Are Borrowers Paid to Repay? Payday Effect in FinTech Lending *

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Abstract

We conduct a field experiment to investigate how payday loan contracts design affects loan outcomes. Using a FinTech lending platform in Indonesia, we randomly extend the loan term by one or two days to align the loan due date with borrowers' salary payday after the loan has been approved. Difference-in-difference estimator suggest that the extension postponing the due date after borrowers' salary payday increases the repayment likelihood by 27%, although such loan extension does not affect loan repayment when the due date is far away from salary payday. The effect is larger for small-sized loans, borrowers with low credit ratings, and borrowers with overdue records. Our results highlight the relationship between loan contract flexibility and loan performance.

Keywords: FinTech, Household Finance, Payday

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1 Introduction

Financial innovation expands rapidly around the world and the adoption is particularly high in markets where the traditional financial service industry is less developed, such as Southeast Asia. The growth of alternative financial services mainly in the form of FinTech firms has greatly included many customers in financial markets. For example, online lending and peer-to-peer lending platforms made credit available to customers that cannot be served by banks. At the same time, however, lack of transparency due to the nature of unregulated businesses often leads to adversarial consequences such as massive defaults, frauds, predatory lending, and violent debt collection that can harm not only the consumers but also the lending platforms eventually. With obvious policy implications, financial economists have empirically approached these issues stemming from asymmetric information through adverse selection (Karlan and Zinman, 2009; Dobbie and Skiba, 2013), moral hazard (Karlan and Zinman, 2009; Bryan, Karlan, and Zinman, 2015), and alternative data (Berg et al. (2020)). However, not much is known about how contract design can change the borrowers' incentive of repayment.

In this study, we focus on borrowers' loan repayment flexibility. Borrowers' loan due day and the salary payday are usually determined separately. Since salary payment can improve liquidity and help the loan repayment, we might improve borrowers repayment by align the loan due day and salary payday in the contract design. We fill the gap by studying the effect of loan tenor flexibility on loan outcome.

The empirical challenge of examining contract design in the credit market lies in identification – contracts are not randomly offered to borrowers. We overcome this issue by conducting a field experiment in Indonesia using one of the region's largest online lenders' platform. We only sample approved loans to control the selection effect and identify how contract flexibility affect moral hazard. We treat randomly selected borrowers by extending their loan maturity by one or two days so that the loan due date falls on or after a positive liquidity shock to the borrower, the monthly

pay day. For example, consider borrowers whose loan due days are one day before salary paydays. After we receive the approved loans, we randomly select one third of borrowers and we provide a one-day loan extension with no additional interest cost. In this case, the new loan due day is on the same day of the salary payday and we align the loan due day with salary payday. Since we provide loan extension with no interest cost and align the loan due day with the salary payday, the treatment effects on loan payment capture both the income effect (due to tenor difference) and the liquidity effect (due to salary payday alignment).

To sharpen our identification, we include placebo subjects that also receive the loan extension but do not experience a liquidity shock from payday because of the extension. The sample includes borrowers whose salary paydays are at least 10 days away from loan due days. Since teh placebo effect only capture the income effect, the difference between the treatment group and placebo group over the control group captures the liquidity effect on loan outcomes. We provide the details of our experiment design in Section 3.

We conduct the experiment over 7 months from March 2021 to October 2021 with 3402 subjects in total. We conjecture that the alignment of maturity date with borrowers' payday will increase the cash adequacy and thus increases borrowers' repayment propensity (capability and intention), which receives strong empirical supports. The DiD estimators suggest that aligning borrowers' salary payout date with their loan due date reduces the likelihood of loans being overdue, overdue by 1 day, and overdue by 1 to 7 days by 5.6%, 4.3%, and 5.9% respectively. Such treatment effect is economically large, relative to the 19% average overdue rate during the same sample period for the lending platform. Our results indicate that flexibility in loan contract design can reduce loan delinquency rate and save debt collection costs if lenders take borrowers' liquidity shocks into consideration.

We then estimate the payday effect on the distribution of borrowers' repayment dates using a hazard model. Across all repayment dates, loans maturing after the borrowers' actual salary payout days on average are 27% more likely to receive repayment relative to the placebo group. This result

is consistent with the borrower's' expectation of her liquidity shock on the payