuals. Interestingly, we find much larger effects of the treatment (again T2) for those low-income individuals. At week 24 we observe large effects at 30, 60 and 90 days delays. The 30-days delinquency rate reduces from 17.8% to 13.9%, the 60-days delinquency rates reduces from 10.9% to 5.5%, and the 90-days delinquency rates reduces from 8.4% to 5% (Figure 11).

Figure 11: Delinquency Rates by Treatment at Week 24 for those with low-income



Notes: Authors' own calculations.

4 The Neutral Message Effect

To evaluate the intervention as a whole, it is also necessary to consider the effect that any treatment can have in reducing delinquency rates. In our case, since the neutral message group tends to show on average, for the whole sample, a lower delinquency rate, it is important to consider all intervened groups against a comparison group. Since we could not have a pure control that received no message at all (because of the limited sample we were allowed to intervene), we built a synthetic control group from the group of individuals that did not accept to participate or where not able to be contacted for the informed consent. Given that there is some evidence of self-selection to participate, as we showed above, a direct comparison was not possible. Instead, we performed a matching re-weighting strategy to build a synthetic control group. In particular, we used a propensity score matching to allocate comparison individuals to each treated individuals. We then make comparisons of T0, T1, T2 versus a Synthetic Control group.

We present our estimates comparing the Neutral Message to the Synthetic Control group in Table 6. In the first row we show the level of delinquency rate at week 12 and 24, for 30, 60, and 90 days. We observe that receiving a reminder neutral message has a small effect by week 12 in any measure of delinquency rate (second row of Table 6). However, by week 24 there are important differences. In fact, the neutral message reduces the 30-days delinquency rate in 19% (from 16% to 13%). The 60-days delinquency rate is reduced in 10% (from 10% to 9%), and the 90-days delinquency rate is reduced in 23% (from 7.7% to 5.9%). This effect of reducing the delinquency rate of the neutral message is important because of the reminder effect, where the limited attention may play a relevant role.

Table 6: **Neutral Message effect using a Synthetic Control groups**

Delinquency rates reduction:	at week 12			at week 24		
	(1) 30 days	(2) 60 days	(3) 90 days	(4) 30 days	(5) 60 days	(6) 90 days
Counseling Type						
<i>Synthetic Control (level)</i>	0.100	0.050	0.030	0.160	0.100	0.077
T0: Neutral	-0.003	0.000	-0.001	-0.030**	-0.010**	-0.018**
Any Treatment (T0, T1, T2)	-0.010**	-0.002	-0.005**	-0.030**	-0.020**	-0.020**
Number of observations	2236	2236	2236	2236	2236	2236
% Reduction of T0				-19%	-10%	-23%
% Reduction of Any Treatment	-10%		-17%	-19%	-20%	-26%

Notes: *level* in row Synthetic Control indicates the delinquency rate level.

** significant at 5%, * significant at 10%

We also estimate the effect of the ‘Any Treatment’ (considering all treatments T0, T1, and T2). We observe that at week 12 there are some significant effects for 30 and 90-days delinquency rates, but not for 60-days delinquency rates. However, at week 24 the effects are much larger and significant at all measures of delinquency. In fact, we observe reductions in delinquency rates of 19%, 20%, and 26% for 30, 60, and 90-days delinquency rates, respectively.

5 Does the intervention as a whole reduce delinquency rates? A cost-benefit analysis of the intervention

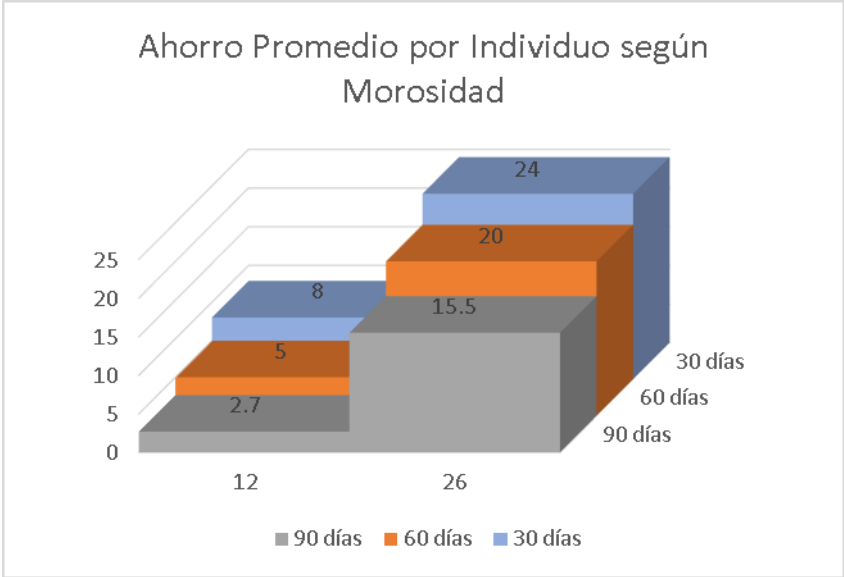
The cost of sending the messages is so low that any gain in reducing delinquency rates can be profitable. In fact, the marginal cost of sending the messages through the platform we used was US\$0.012 per message (1.2 cents). Moreover, the simplicity of the intervention makes it easy to scale up. This design has the potential to make the intervention very cost-effective and generate significant benefits. On the one hand, the individuals that do not fall into arrears and pay on time benefit themselves by paying less delinquency interests and having clean credit score records. On the other hand, the bank that issue the loans do also benefit by spending less in collecting the installments, and also end up retrieving a larger share of the credit issued. Nevertheless, for the sake of simplicity, we will concentrate only in the difference in the amount of money that that is paid back under each treatment.

Using the administrative data, we compute the amount of money paid back by each borrower, and also the amount of money that is not. Then, we obtain the difference in the amount of money collected by the bank from the borrowers in our intervention. In average per-cápita terms, the financial counseling intervention achieved, by week 26, a reduction in the 30-days arrears of US\$24, 60-days arrears of US\$20, and 90-days arrears of US\$15.5, when compared to the synthetic control group (Figure 12).

With these results, we compute the Cost-Benefit analysis of the intervention by comparing the treated groups to the synthetic control group. This comparison shows a reduction of between 35% to 40% in the unpaid debt. This implies savings for the bank of US\$ 108,000,

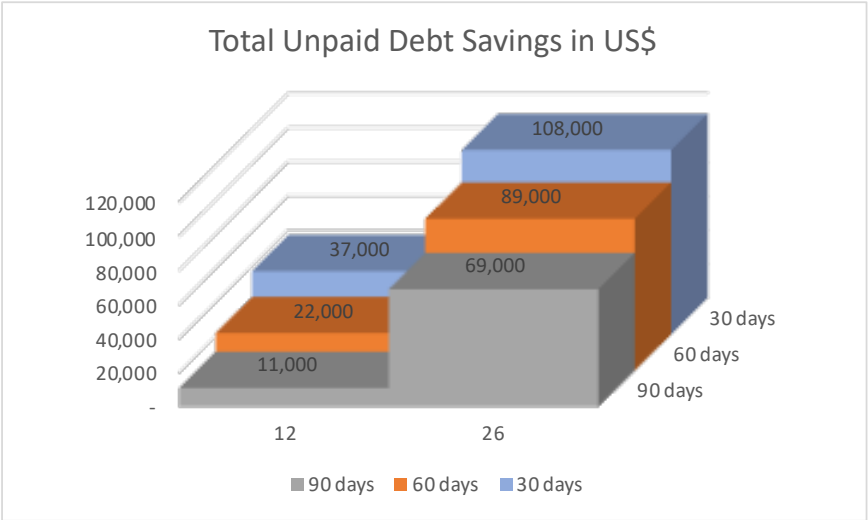
US\$ 89,000 y US\$ 69,000, by week 26 for 30, 60, and 90-days delays, respectively (Figure 13). Certainly, these are very large figures that suggest the implementation of such a intervention like this one could be very promising.

Figure 12: Average savings by individual



Notes: Authors' own calculations.

Figure 13: Total Savings



Notes: Authors' own calculations.

6 Conclusions

In this paper, we present the main results of the impact of providing financial counseling through text messages on short run bank-loan delinquency rate. We find that receiving a cognitive counseling set of messages, with images and videos targeting behavioral biases such as limited attention and present bias, consumer drivers such as social comparison, and over-indebtedness drivers such as shocks, plus an additional set of practical counsels about the options that the bank provides to individuals that are at risk of defaulting, can significantly reduce delinquency rates in about 20% to 26%. However, we find no lasting effect for the treatment that included the cognitive counseling alone. These results highlight the importance of the content of the messages of the financial counseling.

By using a synthetic control group, we evaluate the ‘Neutral Message Effect’. We find that just sending a neutral message can reduce 30-days delinquency rates by 19%. This is a large reduction from 16% to 13%, implying that just reminding the individuals about their loans can improve repayment significantly. These results also allow to estimate large benefits for the bank in terms of more paid back loans.

These results indicate that a simplified financial counseling set of messages can be used cost-effectively to reduce delinquency rates. This is also very important to facilitate the financial inclusion of low-income individuals.

Our results also indicate that there are heterogeneous effects according to some individual characteristics. We find larger and long lasting effects for younger individuals, for men, for those with ex-ante higher probability of default, and for low-income individuals. This evidence suggests that there is room to inexpensively customize the text messages in order to be more effective. Moreover, the fact that individuals with higher baseline probability of delinquency are more likely to react to the treatments indicates that there are tools to improve the repayment behavior of individuals that may be more at risk of being credit constraint.

More research is needed to go deeper in understanding financial behavior of the individuals in our treatments. In particular, using administrative data we can only observe what happens with the individuals behavior in the bank and in the financial system as a whole, being completely blind about other sources of credit. In fact, other parallel information sources such as household surveys indicate that individuals use different financial tools, both formal and informal. For example, credit crowding-out may be present among treated individuals. In addition, individuals usually make decisions within a household context. This means that information about income or expenses shocks by other members of the household could significantly help to understand the effectiveness of the intervention. Investigating in this direction requires complementary sources of information for this particular set of treated individuals.

While this results add to a growing body of research about the provision of text-messages nudges to increase savings and loan repayment (Cadena and Schoar, 2011; Karlan et al., 2015; Akbas et al., 2016; Karlan et al., 2016; Kast et al., 2018; Bursztyn et al., 2019), using text messages, comics and videos, further research is needed to attempt to separate the effect of each type in order to determine which is more cost-effective.

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A Intervention's Messages

Introductory Message to All Participants

English

1. *[Name], I am Andrés from the University of Chile. In the past I requested a consumer loan in order to reach some of my family goals. In the process, I faced challenges from which I learned a lot. That is why, during the following weeks, I will be texting you some advices and financial information based on my personal experience.*

Spanish

1. *[Nombre], soy Andrés, de la Universidad de Chile. En el pasado solicité un crédito de consumo para alcanzar algunas de mis metas familiares. En el proceso enfrenté algunos desafíos de los que aprendí. Por eso, durante las próximas semanas te estaré escribiendo con algunos consejos financieros sobre mi experiencia.*

Neutral Message

English

1. *[Name], remember that you can see your loan information at www.bancoestado.cl.*

Spanish

1. *[Nombre], recuerda que en www.bancoestado.cl puedes ver la informacion de tu credito.*

Text Messages for Cognitive Counseling

English

1. *[Name], in the past it was useful to me to save some money every time I was paid. In that way, I could be prepared to face unexpected expenses that can happen anytime.*
2. *[Name], sometimes it is hard to plan ahead but I have made the effort to write down in a paper my income entries and usual expenses, so I know how much I can spend.*
3. *[Name], when I have faced unexpected expenses, it has been useful to think: What expenses can I decrease or postpone? Expenses on clothing, entertainment or going out with friends?*
4. *[Name], in the past I have required money to face financial problems. In one occasion I sold some unused objects.*
5. *[Name], some time ago when I faced unexpected expenses, I used part of my savings instead of acquiring more debt. Thanks to that I was less worried about it.*
6. *[Name], do you want to buy something for yourself or your family? In the same situation it has been useful for me to think if it's truly necessary before buying anything.*
7. *[Name], do you want to buy something new? In my experience, it is better to wait until you have fully controlled the other debts' payments.*
8. *[Name], before taking any financial decision, it has been useful for me to know how much I owe and how much I need to pay my installments monthly.*

9. *[Name], in the past I have been tempted to buy a nice cellphone to be up to date, but I have discovered that I need to be up to date with my financial situation.*
10. *[Name], sometimes I want to buy my kid the same shoes as his friends, but before buying them I think if it's worth doing it.*

Spanish

1. *[Nombre], en el pasado me fue útil ahorrar un poco cada vez que me pagaban. Así pude estar preparado para enfrentar los imprevistos que nunca faltan.*
2. *[Nombre], a veces cuesta planificarse, pero he hecho el esfuerzo de anotar en una hoja mis ingresos y gastos usuales, con lo que veo cuanto puedo gastar.*
3. *[Nombre], cuando he enfrentado gastos inesperados me ha sido útil pensar: ¿qué gastos puedo disminuir o posponer? ¿Gastos en salidas, ropa u entretenimiento?*
4. *[Nombre], en el pasado he requerido de dinero para enfrentar problemas financieros. En una ocasión vendí algunos objetos que tenía en desuso.*
5. *[Nombre], cuando hace un tiempo enfrente gastos inesperados utilice parte de mis ahorros en vez de adquirir otra deuda. Así estuve más tranquilo.*
6. *¿[Nombre], quieres comprar algo para ti o para tu familia? En la misma situación me ha resultado útil pensar, antes de comprar, si en verdad lo necesito.*
7. *¿[Nombre], quieres comprar algo nuevo? De mi experiencia, es mejor esperar hasta tener bien controlado el pago de mis otras deudas.*
8. *[Nombre], antes de tomar cualquier decisión financiera me ha sido útil saber bien cuanta deuda tengo y cuanto necesito para pagar mis cuotas al mes.*
9. *[Nombre], en el pasado me han dado ganas de comprar un buen celular para estar al día, pero he descubierto que primero debo estar al día con mis finanzas.*
10. *[Nombre], a veces quisiera comprarle a mi hijo las mismas zapatillas que sus amigos, pero antes de comprar he pensado si de verdad vale la pena.*

Comic Messages for Cognitive Counseling

English

1. *[Name], this comic with financial advises can be useful for you!: "Save a little every month" <https://bit.ly/2KEQnGW>*
2. *[Name], this comic with financial advises can be useful for you!: "Get organized to reduce your debts" <https://bit.ly/2IOee4H>*
3. *[Name], this comic with financial advises can be useful for you!: "Think before buying something if I really need it" <https://bit.ly/2J6mSus>*
4. *[Name], this comic with financial advises can be useful for you!: "Before buying something it's better to be up to date with my financial situation" <https://bit.ly/2IPhRrd>*

Spanish

1. ¡[Nombre], este comic con consejos financieros te puede servir!: “Ahorra un poco cada mes” <https://bit.ly/2KEQnGW>
2. ¡[Nombre], este comic con consejos financieros te puede servir!: “Organízate para disminuir tus deudas” <https://bit.ly/2IOee4H>
3. [Nombre], ¡este comic con consejos financieros te puede servir!: “Pensar, antes de comprar, si en verdad lo necesito” <https://bit.ly/2J6mSus>
4. ¡[Nombre], este comic con consejos financieros te puede servir!: “Antes de comprar vale la pena estar al día con mis finanzas” <https://bit.ly/2IPhRrd>

Video Messages for Cognitive Counseling

English

1. [Name], this video with financial advises can be useful for you!: “Don’t be overconfident! Save a little every month” <https://bit.ly/2WXUzDi>
2. [Name], this video with financial advises can be useful for you!: “A penny saved is a penny earned” <https://bit.ly/31QlGDS>
3. [Name], this video with financial advises can be useful for you!: “Save a little every day to face unexpected expenses” <https://bit.ly/31UBHso>
4. [Name], this video with financial advises can be useful for you!: “Get organized to reduce your debts” <https://bit.ly/2LoSpdV>
5. [Name], this video with financial advises can be useful for you!: “It is better to think before buying something” <https://bit.ly/2Nd9wBF>
6. [Name], this video with financial advises can be useful for you!: “Is it worth to be overindebted?” <https://bit.ly/2IMSwOJ>

Spanish

1. ¡[Nombre], este video con consejos financieros te puede servir!: “No te confíes! Ahorra un poco cada mes” <https://bit.ly/2WXUzDi>
2. ¡[Nombre], este video con consejos financieros te puede servir!: “El que guarda siempre tiene” <https://bit.ly/31QlGDS>
3. ¡[Nombre], este video con consejos financieros te puede servir!: “Ahorra un poco todos los días para prevenir imprevistos” <https://bit.ly/31UBHso>
4. ¡[Nombre], este video con consejos financieros te puede servir!: “Organízate para disminuir tus deudas” <https://bit.ly/2LoSpdV>
5. ¡[Nombre], este video con consejos financieros te puede servir!: “Mejor pensar antes de comprar algo” <https://bit.ly/2Nd9wBF>
6. ¡[Nombre], este video con consejos financieros te puede servir!: “Vale la pena sobre endeudarse?” <https://bit.ly/2IMSwOJ>

Text Messages for Practical Counseling

English

1. *[Name], once I couldn't pay my loan with BancoEstado, I encouraged myself and called the bank toll-free at *2326 and they proposed me different solutions.*
2. *[Name], once I couldn't pay my loan with BancoEstado, I went to their office located at San Diego 85, Stgo, from 9am to 7pm and they offered me different options.*
3. *[Name], once I couldn't pay loan with BancoEstado, I went to the bank and they told me that maybe I could reschedule: changing the deadline and the installment amounts.*
4. *[Name], once I was in arrears with my loan, at the bank they told me that sometimes paying late the minimum of the installment is better than rescheduling.*
5. *[Name], once I lost my job and couldn't pay my debts. At the bank they allowed me to not pay the installments during a few months, paying them at the end.*
6. *[Name], once I had health problems and couldn't pay my debts. At the bank they allowed me to not pay the installments during a few months, paying them at the end.*
7. *[Name], once I spent a long time without being able to pay the total amount of my loan and for 1 year the bank allowed me to pay only the interest rate so my debt didn't grow.*
8. *[Name], once I couldn't pay my loan. I went to the bank and they told me that I had an insurance associated to my loan. Why don't you ask if you have one?*
9. *[Name], once I lost my job, I learned that every worker with a permanent contract can cash her unemployment insurance at AFC Chile.*

Spanish

1. *[Nombre], una vez que no podía pagar mi crédito con BancoEstado, me anime y llame gratis al banco al *2326 y me dieron diversas opciones de solución.*
2. *[Nombre], una vez no podía pagar mi crédito con BancoEstado, me acerque a la sucursal de San Diego 85, Stgo, de 9 a 19hrs y me dieron diversas opciones.*
3. *[Nombre], una vez que no podía pagar mi crédito, me acerque al banco y me indicaron que quizás podría reprogramarlo: cambiando plazo y montos de la cuota.*
4. *[Nombre], una vez que caí en mora, en el banco me dijeron que a veces pagar el mínimo de la cuota atrasada puede ser más conveniente que reprogramar.*
5. *[Nombre], una vez perdí el trabajo y no podía pagar mis deudas. En el banco me permitieron pasar algunos meses sin pagar las cuotas, pagándolas al final.*
6. *[Nombre], cuando tuve problemas de salud y no pude pagar mis deudas, en el banco me permitieron pasar algunos meses sin pagar las cuotas, pagando al final.*
7. *[Nombre], una vez pase largo tiempo sin poder pagar el total de mi crédito, y por 1 año me permitieron pagar solo los intereses para no aumentar la deuda.*
8. *[Nombre], una vez no podía pagar mi crédito, me acerque al banco y me dijeron que tenía un seguro asociado al crédito. ¿Por qué no averiguas si tienes uno?*

9. [Nombre], una vez que perdí el empleo aprendí que todos los trabajadores con contrato indefinido pueden cobrar su seguro de cesantía en AFC Chile.

Default Message in Case of an Answer

English

1. For more information, do not hesitate to contact me at consejosfinancieros@fen.uchile.cl.

Spanish

1. Para mayor información, no dudes en escribirme a consejosfinancieros@fen.uchile.cl.

Message Examples

Figure 14: Example of Neutral Message

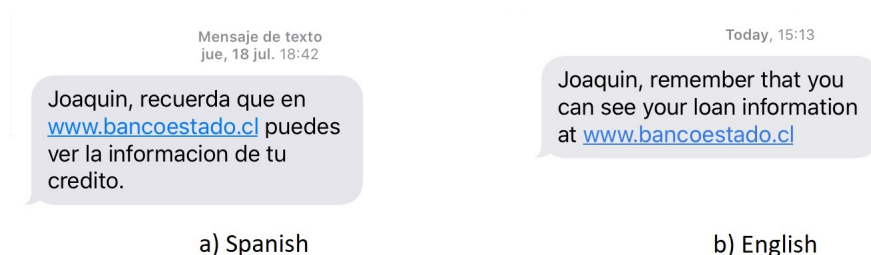


Figure 15: Example of Text Message to Cognitive Counseling Group



Figure 16: Example of Video Message to Cognitive Counseling Group

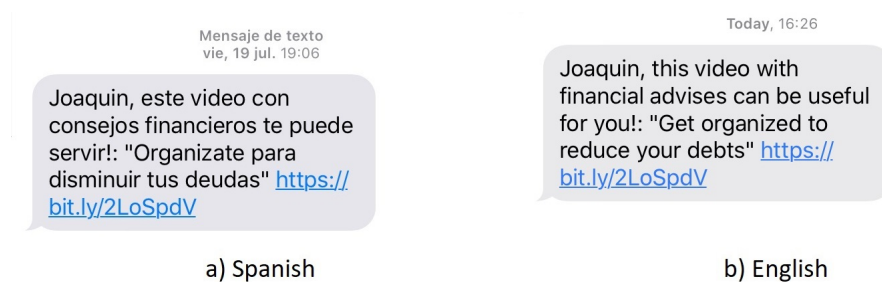


Figure 17: Example of Text Message to Practical Counseling Group

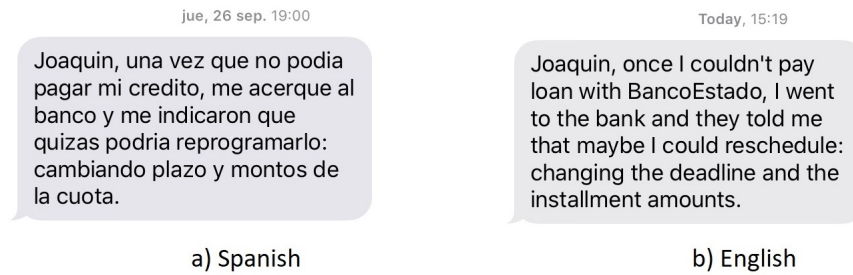


Figure 18: Comic “Ahorra un poco cada mes”

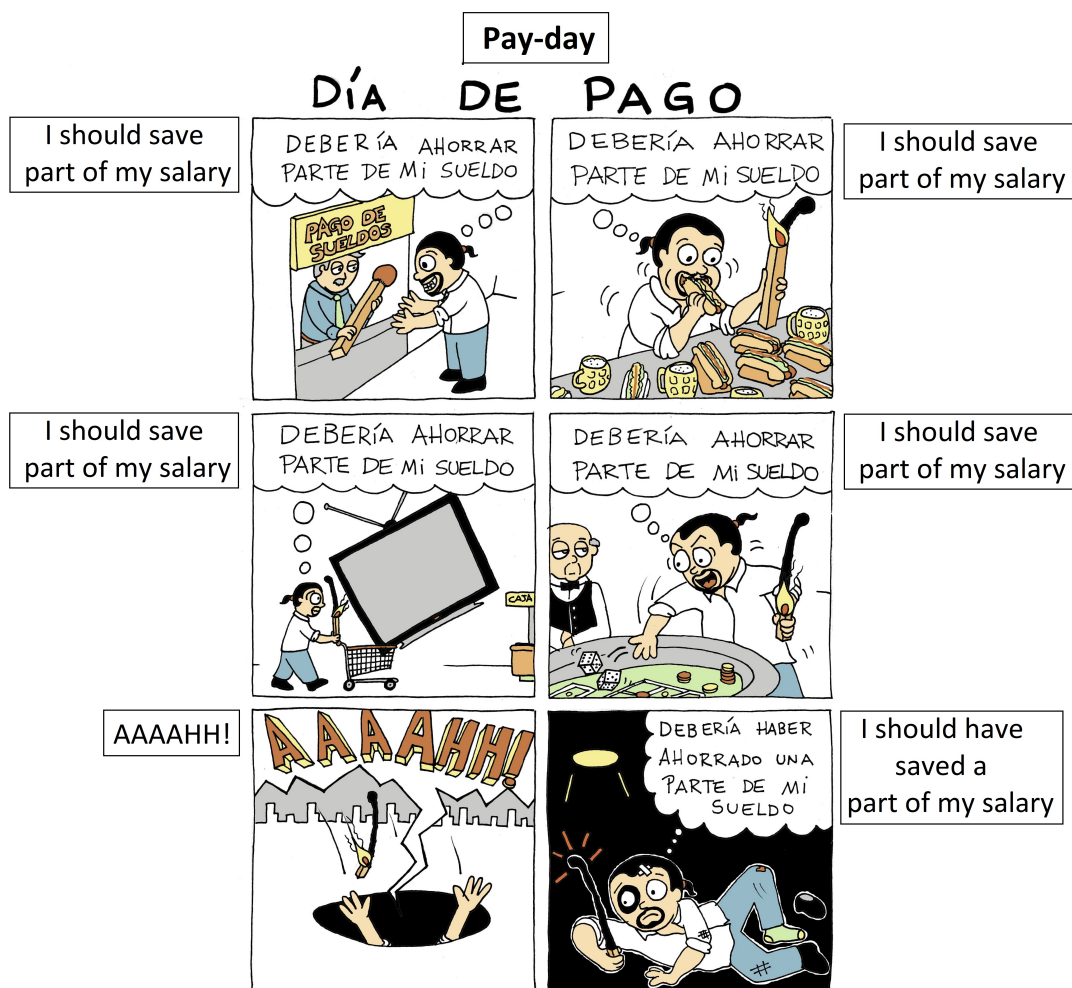


Figure 19: Comic “Organizate para disminuir tus deudas”

Bills

CUENTAS


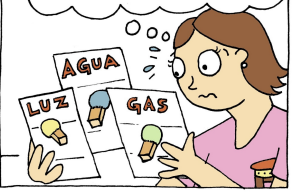

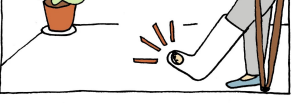

<p>The bills have arrived</p>	<p>LLEGARON LAS CUENTAS</p> 	<p>¡UF!... ¡QUE SALIERON CARAS LAS CUENTAS ESTE MES!</p> 	<p>Uf! This month they are very expensive!</p>	
<p>Besides, there are the installments of the bank loan I asked for</p>	<p>ADEMAS ESTÁN LAS CUOTAS DEL BANCO POR EL CRÉDITO QUE PEDÍ,...</p> 	<p>...ESOS DÍAS EN EL HOSPITAL ME SALIERON UN OJO DE LA CARA</p> 	<p>Those days at the hospital were very expensive</p>	
<p>¿CÓMO PODRÍA AHORRAR UN POCO DE PLATA?</p> 				<p>How could I save some money?</p>

Figure 20: Comic “Pensar, antes de comprar, si en verdad lo necesito”



Figure 21: Comic “Antes de comprar vale la pena estar al día con mis finanzas”



B Qualitative interviews with BancoEstado customers

Previous to the intervention start, a qualitative field work was carried out. Specifically, 28 interviews were held to BancoEstado's Emerging Segment customers in order to gather information on their perception of the proposed intervention instruments (messages, comics and videos).

The sample was divided in 4 groups of 7 individuals each. For all groups a series of general questions were asked regarding their willingness to receive messages with financial advice, their preferred means to receive them (SMS or WhatsApp) and their time of the day preferences to receive the messages. Besides, specific questions were asked to each group regarding different intervention's instruments:

1. Group 1: They were shown the 10 text messages from the Cognitive Counseling with advice to prevent and to face shocks, to face self-control problems and social comparison as a motivator of over-indebtedness.
2. Group 2: They were shown the 9 text messages from the Practical Counseling with specific information from BancoEstado concrete and practical options individuals could take when facing a shock and/or loan default.
3. Group 3: They were shown the 4 comic messages and some text messages from the Cognitive Counseling.
4. Group 4: They were shown the 6 video messages and some text messages from the Cognitive Counseling.

In general terms, the interviewees stated that they would read the messages because they believe they can learn from financial advice and, in particular, because of the reputation of the University of Chile. As for the mean of communication, they preferred mostly WhatsApp over SMS, because they think it's more "friendly" (it's the way they communicate with closest people). The use of this mean over text messages was also suggested by some communications experts. Besides, nobody indicated that they would not read the financial advices in WhatsApp, therefore the recommendation was to use that tool. Finally, respondents preferred to receive messages during the week (not on weekends) and, in general, not later than 8pm.

Regarding the Cognitive Counseling' text messages, they were generally understood, with some differences within people in the message interpretation. The majority of the messages were considered useful and would be re-send to family and friends. Some of the messages, such as the one of that suggests selling things that are disused, were generally well received, but also generated some reluctance in some respondents. However, since these types of recommendations are quite standard in financial education, it was recommended to keep them.

Additionally, some of the interviewed indicated that they would prefer the messages in third person as a direct recommendation (instead of being told in first person). However, the theoretical marketing framework in Chile indicates that first person stories are a more persuasive resource (since they produce a better reception because of the proximity felt by the recipient). Therefore, it's proposed to keep the first person characteristic of the messages. This also considering that the individuals will receive first an introductory message in which the individual who will send them the messages will be presented to give them a better context.

Regarding the Cognitive Counseling' comic messages, respondents valued them significantly and considered them very complete and direct in the message they deliver (it was suggested that they contain even more information than the messages that only consists on text). Some people felt quite interpreted by the situations presented in the comics and liked the colors and characters. Finally, some minor modifications were suggested in some of the comics (font sizes, character appearances and bullet saturation).

Regarding the Cognitive Counseling' video messages, they were much appreciated for their informative and entertaining nature. Some respondents considered that they were very short, but no one considered them to be very long. Respondents felt in general identified with the characters in the videos, "ordinary people". No relevant changes to the audiovisual material were suggested.

Regarding the Practical Counseling' text messages, most people understood them, found them useful and liked them, since they are short, precise and deliver new options. There were some concepts and information that were more difficult for clients to understand (such as the term "reprogram" or the benefits of paying interest without the principal). Therefore, some messages were modified in order to make them more understandable and more simple in their words. Some people said they would share the messages only when they were found useful and in situations that someone needs the information.

Thus, after making all the modifications suggested by the interviewees (in addition to those suggested by BancoEstado), the definitive instruments that are used in the intervention were established.

C BancoEstado’s 2012-2018 Data Information Description

Using BancoEstado’s historic administrative data, it’s possible to count with a series of anonymous information from all the clients of the Emerging Segment that requested a consumption credit in the Metropolitan region, without remuneration agreement¹. Specifically, we count with the following information for the 2012-2018 period:

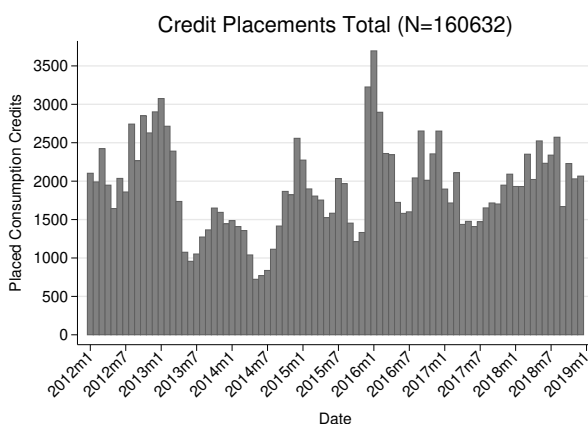
1. Sociodemographic and socioeconomic information: gender, age, educational and income level.
2. Credit’s information: start date, total value, installments’ value, length, interest rate and delinquency prevalence, among others.
3. Superintendence of Banks and Financial Institutions (SBFI) information: debt and default prevalence in the financial system during the last twelve months.
4. Complementary information: individual’s family characteristics (spouse and children presence), physical properties and vehicles, other savings, among others.

C.1 Target population description

The population of interest are the clients from the Emerging Segment of BancoEstado that request a consumption credit in the Metropolitan Region (MR) and that doesn’t have remuneration agreement. We count with information for this group from January 2012 to December 2018, which allows to observe the complete the credit cycle for the placements that occurred during the first years of this period.

A total of 160632 consumption credits were placed by this group during the seven years of analysis. The monthly distribution of the credit placements is shown in Figure 22.

Figure 22: **Consumption credit placements by month, emerging segment in MR**



There is certain variance of the credit placements throughout each year, without an evident seasonal pattern. Besides, there is also some variance over the years, although most months there are between 1500 and 2500 credit placements.

¹That is, their employers don’t have an agreement to deposit the individual’s salary directly in their accounts. Only this group is considered, since the consumer credits’ installments of individuals who do have a remuneration agreement are paid automatically through payroll discounts.

Table 7 presents summary statistics of the sample and the 1-day, 30-day, 60-day and 90-day delinquency rates, according to different characteristics.

Table 7: **Summary statistics and loan-delinquency prevalence**

	%	Loan-delinquency (%)			
		1-day	30-day	60-day	90-day
Total (N=160.632)		41.2	30.1	23.3	19.1
<i>Sex:</i>					
Women	42.2	38.8	27.3	20.7	16.7
Men	57.8	42.9	32.1	25.2	20.9
<i>Age groups:</i>					
18-24 years	3.0	46.5	35.3	27.3	22.9
25-34 years	36.6	47.4	36.0	28.5	23.6
35-44 years	26.1	43.0	31.9	24.6	20.2
45-54 years	20.2	35.6	24.5	18.6	15.0
55-64 years	11.6	29.6	19.1	14.0	11.3
65 years and more	2.5	23.7	13.8	10.1	8.2
<i>Educational level:</i>					
Primary education	3.6	45.4	33.2	26.1	22.2
Secondary education	58.9	41.2	30.0	23.4	19.3
Incomplete technical education	5.1	38.2	27.7	21.2	17.4
Complete technical education	18.3	41.8	30.7	23.4	19.1
Incomplete tertiary education	3.2	40.3	30.0	23.1	18.3
Complete tertiary education	5.4	32.2	21.3	15.5	12.2
Postgraduate	0.1	36.6	19.4	16.1	11.8
Without information	5.4	48.8	37.4	30.0	25.1
<i>Income group (in US\$ 2019 Dollars):</i>					
0	0.1	44.1	30.3	24.8	22.8
1-285	4.8	46.0	33.3	26.9	23.1
285-570	39.7	50.7	38.8	31.3	26.1
571-855	47.8	35.2	24.6	18.1	14.6
856-1140	5.1	26.6	16.8	11.7	9.2
1141-1425	1.5	23.9	14.7	10.6	8.1
1426-1710	0.9	26.4	16.8	12.2	9.1
1711 and more	0.0	33.3	22.2	22.2	16.7
<i>Credit length:</i>					
Between 6 and 12 months	5.3	30.2	17.4	13.8	12.1
Between 13 and 24 months	24.0	31.5	21.2	16.4	13.7
Between 25 and 36 months	43.7	44.3	33.2	26.2	21.5
Between 37 and 48 months	23.2	46.2	34.8	26.3	21.4
Between 49 and 60 months	3.8	51.0	38.7	27.9	22.5
More than 60 months	0.0	63.0	40.7	14.8	14.8
<i>Credit's interest rate:</i>					
1st quintile	21.1	35.5	24.9	18.3	14.8
2nd quintile	19.2	40.2	29.1	22.3	18.1
3rd quintile	20.9	40.5	29.7	22.9	19.1
4th quintile	19.1	39.5	28.7	22.5	18.5
5th quintile	19.7	50.4	38.2	30.7	25.6
<i>Financial system history (last 12 months):</i>					
Without debt	48.5	49.6	38.0	30.6	25.6
With debt, without 30-day delinquency	49.3	33.1	22.5	16.4	13.0
With debt and 30-day delinquency	2.2	37.5	25.2	17.8	13.8
<i>Complementary information:</i>					
Doesn't have renegotiated credits	64.9	30.8	21.8	18.9	17.8
Has renegotiated credits	18.1	79.1	67.8	48.2	33.3
Without information (renegotiated credits)	17.1	40.4	21.6	13.4	9.4
Doesn't have savings	2.7	20.8	12.4	8.4	6.6
Has savings	65.2	39.1	27.7	21.1	17.0
Without information (savings)	32.2	47.0	36.3	29.0	24.5
Has children	38.2	44.4	33.2	25.8	21.3
Without information (children)	61.8	39.2	28.1	21.7	17.8
Has vehicles	39.5	36.8	25.6	19.3	15.6
Without information (vehicles)	60.5	44.0	33.0	25.9	21.5
Has properties	17.7	27.0	16.5	11.4	8.8
Without information (properties)	82.3	44.2	33.0	25.8	21.4

It can be seen that 41.2% ($N = 66135$) of the sample fell at least one time in 1-day delin-

quency during the period and 30.1% ($N = 48272$) in 30-day delinquency. Besides, 23.3% ($N = 37375$) and 19.1% ($N = 30743$) of the credits fell in 60-day and 90-day delinquency, respectively, at least one time in the same period.

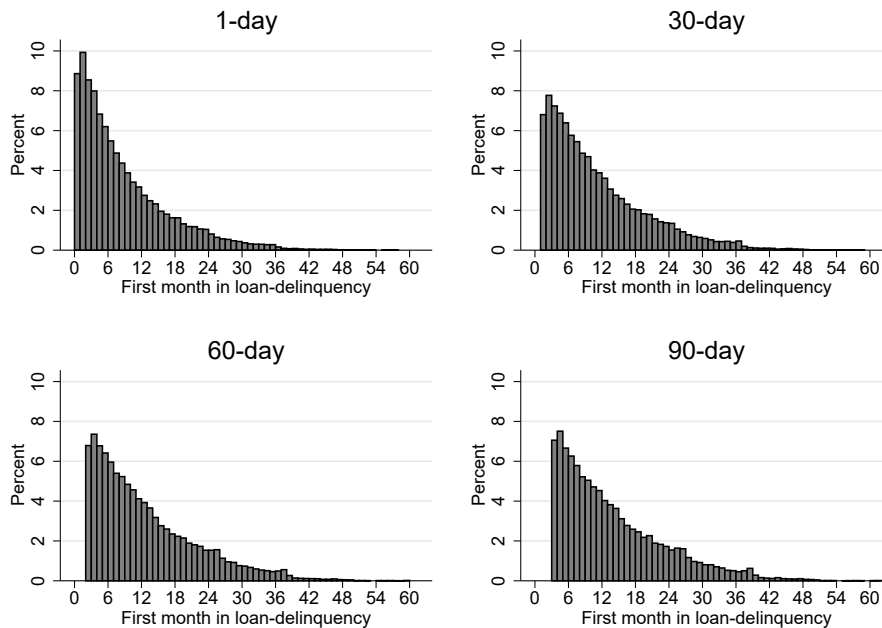
Men’s loan-delinquency rates are higher than women’s and, regarding age, the 25-34 age group is the one with the highest prevalence (specifically, in this group the delinquency reaches its peak and then it diminishes with the age). On the other side, individuals with secondary education or less and the ones that don’t inform their educational level have higher delinquency prevalence than more educated people (more than secondary).

On the other hand, loan-delinquency is higher in low income people and there is a negative gradient between income and delinquency prevalence. In that line, people who reported having vehicles or properties, which is directly related to income, have lower rates of loan-delinquency. People who have at least one child show higher loan-default prevalence.

Additionally, there is a positive relation between delinquency rates and the credit length and loan-delinquency prevalence is higher for those with higher interest rates. The latter is natural since the interest rate should capture the individual’s risk, therefore, individuals whose credits have higher interest rates are more likely to fall into default. Consistent with the above, individuals with renegotiated credits have a higher level of default. Lastly, looking at the financial system as a whole, delinquency rates are higher for individuals who don’t have debts in the last 12 months.

Finally, the data allow to identify in which month the individuals fall in loan-delinquency for first time. The distribution of the first month in 1-day, 30-day, 60-day and 90-day delinquency is shown in Figure 23.

Figure 23: Distribution of the first month in loan-delinquency



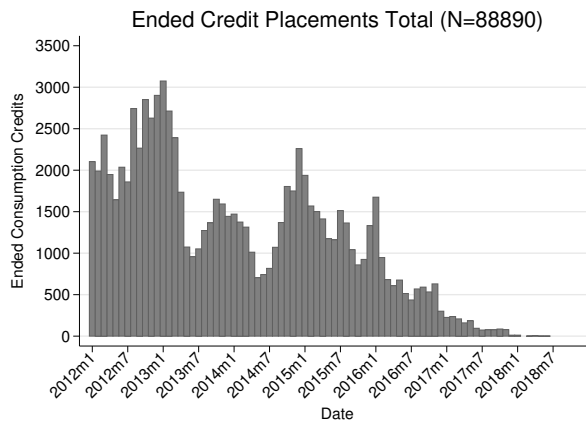
It's observed that the first significant jump in the 1-day delinquency occurs after the expiration of the first installment and that it occurs one month after for the 30-day delinquency, two months after for the 60-day delinquency and 3 months after for the 90-day delinquency. In addition, it can be seen that about 40% of the 30-day delinquency falls happen during the first 6 months of the credit cycle and about 55% happen during the first 9 months. This number increases to 82% for the first 18 months.

To sum up, the analysis of BancoEstado's Emerging Segment administrative data for the consumption credits placed between January 2012 and December 2018 in the Metropolitan region, without remuneration agreement, suggests that there are some groups with higher loan-delinquency prevalence such as men, younger individuals, those with lower income and those whose credits have longer term and higher interest rates. Additionally, more than a third of the credits that fall into 30-day delinquency at any time, do so within the first 6 months of the credit cycle. The latter is important to consider, since it's during the first months of the credit cycle where the intervention starts.

C.2 Sample aspects for the intervention

As stated before, between January 2012 and December 2018 160632 consumption credits were placed by the Emerging Sector's clients in the Metropolitan Region (MR), without remuneration agreement. Of those credits, 88890 (55.3%) ended their cycle during the same period. Figure 24 shows the monthly distribution of the ended consumption credits during the period.

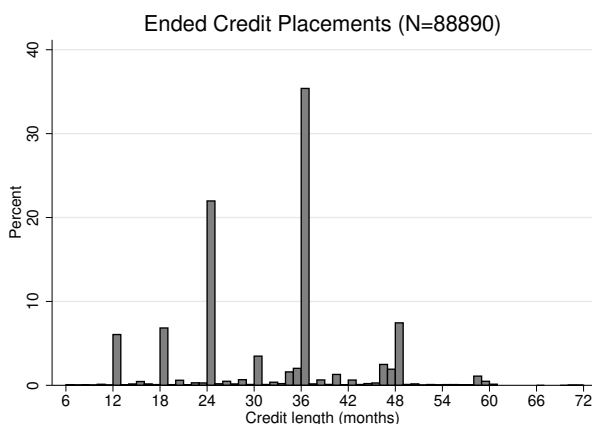
Figure 24: Credit placements by month in the MR, ended credits



It should be mentioned that the ended credits universe is relevant for the analysis of the 30-day delinquency prevalence ever during the credit cycle. However, for the analysis of the 30-day delinquency prevalence in the first six months of the credit cycle or in the first nine, the relevant universe is all the credits with maturities higher than 6 and 9 months, respectively.

In terms of length, ended credit placements last 32 months on average, with a minimum of 6 months and a maximum of 72 months. Figure 25 presents the distribution of the credits lengths for the group of ended credits. It can be seen that the credits' distribution is mainly concentrated around yearly lengths (12 months, 24 months, 36 months and 48 months).

Figure 25: **Credits length distribution, ended credits**



	Mean	St. Dev.	Min.	Max.	Obs.
Credit length	31.8	10.5	6	72	88890

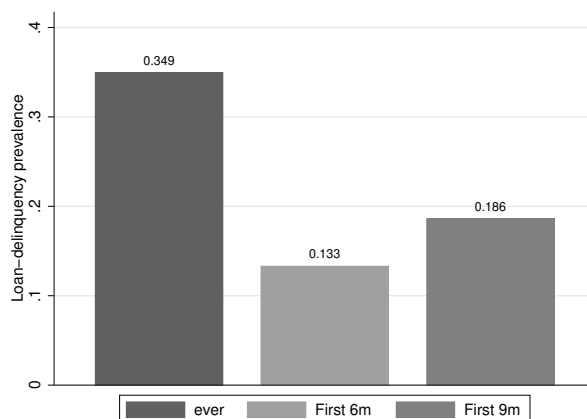
When we group the credits according to their length (Table 8), it can be observed that the majority of them last between 25 y 36 months (44.77%) and the second largest group of credits last 24 months (21.98%). Credits with duration lower than 24 months represent 15.46% of the total and those of more than 36 months 17.79%.

Table 8: **Credits length distribution by group, ended credits**

Length	Total	Percent	Accumulated
<24 months	13,744	15.46	15.46
24 months	19,534	21.98	37.44
25-36 months	39,797	44.77	82.21
>36 months	15,815	17.79	100.00
Total	88,890	100.00	

Regarding loan-default, 34.9% of the ended credits fall in 30-day delinquency at least one time during the credit cycle. On the other hand, from the credits with at least 6 months of maturity, 13.3% are in 30-day delinquency at least one time during the first 6 months of the cycle and 18.6% of the credits with at least 9 months of maturity are in 30-day delinquency at least one time in the first 9 months (see Figure 26).

Figure 26: **30-day loan-delinquency prevalence**



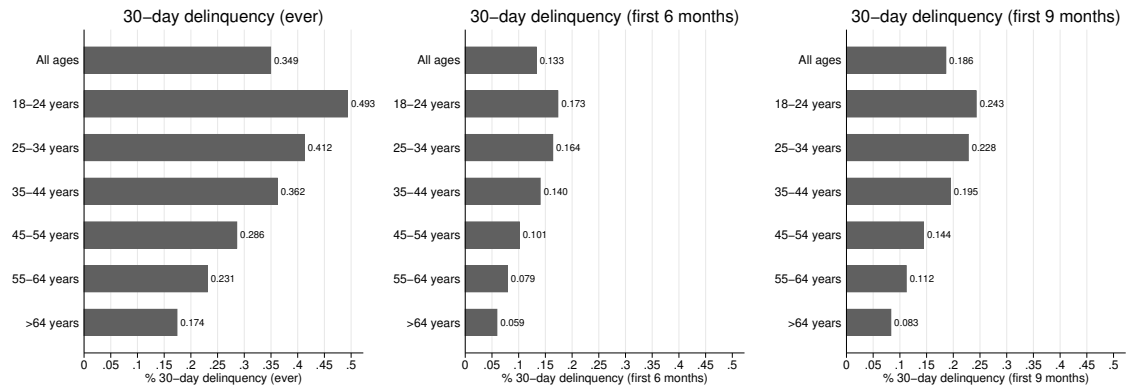
There could be different patterns of loan-delinquency prevalence according to the individuals' age profile. Splitting the sample by age-group shows that the largest group is the one between 25 and 34 years old (36.64%) and that just 2.75% of the sample are older than 64 years (see Table 9).

Table 9: **Age distribution of ended credits sample, according to age groups**

Age	Total	Percent	Accumulated
18-24 years	2,713	3.05	3.05
25-34 years	32,566	36.64	39.69
35-44 years	23,464	19.83	66.09
45-54 years	17,625	11.34	85.91
55-64 years	10,078	20.73	97.25
>64 years	2,444	2.75	100.00
Total	88,890	100.00	

Analyzing the 30-day delinquency rates by age-group (Figure 27) shows that there is a negative gradient between loan-delinquency prevalence and age. Specifically, people between 18 and 24 years exhibit a 30-day delinquency rate of 49.3% ever during the credit cycle, 17.3% in the first 6 months and 24.3% in the first 9 months. On the other hands, people that are older than 64 years show a 30-day delinquency rate of 17.4% ever during the credit cycle, 5.9% in the first 6 months and 8.3% in the first 9 months.

Figure 27: 30-day delinquency prevalence, according to age group



Due to the latter, a selection on age will be done for the intervention. All individuals older than 64 (2.75% in the data for the period 2012-2018) will be excluded in order to count with a sample that presents higher loan-delinquency prevalence so the treatments could have larger effect on them².

²Also those who not report income (0.06%) will be excluded in order to be able to compute the debt/income ratio for all the participant sample

D Predictive Model of 30-day Delinquency

When implementing the treatments, the main goal is to focus on those people who are more likely to default, since the intervention could have more impact on them. At the same time, however, it's necessary that the selected sub-sample is large enough to reach the needed power to make inference.

For the foregoing, we estimate a predictive model to identify and select those individuals whose probability of falling into loan delinquency is higher. Specifically, the model calculates for each person the probability of 30 day-delinquency, according to a set of observable characteristics. Then, a probability threshold is defined and the people above it are selected for the intervention, which implies a trade-off between the probability of loan default in the selected sample and its size. This will be explained in detail using an out of sample prediction exercise.

D.1 Out of Sample Prediction Exercise

Using BancoEstado historic information from the period 2012-2016, we predicted the 30-day delinquency probability in the consumption credits from 2017-2018. Since the intervention is implemented in the first months of the credit cycle, the focus is placed on those people who fall in 30-day delinquency within the first six months. For that reason, the sample is restricted to credits with at least six months of maturity.

From the sample of interest for the period 2017-2018 (N=27769), we excluded people older than 64 (2.2%) and people not reporting income (0.0004%), keeping a final sample of 27134 credit placements. For this group, the actual levels of 30-day delinquency in the first six months of the credit are presented in Table 10, according to different types of credit lengths. It can be seen that the prevalence of 30-day delinquency in the first six months is 11%, being higher in those credits of more length (13.2% in credits of more than 36 months).

Table 10: **30-day delinquency in first six months of the credit, 2017-2018 sample**

Length	% 30-day delinquency first six months	N	% of sample
< 24 months	8.1	3805	14.02
24 months	7.9	4877	17.98
25-36 months	11.7	10852	39.99
> 36 months	13.2	7600	28.01
Total	11.0	27134	100

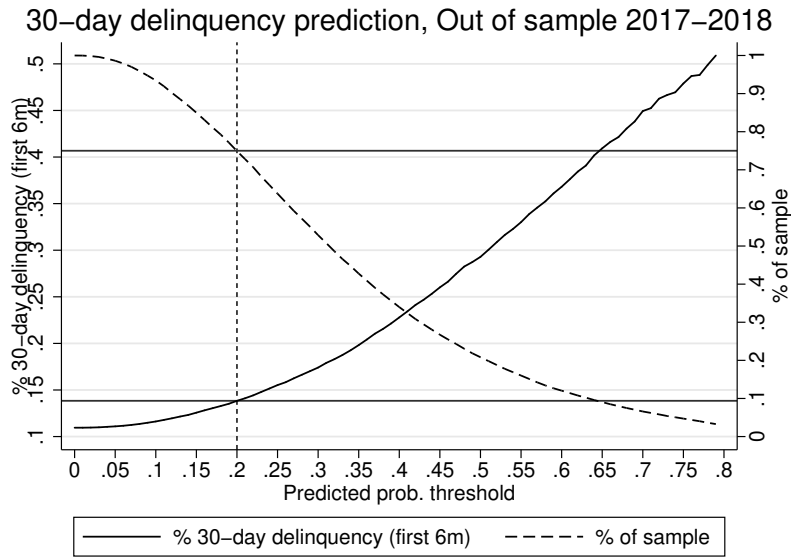
For the prediction, we calibrate a model using BancoEstado 2012-2016 information. Specifically, we estimate a probit model that considers as dependent variable a binary variable indicating if the person has fallen in 30-day delinquency and as explanatory variables sociodemographic characteristics (gender, age, education, income, properties, vehicles and children), credit's characteristics (value of the credit installment, loan to income ratio and interest rate), the individual financial history in the twelve months previous to the credit placement and month-fixed effects.

It should be considered that there is a trade off between the model predictive ability and

the share of the sample selected for the intervention. The model assumes that someone is loan-delinquent if her predicted probability is higher or equal than certain threshold. Thus, a higher threshold allows more accuracy in the prediction made, but a smaller number of individuals predicted as loan-delinquents (so, a smaller sample to intervene). Considering this and the need to count with a sample large enough to intervene, it was determined to use the threshold that allows to work with 75% of the sample with the highest predicted probability of loan-default.

The aforementioned trade-off between the accuracy of the prediction and the share of the sample selected can be noted in Figure 28, according to different possible prediction thresholds. Fixing the threshold in 0.2, 75% of the sample is selected with a 30-day delinquency prevalence of 13.84% in the first six months.

Figure 28: **Trade-off between prediction accuracy and selected sample size**



Regarding the initial scenario, Table 11 presents a comparison between the base sample (see Table 10) and the 30-day delinquency prevalence after selecting the sub-sample based on the predictive model. For each type of credit length the prevalence increases between 2.3 y 3.2 pp. after predicting and selecting.

Table 11: **30-day delinquency in first six months, base sample and selected sample**

Length	% 30-day delinquency (first six months)	
	Base sample	Selected sample
< 24 months	8.1	10.8
24 months	7.9	10.2
25-36 months	11.7	14.6
> 36 months	13.2	16.4
Total	11.0	13.8
N	27134	20327

Like we set the threshold that selects 75% of the sample with the highest predicted loan-default probability, we can also determine those thresholds that select 50% and 25% of the sample with the highest predicted probability of 30-day delinquency. Using after that information to stratify the intervention’s randomized allocation, allows to count with smaller sub-samples that have higher probability to fall in 30-day delinquency in the first six months, without having to stop accumulating a sufficiently large sample in each placement month. In that line, Figure 29 shows the 30-day delinquency predicted probability distribution for the 2017-2018 sample and indicates the thresholds that split the sample in groups of 25% (0.2, 0.3135 y 0.464, respectively).

Figure 29: **30-day delinquency predicted probability distribution and thresholds**

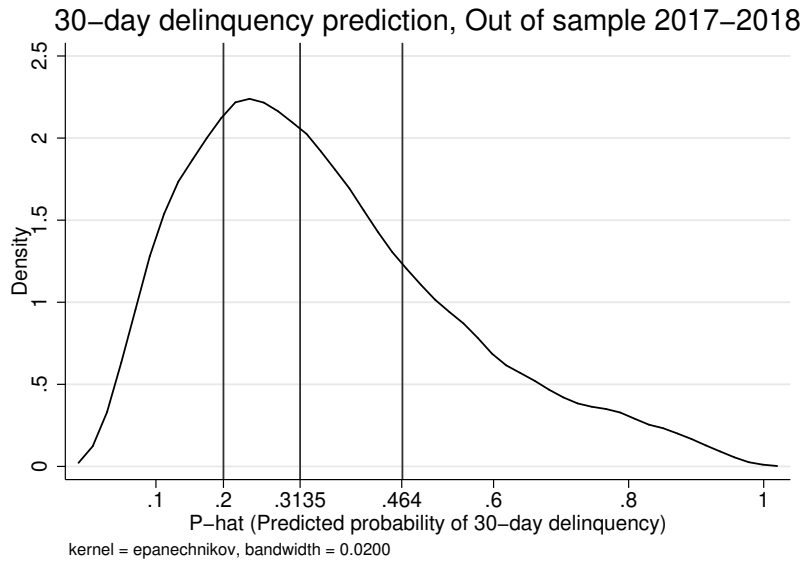


Table 12 presents the sample distribution in each of these groups and their respective 30-day delinquency prevalence in the first six months. As expected, there is a positive gradient between the actual 30-day delinquency prevalence and its predicted probability.

Table 12: **30-day delinquency in first six months according to thresholds, 2017-2018 sample**

Predicted Probability (p)	% 30-day delinquency first six months	N	% of sample
$0 \leq p < .2$	2.8	6807	25
$.2 \leq p < .3135$	5.3	6759	25
$.3135 \leq p < .464$	9.1	6789	25
$.464 \leq p$	27.0	6779	25
Total	11.0	27134	100

Another way to see this is how it’s shown in Table 13. Selecting the 75% of the sample with the highest predicted loan-default probability implies an actual prevalence of 13.8% (higher than the base scenario of 11%). On the other side, the 50% of the sample with the highest

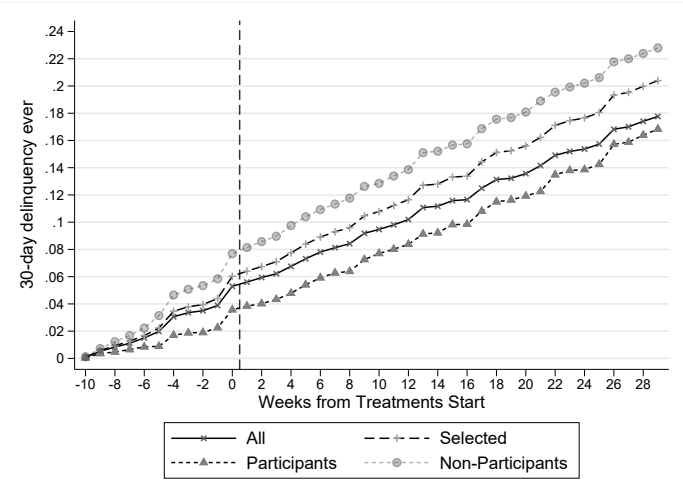
predicted delinquency has 18% of 30-day delinquency and the 25% with the highest propensity to default shows a prevalence of 27%.

Table 13: **30-day delinquency in first six months, 2017-2018 selected samples**

Predicted Probability (p)	% 30-day delinquency first six months	N	% of sample
$.2 \leq p$	13.8	20327	75
$.3135 \leq p$	18.1	13568	50
$.464 \leq p$	27.0	6779	25

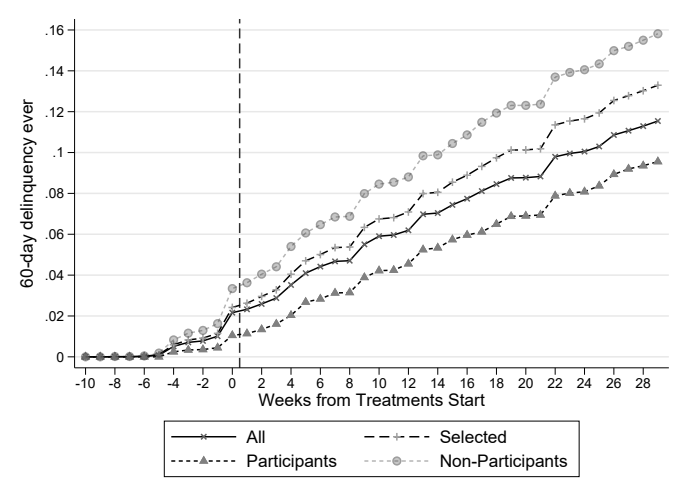
E Loan Delinquency ever rates by Sample Selection and Participation

Figure 30: 30-day loan delinquency ever, by Sample Selection and Participation



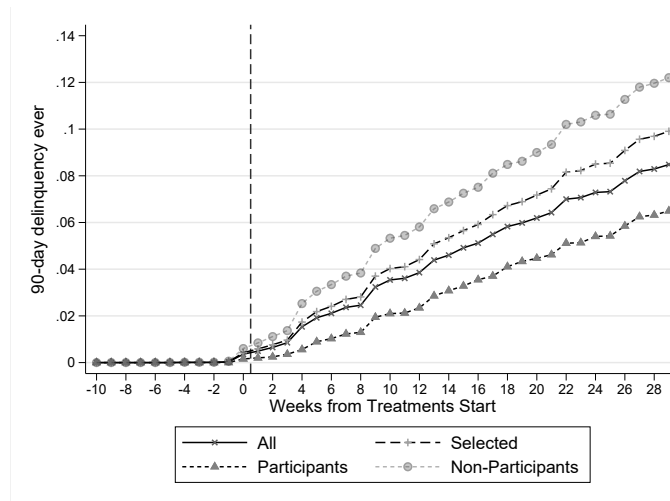
Notes: Authors' own calculations.

Figure 31: 60-day loan delinquency ever, by Sample Selection and Participation



Notes: Authors' own calculations.

Figure 32: 90-day loan delinquency ever, by Sample Selection and Participation

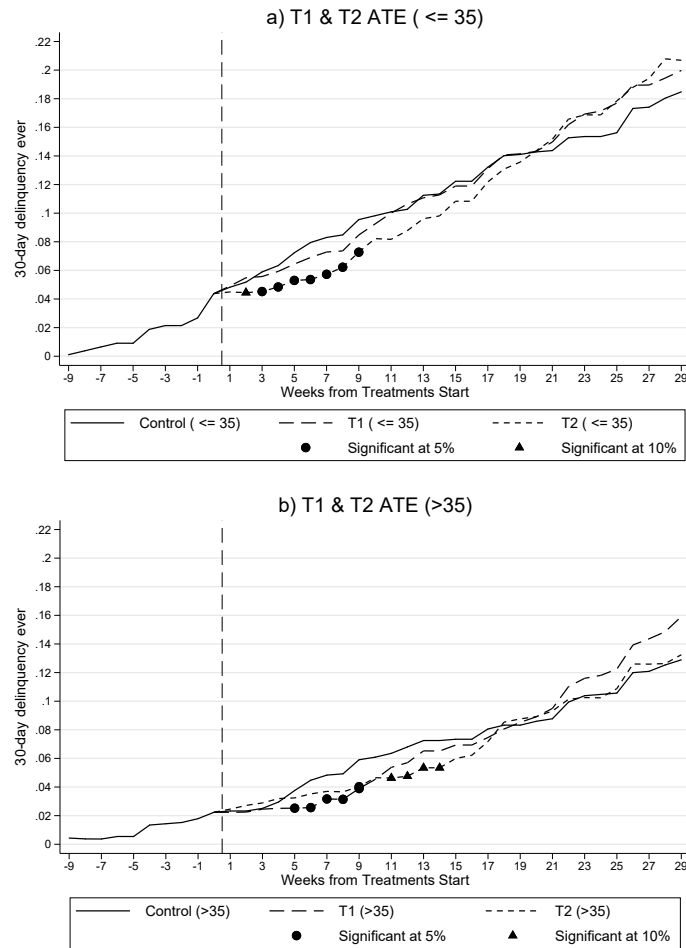


Notes: Authors' own calculations.

F 30-60-90 days delinquency rates by individual characteristics

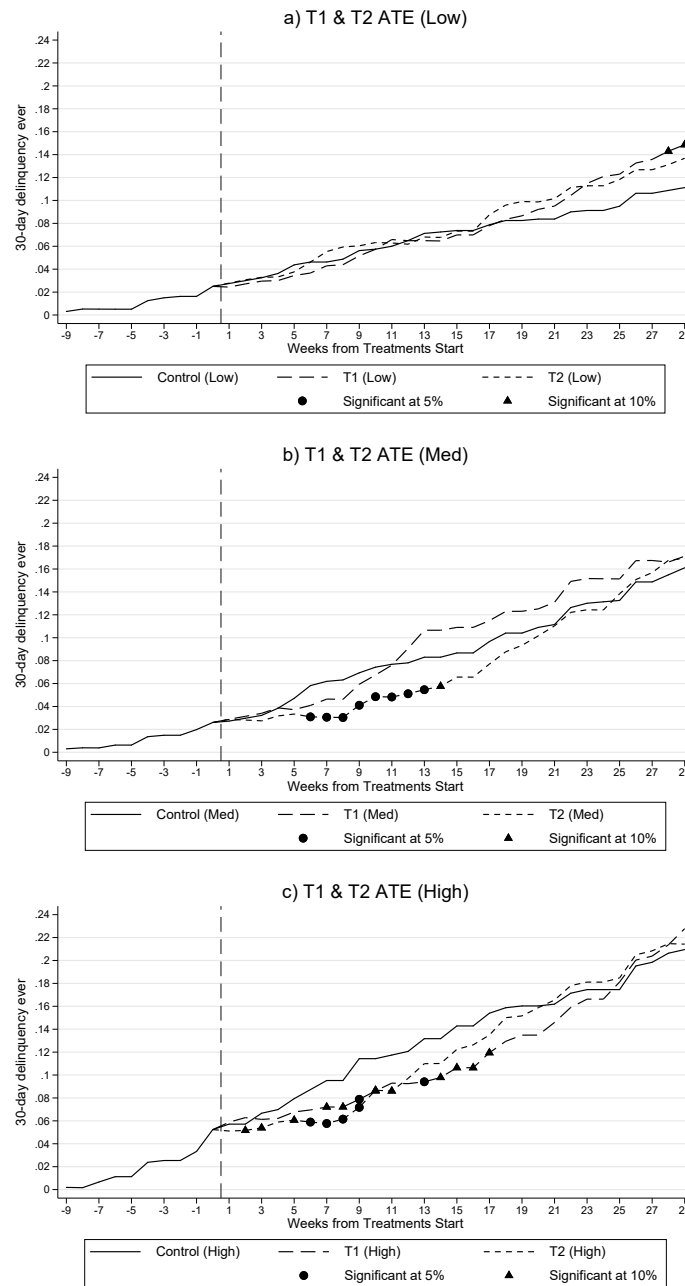
F.1 30-day delinquency ever

Figure 33: Average Treatment Effects on 30-day delinquency ever by Age-Group



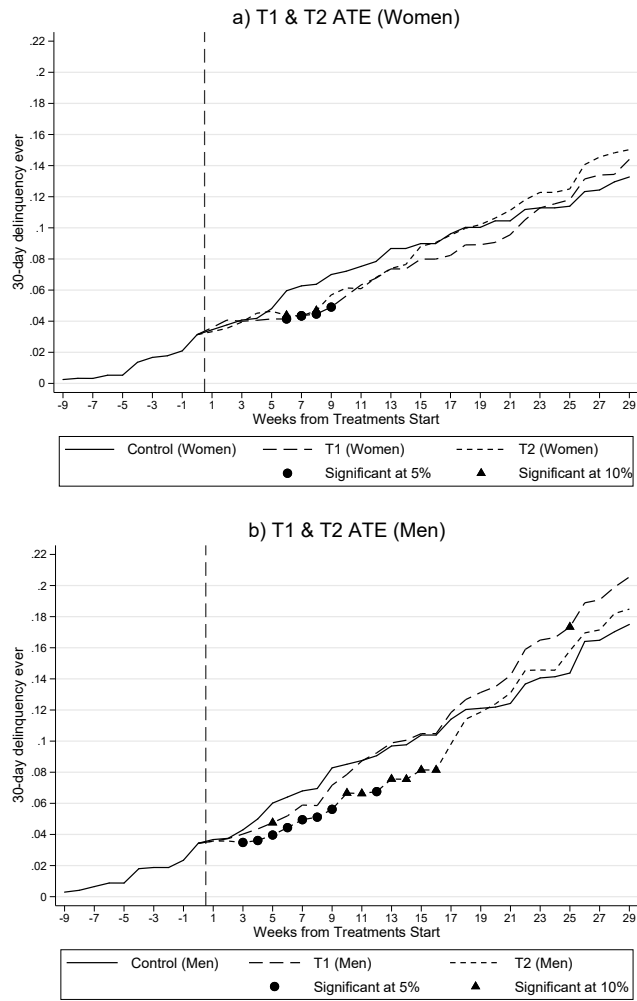
Notes: Authors' own calculations.

Figure 34: Average Treatment Effects on 30-day delinquency ever by Delinquency Probability Group



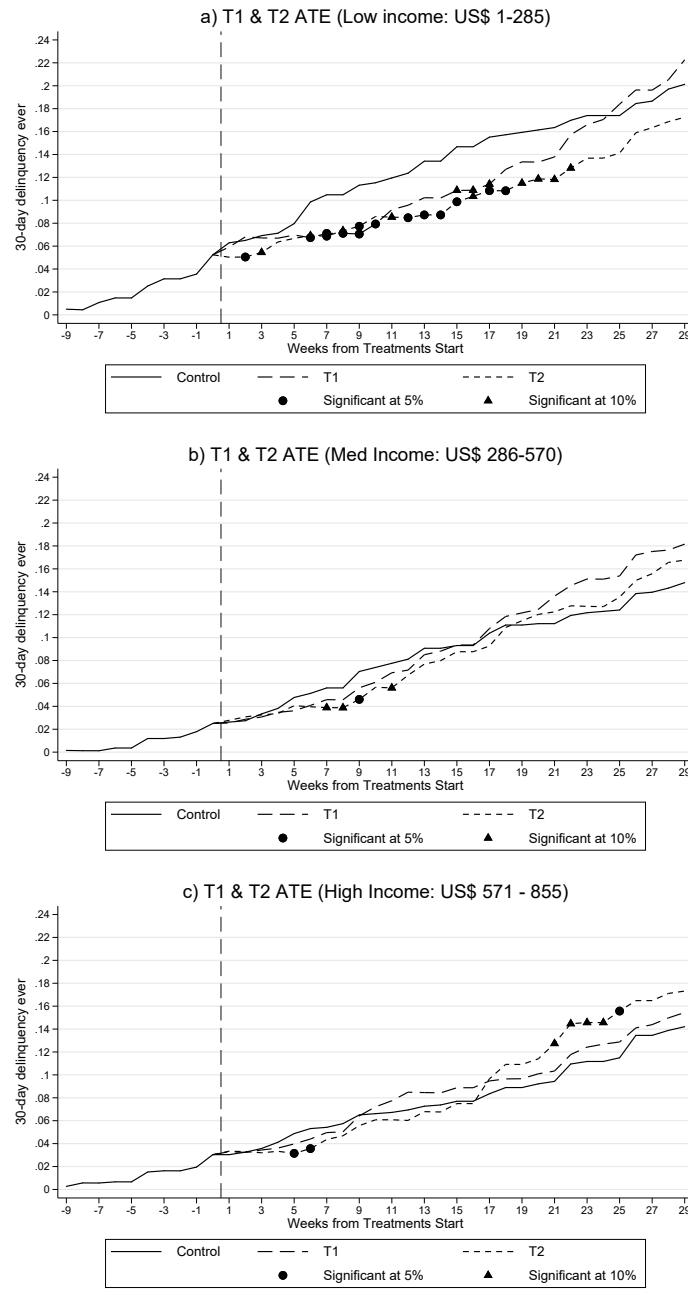
Notes: Authors' own calculations.

Figure 35: Average Treatment Effects on 30-day delinquency ever by Sex



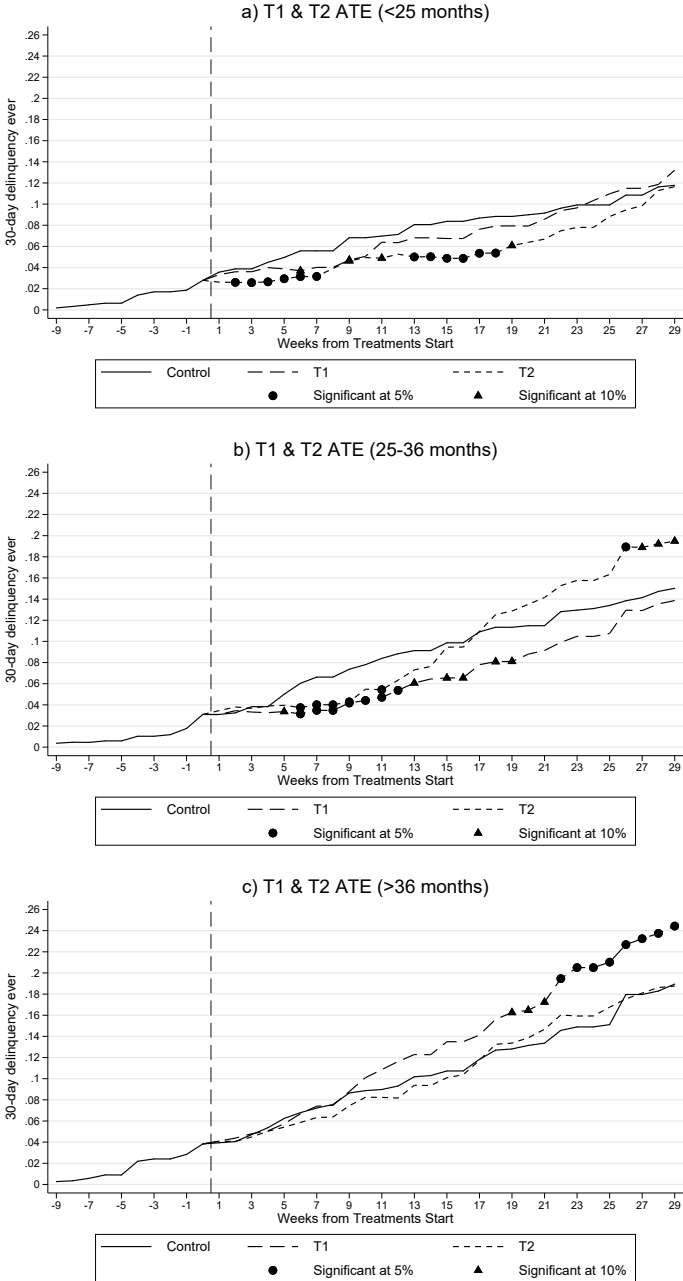
Notes: Authors' own calculations.

Figure 36: Average Treatment Effects on 30-day delinquency ever by Income



Notes: Authors' own calculations.

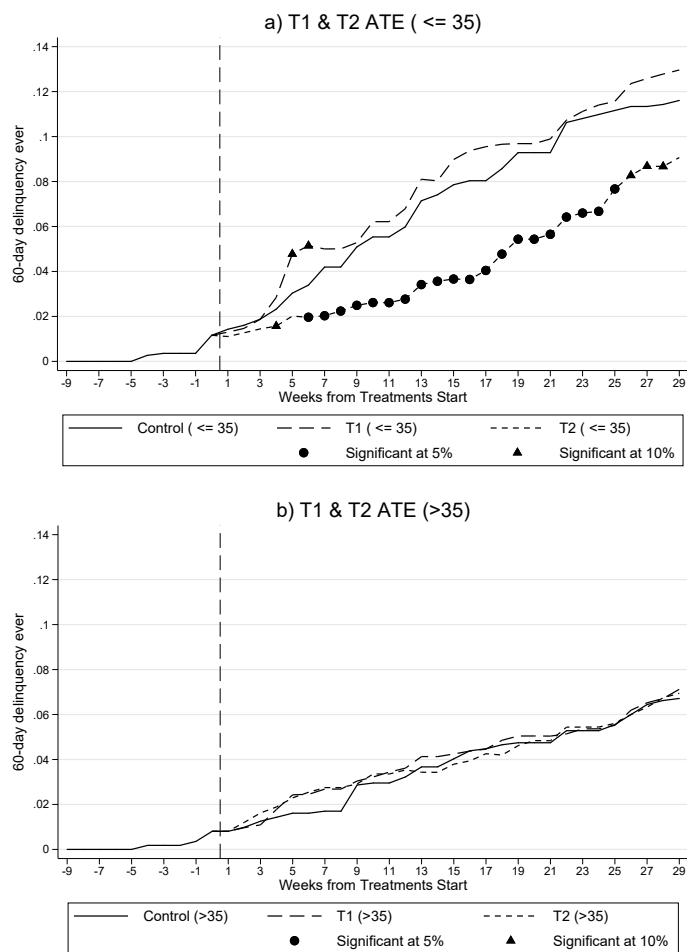
Figure 37: Average Treatment Effects on 30-day delinquency ever by Loan Length



Notes: Authors' own calculations.

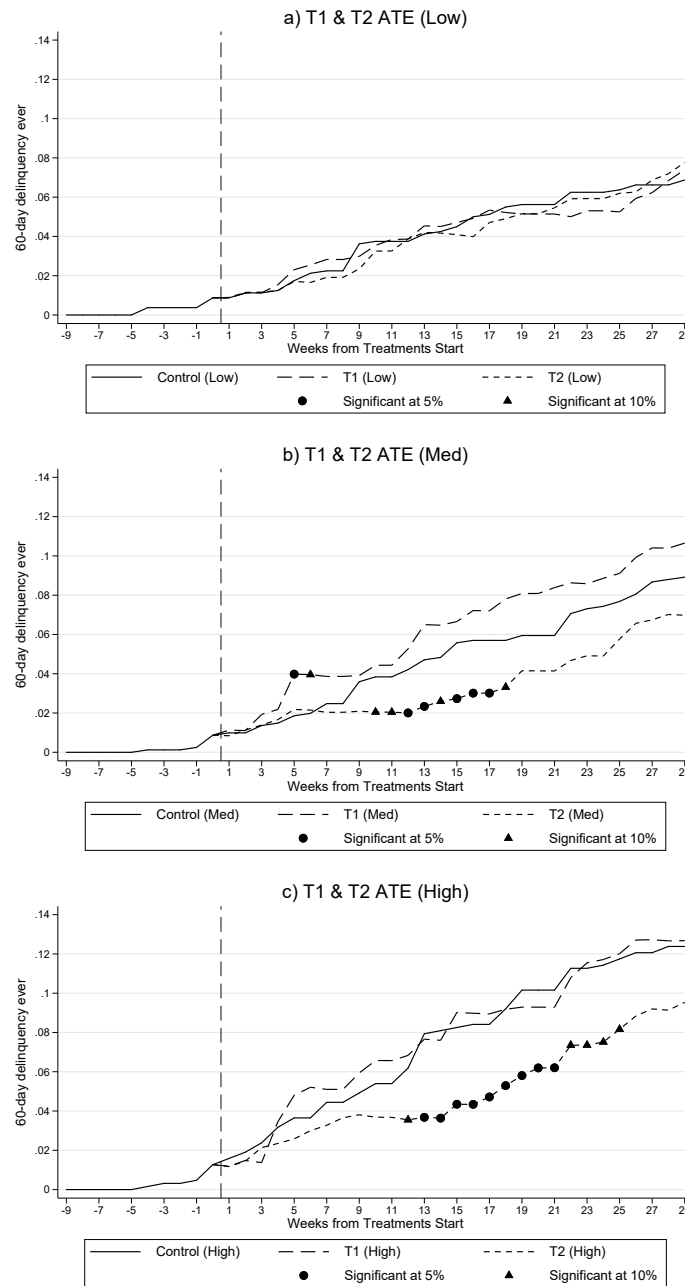
F.2 60-day delinquency ever

Figure 38: Average Treatment Effects on 60-day delinquency ever by Age-Group



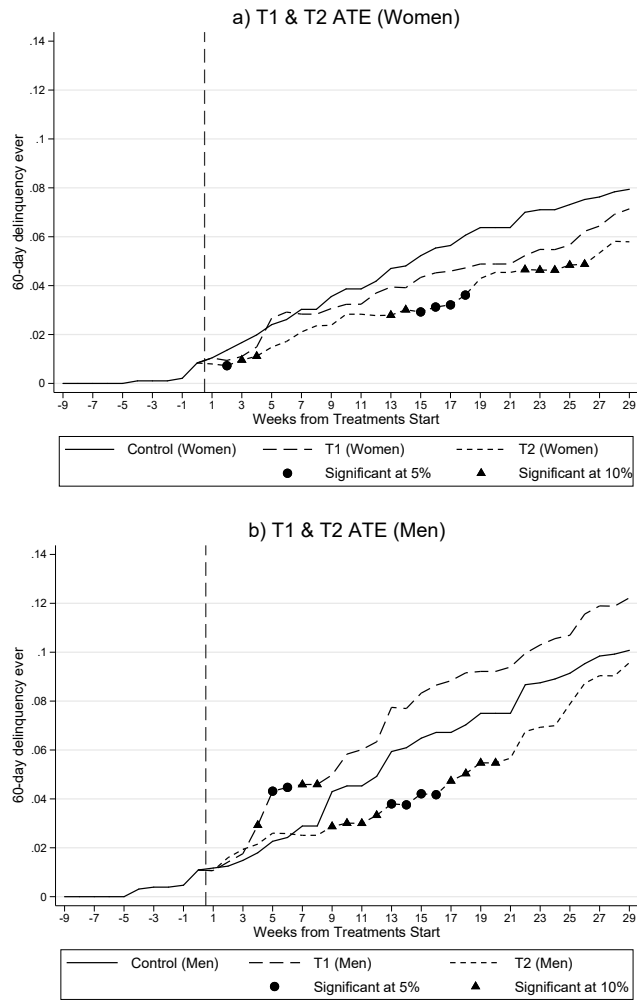
Notes: Authors' own calculations.

Figure 39: Average Treatment Effects on 60-day delinquency ever by Delinquency Probability Group



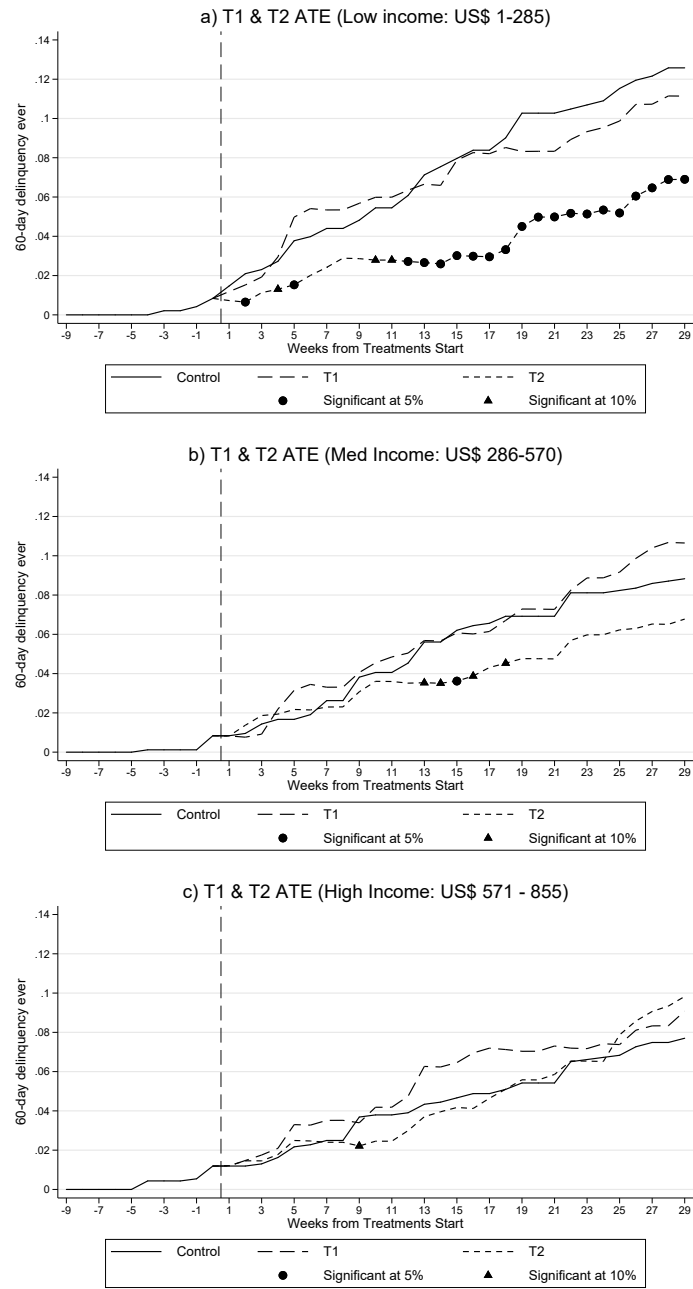
Notes: Authors' own calculations.

Figure 40: Average Treatment Effects on 60-day delinquency ever by Sex



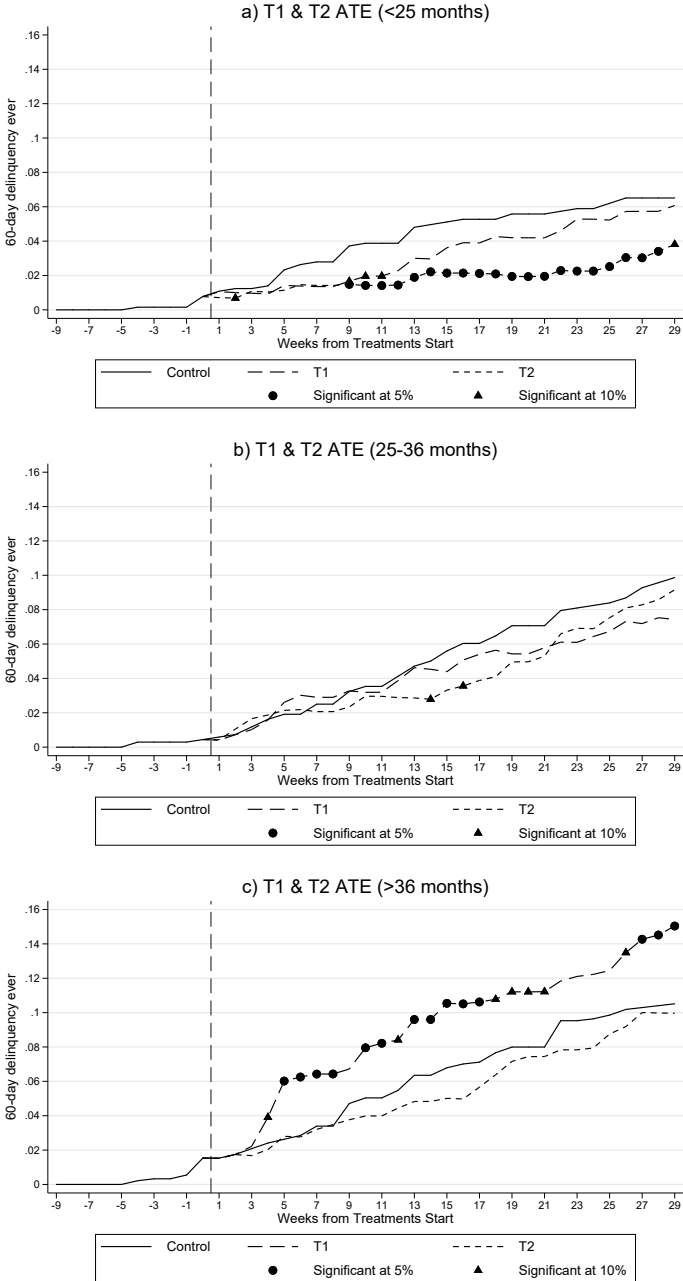
Notes: Authors' own calculations.

Figure 41: Average Treatment Effects on 60-day delinquency ever by Income



Notes: Authors' own calculations.

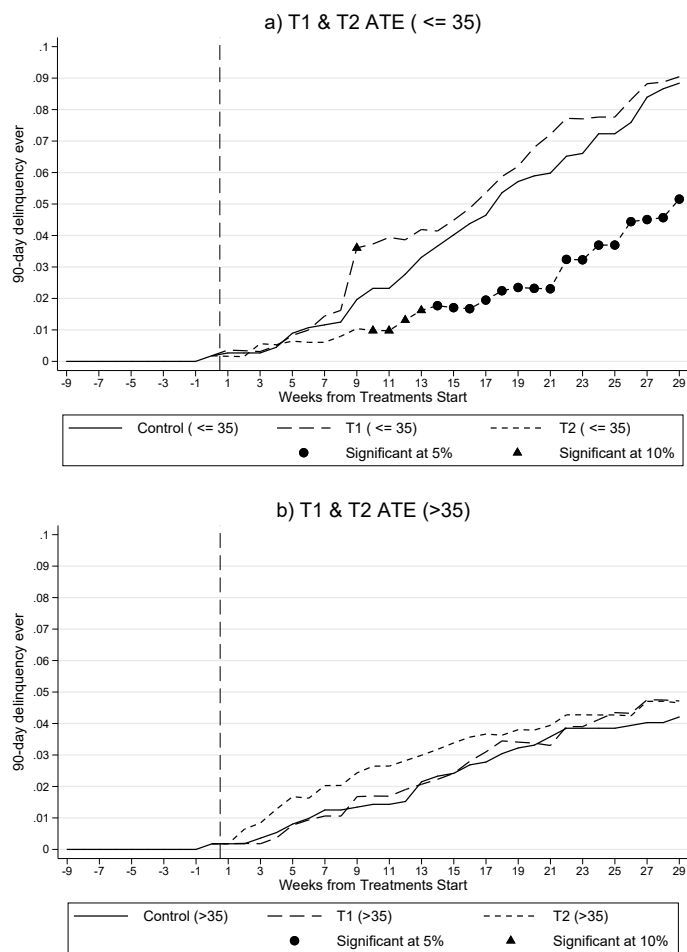
Figure 42: Average Treatment Effects on 60-day delinquency ever by Loan Length



Notes: Authors' own calculations.

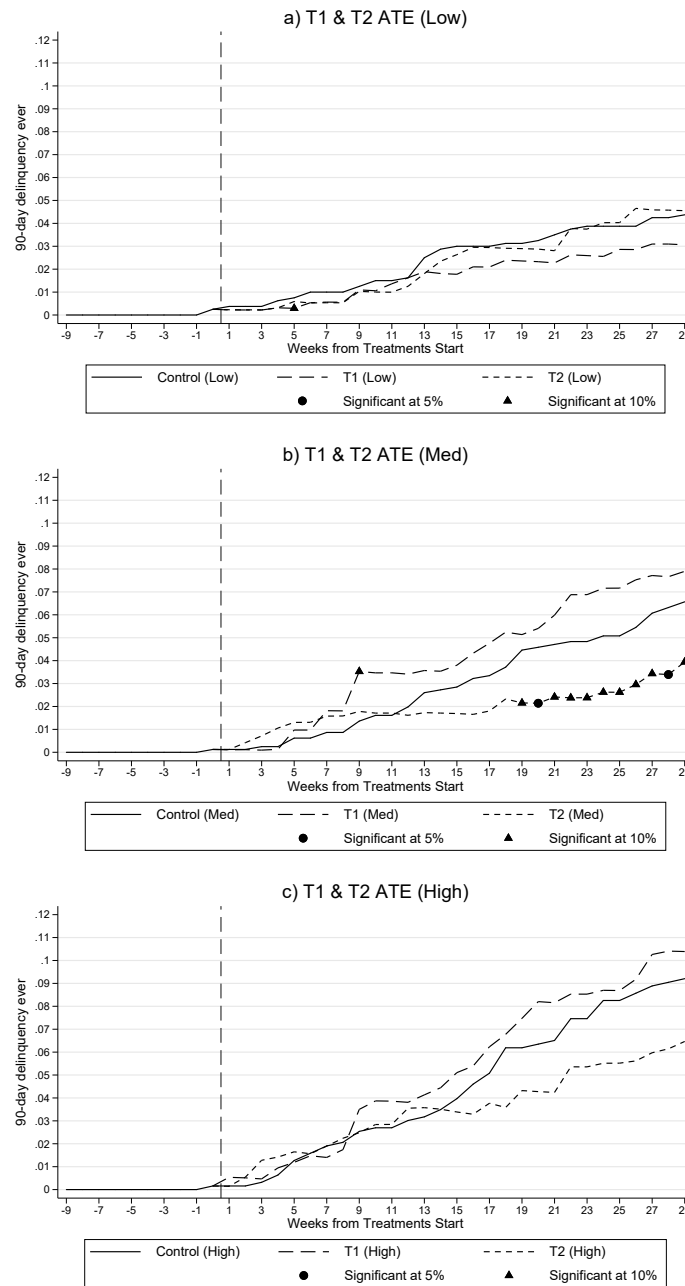
F.3 90-day delinquency ever

Figure 43: Average Treatment Effects on 90-day delinquency ever by Age-Group



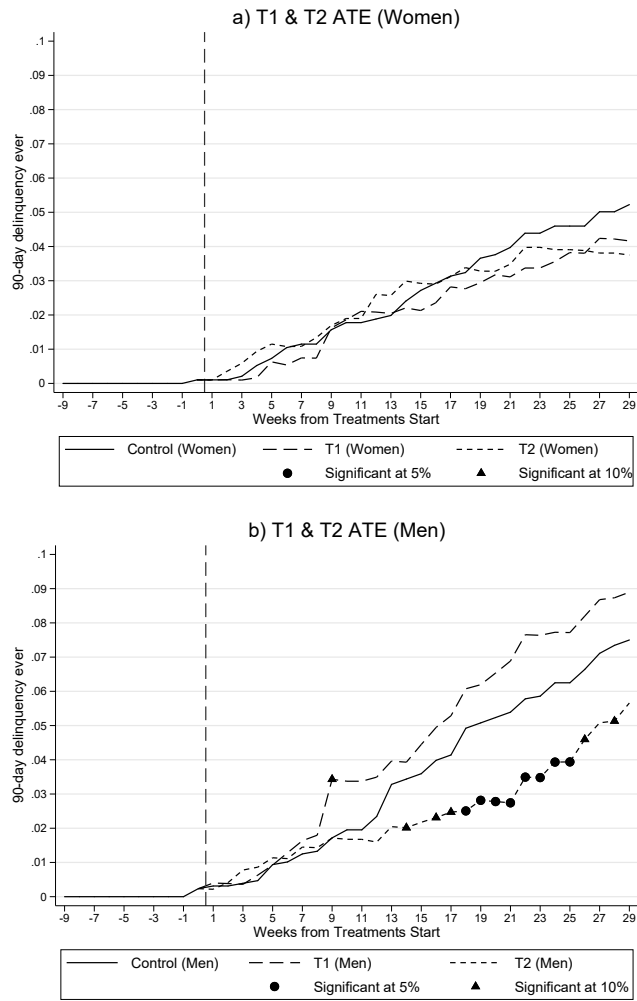
Notes: Authors' own calculations.

Figure 44: Average Treatment Effects on 90-day delinquency ever by Delinquency Probability Group



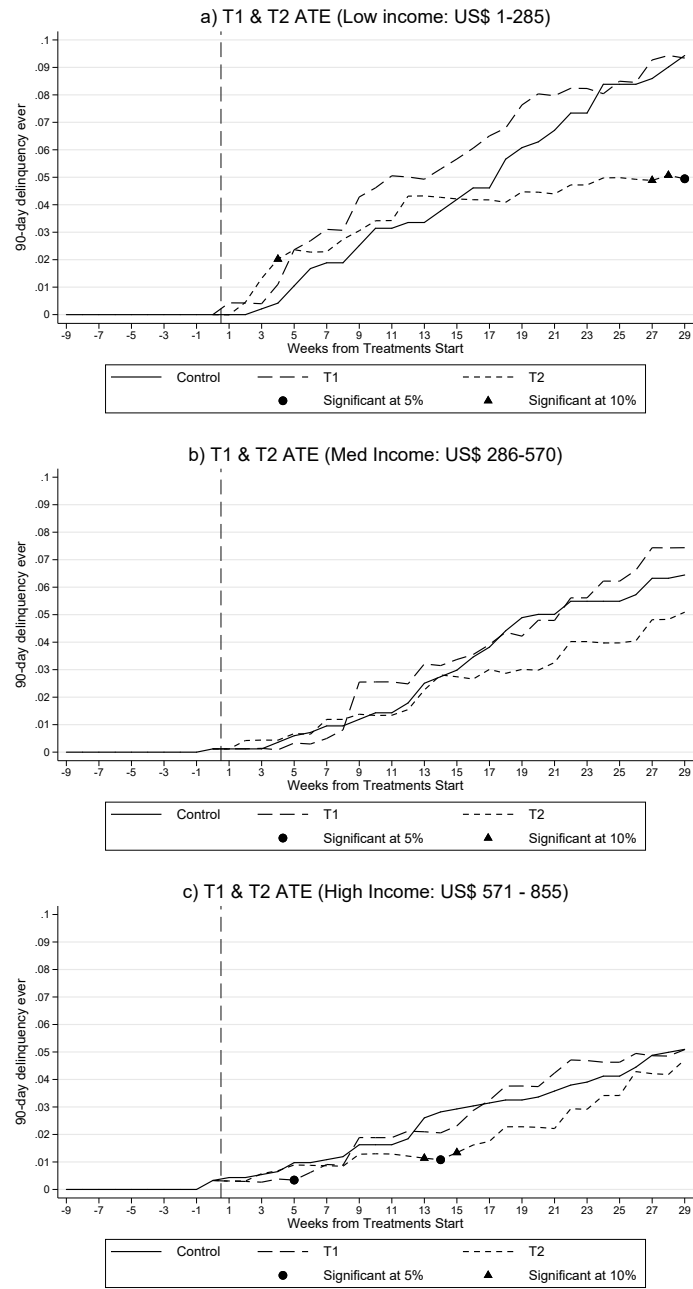
Notes: Authors' own calculations.

Figure 45: Average Treatment Effects on 90-day delinquency ever by Sex



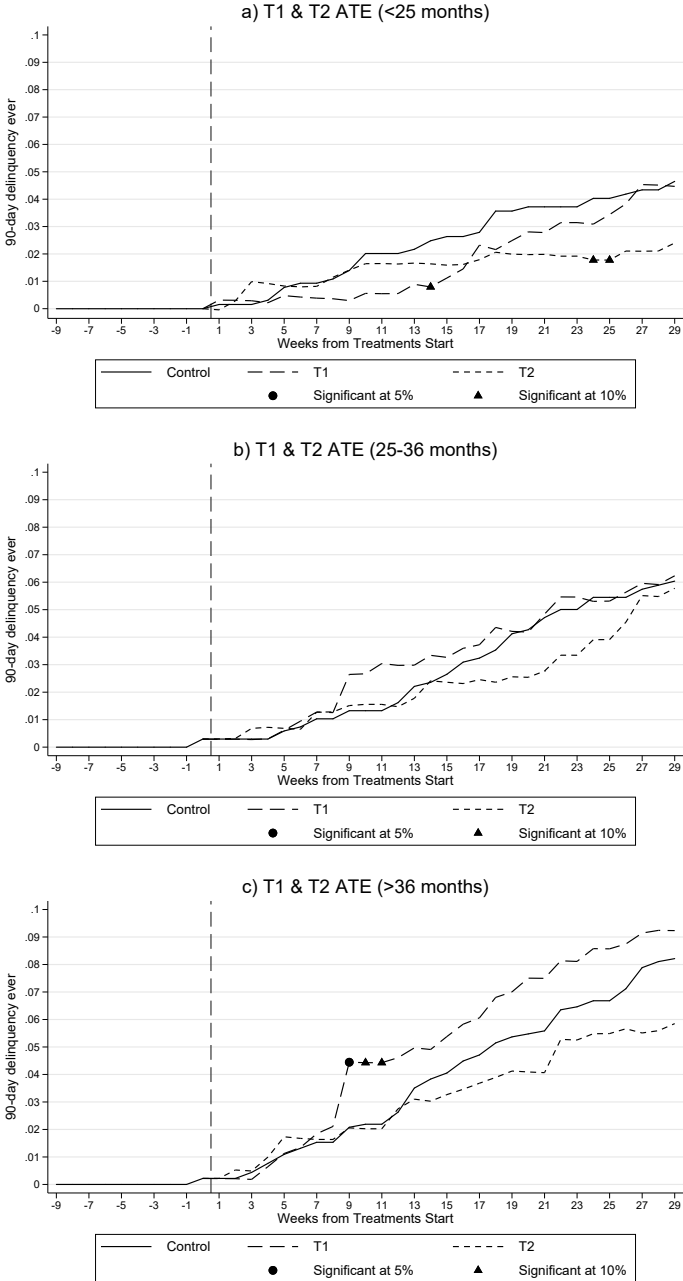
Notes: Authors' own calculations.

Figure 46: Average Treatment Effects on 90-day delinquency ever by Income



Notes: Authors' own calculations.

Figure 47: Average Treatment Effects on 90-day delinquency ever by Loan Length



Notes: Authors' own calculations.

G Modeling Participation and Synthetic Control

Table 14: **Loan Placements by Month, Selection and Acceptance**

Sample	Month of loan placements							Total
	January	February	March	April	May	June	July	
Total	2500	1789	1731	2058	1929	2492	2758	15257
Age<65	2391	1717	1646	1951	1815	2336	2594	14447
P-hat \geq 0.2	1760	1300	1227	1510	1443	1815	2073	11125
Accepts	774	596	529	683	736	832	329	4479
Participation (%)	44%	45.8%	43.1%	45.2%	51.1%	45.8%	15.8%	40.2%

Notes: Authors' own calculations. Since October 18th the Call-Center was suspended due to the social conflict occurring in Chile. The contact process for the sample of loan placements of July was interrupted and it was decided to consider for the intervention only those people that have accepted to participate before this. That's why the July participant sample is smaller than the rest.

Table 15: **Participation by Month, Conditional on Selection**

Month	Participates		
	No	Yes	Total
January	986	774	1,760
February	704	596	1,300
March	698	529	1,227
April	827	683	1,510
May	704	736	1,440
June	983	832	1,815
July	1,744	329	2,073
Total	6,646	4,479	11,125

Table 16: **Balance Check**

Variables	Participates			
	No	Yes	Difference	p-value
Men	.557	.572	-.014	.138
18-29 years	.350	.290	.060	.000
30-39 years	.288	.327	-.039	.000
40-49 years	.192	.212	-.020	.009
50-59 years	.136	.136	-.000	.962
60-64 years	.034	.034	-.000	.931
Primary	.054	.039	.015	.000
Secondary	.652	.690	-.037	.000
Incomplete Technical	.046	.050	-.004	.374
Complete Technical	.046	.058	-.012	.006
Incomplete Tertiary	.041	.044	-.003	.452
Complete Tertiary	.029	.036	-.008	.027
Postgraduate	.001	.000	.000	.356
Without Ed. Info.	.131	.083	.048	.000
1-285 US\$	.285	.221	.064	.000
286-570 US\$	.342	.370	-.028	.003
571-855 US\$	.373	.409	-.036	.000
Loan Installments	32.804	36.062	-3.258	.000
Ln(Value)	11.201	11.386	-.185	.000
Interest Rate	2.227	2.147	.081	.000
No debt in FS	.387	.296	.092	.000
Debt and no Delinquency in FS	.590	.678	-.088	.000
Debt and Delinquency in FS	.022	.026	-.004	.225
Has Children	.268	.276	-.009	.319
Has Savings	.549	.573	-.024	.011
No Savings Info.	.415	.381	.034	.000
Has Vehicle	.214	.233	-.018	.023
Has Properties	.056	.065	-.009	.048
30-day delinquency at week 0	.077	.036	.041	.000
60-day delinquency at week 0	.033	.010	.023	.000
90-day delinquency at week 0	.006	.002	.004	.000
Observations	6646	4479	.	.

Notes: Authors' own elaboration

Figure 48: Neutral Message vs Non-Participants

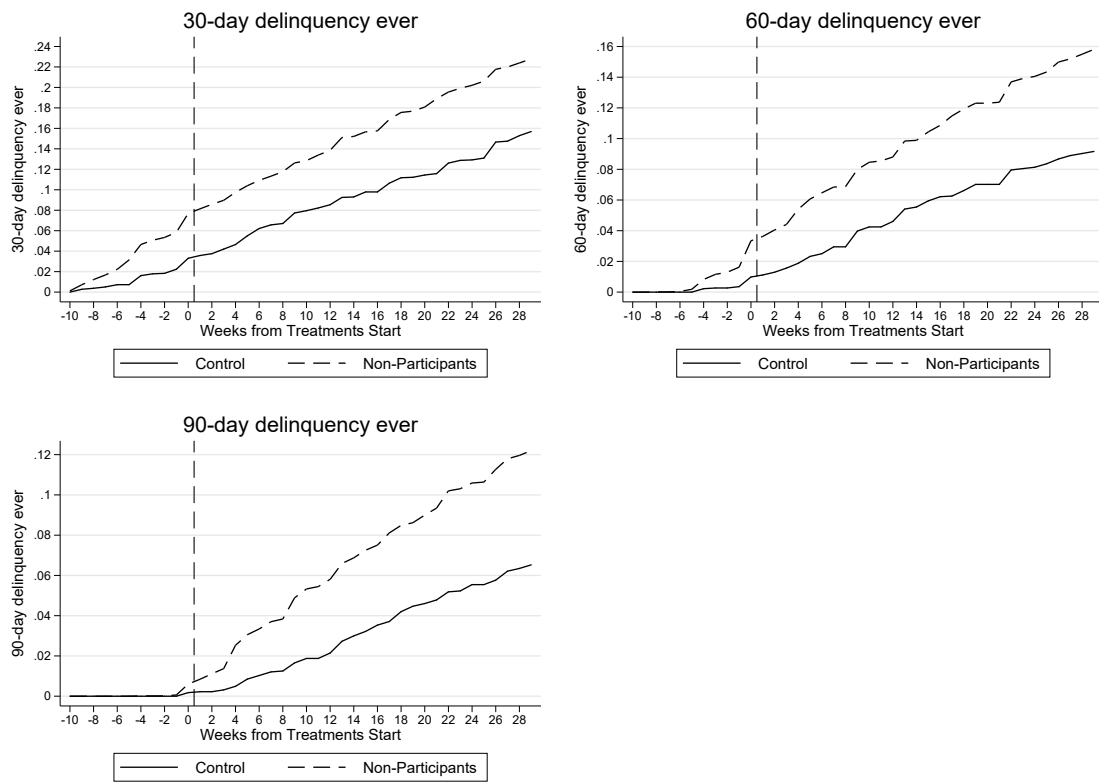


Table 17: Modeling Participation

Controls	Dep. Variable = Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
Men	0.04 (0.02)	-0.00 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.00 (0.03)	0.01 (0.03)
30-39 years	0.19*** (0.03)	0.13*** (0.03)	0.10*** (0.03)	0.10*** (0.03)	0.10*** (0.03)	0.10*** (0.03)
40-49 years	0.18*** (0.03)	0.14*** (0.03)	0.11*** (0.03)	0.11*** (0.04)	0.12*** (0.04)	0.11*** (0.04)
50-59 years	0.12*** (0.04)	0.11*** (0.04)	0.08* (0.04)	0.09** (0.04)	0.10** (0.04)	0.08** (0.04)
60-64 years	0.12* (0.07)	0.14** (0.07)	0.06 (0.07)	0.08 (0.07)	0.09 (0.07)	0.06 (0.07)
Secondary Education		0.19*** (0.06)	0.13** (0.06)	0.13** (0.06)	0.13** (0.06)	0.13** (0.06)
Incomplete Technical Education		0.21*** (0.08)	0.13* (0.08)	0.12 (0.08)	0.13 (0.08)	0.13 (0.08)
Complete Technical Education		0.29*** (0.08)	0.23*** (0.08)	0.22*** (0.08)	0.23*** (0.08)	0.22*** (0.08)
Incomplete Tertiary Education		0.21*** (0.08)	0.14* (0.08)	0.13 (0.08)	0.14* (0.08)	0.14* (0.08)
Complete Tertiary Education		0.29*** (0.09)	0.20** (0.09)	0.19** (0.09)	0.20** (0.09)	0.19** (0.09)
Postgraduate		-0.41 (0.63)	-0.56 (0.61)	-0.54 (0.61)	-0.55 (0.61)	-0.58 (0.61)
Without Educational Information		-0.07 (0.07)	-0.04 (0.07)	-0.04 (0.07)	-0.01 (0.07)	-0.01 (0.07)
286-570 US\$ Income Group		0.15*** (0.03)	0.05 (0.03)	0.03 (0.04)	0.03 (0.04)	0.01 (0.04)
571-855 US\$ Income Group		0.17*** (0.03)	0.04 (0.04)	0.02 (0.04)	0.04 (0.04)	0.01 (0.04)
Number of Loan Installments			0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Ln(Installment Value)			0.12*** (0.03)	0.10*** (0.03)	0.08*** (0.03)	0.09*** (0.03)
Interest Rate			0.05 (0.06)	0.05 (0.06)	0.03 (0.06)	0.04 (0.06)
With Debt and no Delinquency in FS (last 12m)				0.13*** (0.03)	0.14*** (0.03)	0.12*** (0.03)
With Debt and Delinquency in FS (last 12m)				0.10 (0.08)	0.10 (0.08)	0.09 (0.08)
Has Children					-0.03 (0.03)	-0.03 (0.03)
Has Savings					-0.08 (0.06)	-0.10 (0.06)
Without Savings Information					-0.14** (0.06)	-0.15** (0.06)
Has vehicles					0.00 (0.03)	-0.00 (0.03)
Has properties					0.07 (0.05)	0.07 (0.05)
30-day delinquency at week 0						-0.45*** (0.06)
Constant	-0.38*** (0.03)	-0.62*** (0.06)	-2.15*** (0.42)	-1.96*** (0.42)	-1.68*** (0.44)	-1.67*** (0.44)
Observations	11,125	11,125	11,125	11,125	11,125	11,125

Notes: Authors' own calculations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 49: Propensity Score Kernel Density by Group. Matching

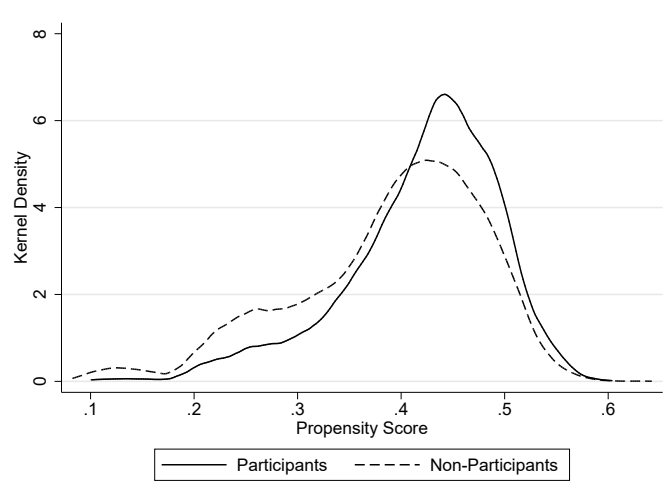


Table 18: Frecuency Weights for Synthetic Non-Participants

Weight	Observations	Percent
0	3,795	57
1	1,825	27
2	639	10
3	247	4
4	87	1
5	39	1
6	8	0
7	5	0
9	1	0
Total	6646	100

Table 19: **Balance Check Weighting for Synt. Non-Participants**

Variables	Participates			
	No	Yes	Difference	p-value
Men	.585	.572	.013	.192
18-29 years	.292	.290	.002	.871
30-39 years	.330	.327	.003	.736
40-49 years	.213	.212	.001	.877
50-59 years	.132	.136	-.004	.577
60-64 years	.032	.034	-.002	.555
Primary	.035	.039	-.004	.371
Secondary	.683	.690	-.007	.524
Incomplete Technical	.046	.050	-.004	.401
Complete Technical	.068	.058	.010	.062
Incomplete Tertiary	.040	.044	-.004	.398
Complete Tertiary	.038	.036	.002	.656
Postgraduate	.000	.000	-.000	.317
Without Ed. Info.	.089	.083	.006	.309
1-285 US\$	.221	.221	.000	.939
286-570 US\$	.367	.370	-.003	.793
571-855 US\$	.411	.409	.002	.847
Loan Installments	35.985	36.062	-.077	.784
Ln(Value)	11.385	11.386	-.001	.958
Interest Rate	2.146	2.147	-.001	.960
No debt in FS	.309	.296	.013	.190
Debt and no Delinquency in FS	.670	.678	-.008	.367
Debt and Delinquency in FS	.022	.026	-.004	.238
Has Children	.276	.276	-.000	.925
Has Savings	.569	.573	-.004	.685
No Savings Info.	.386	.381	.005	.648
Has Vehicle	.227	.233	-.006	.530
Has Properties	.058	.065	-.007	.201
30-day delinquency at week 0	.031	.036	-.005	.265
60-day delinquency at week 0	.013	.010	.003	.372
90-day delinquency at week 0	.002	.002	.000	1.000
Observations	4479	4479	.	.

Notes: Authors' own elaboration

Table 20: Modeling Participation, Weighting for Synt. Non-Participants

Controls	Dep. Variable = Participation					
	(1)	(2)	(3)	(4)	(5)	(6)
Men	-0.04 (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.04 (0.03)	-0.05 (0.03)
30-39 years	-0.00 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.04)	-0.01 (0.04)
40-49 years	-0.00 (0.04)	-0.01 (0.04)	-0.01 (0.04)	-0.01 (0.04)	-0.01 (0.04)	-0.01 (0.04)
50-59 years	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)	0.02 (0.04)	0.02 (0.05)	0.02 (0.05)
60-64 years	0.05 (0.08)	0.05 (0.08)	0.05 (0.08)	0.05 (0.08)	0.05 (0.08)	0.05 (0.08)
Secondary Education		-0.05 (0.07)	-0.05 (0.07)	-0.06 (0.07)	-0.05 (0.07)	-0.05 (0.07)
Incomplete Technical Education		-0.01 (0.09)	-0.01 (0.09)	-0.01 (0.09)	-0.01 (0.09)	-0.01 (0.09)
Complete Technical Education		-0.16* (0.09)	-0.16* (0.09)	-0.16* (0.09)	-0.16* (0.09)	-0.16* (0.09)
Incomplete Tertiary Education		-0.01 (0.10)	-0.01 (0.10)	-0.01 (0.10)	-0.00 (0.10)	-0.00 (0.10)
Complete Tertiary Education		-0.09 (0.10)	-0.09 (0.10)	-0.10 (0.10)	-0.09 (0.10)	-0.09 (0.10)
Without Educational Information		-0.10 (0.08)	-0.10 (0.08)	-0.10 (0.08)	-0.10 (0.08)	-0.10 (0.08)
286-570 US\$ Income Group		0.02 (0.04)	0.02 (0.04)	0.01 (0.04)	0.02 (0.04)	0.02 (0.04)
571-855 US\$ Income Group		0.03 (0.04)	0.03 (0.04)	0.02 (0.04)	0.03 (0.04)	0.03 (0.04)
Number of Loan Installments			0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Ln(Installment Value)			-0.01 (0.03)	-0.01 (0.03)	-0.02 (0.03)	-0.02 (0.03)
Interest Rate			-0.01 (0.06)	-0.01 (0.06)	-0.01 (0.06)	-0.01 (0.06)
With Debt and no Delinquency in FS (last 12m)				0.04 (0.03)	0.04 (0.03)	0.04 (0.03)
With Debt and Delinquency in FS (last 12m)				0.12 (0.09)	0.12 (0.09)	0.12 (0.09)
Has Children					-0.01 (0.03)	-0.01 (0.03)
Has Savings					-0.01 (0.07)	-0.01 (0.07)
Without Savings Information					-0.02 (0.07)	-0.02 (0.07)
Has vehicles					0.03 (0.03)	0.03 (0.03)
Has properties					0.07 (0.06)	0.07 (0.06)
30-day delinquency at week 0						0.10 (0.07)
Constant	0.02 (0.03)	0.06 (0.08)	0.13 (0.47)	0.18 (0.47)	0.29 (0.49)	0.30 (0.49)
Observations	8,958	8,957	8,957	8,957	8,957	8,957

Notes: Authors' own calculations. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure 50: Neutral Message vs Synt. Non-Participants

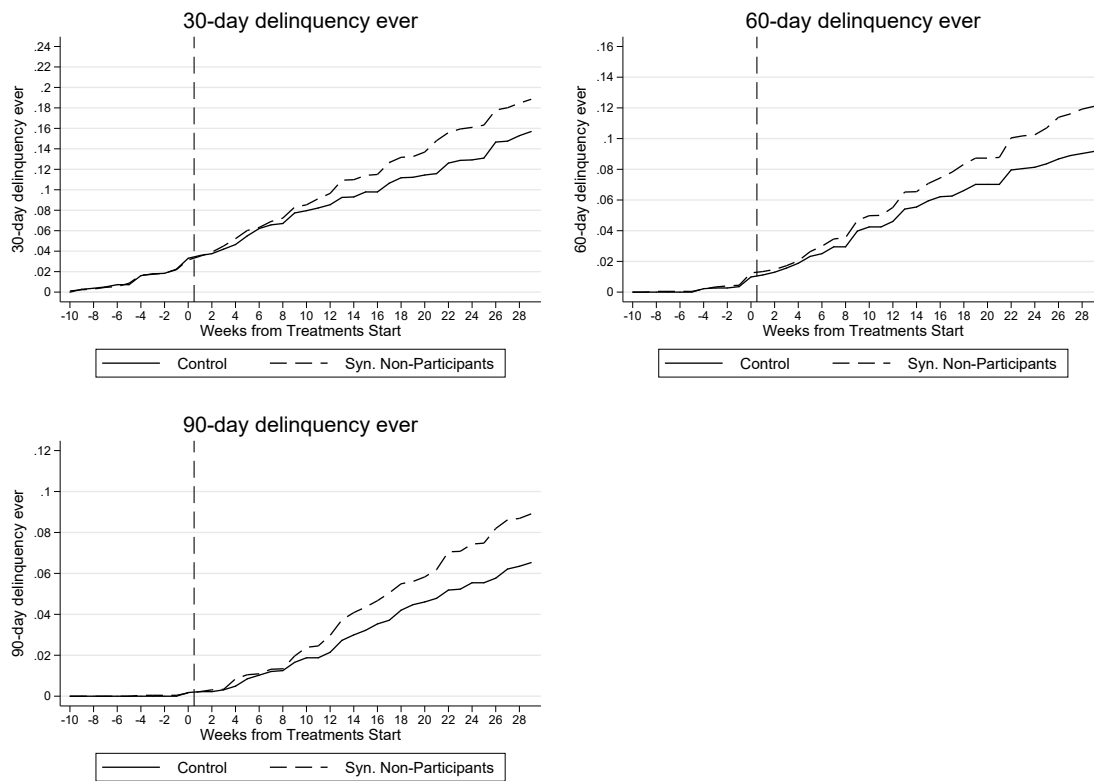


Figure 51: 30-day delinquency ever ATEs

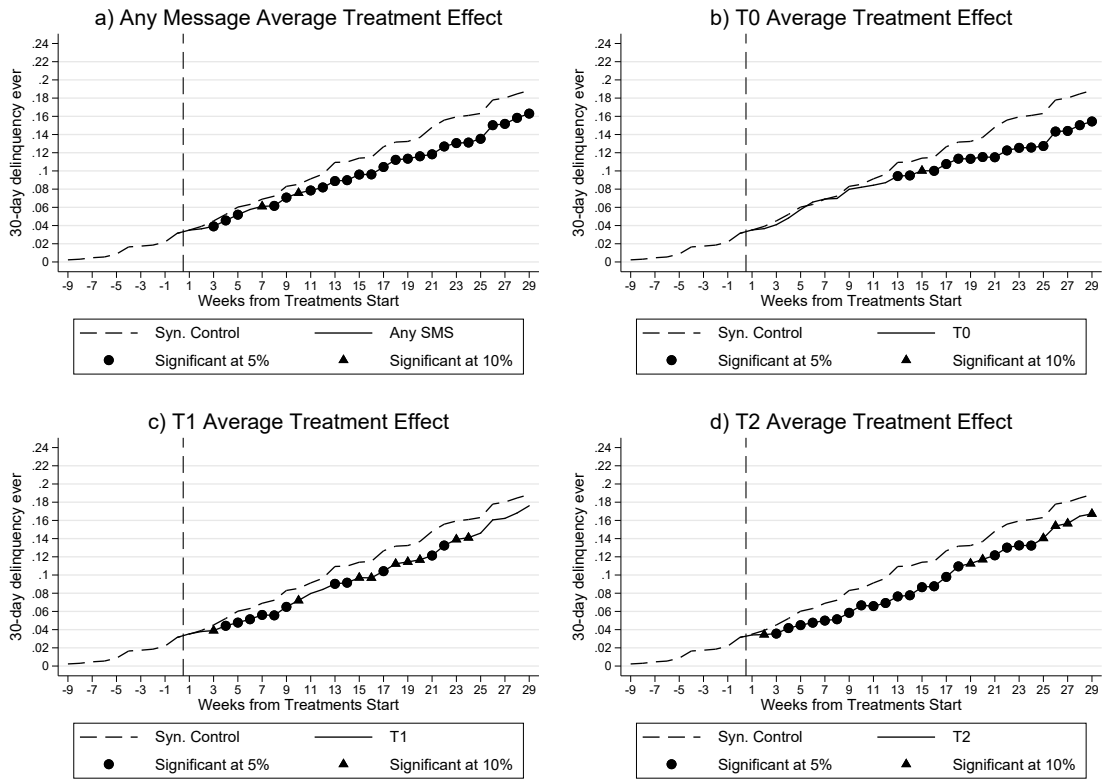


Figure 52: 60-day delinquency ever ATEs

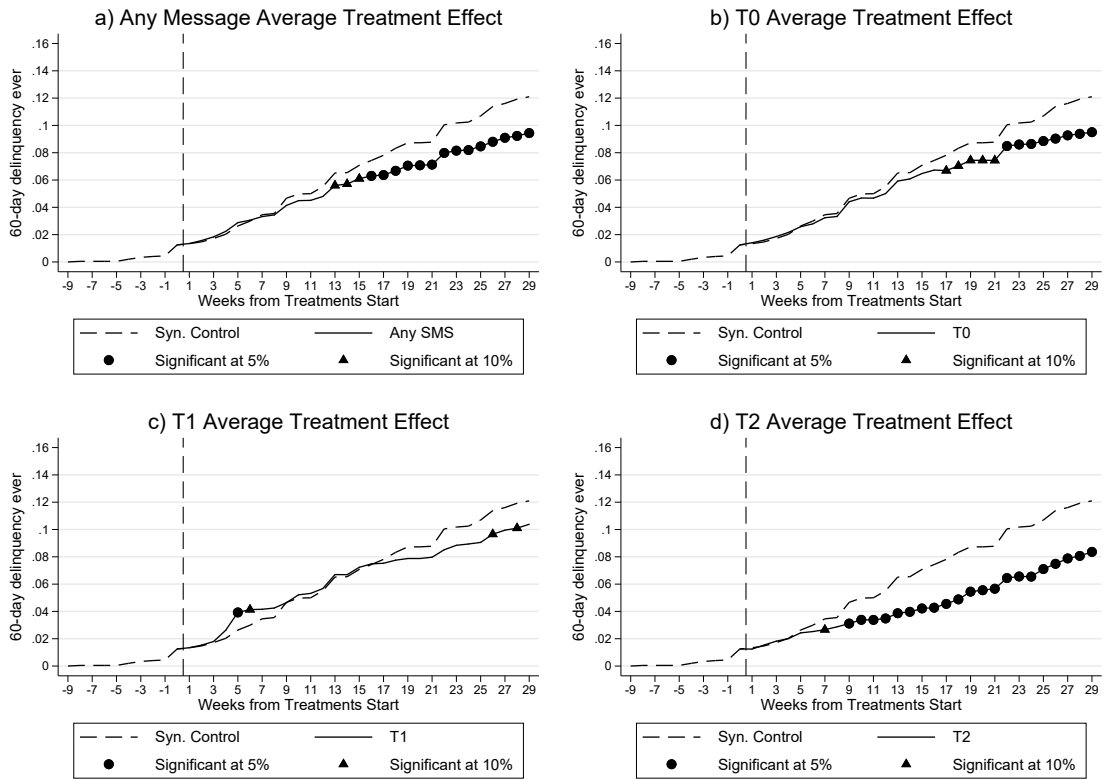


Figure 53: 90-day delinquency ever ATEs

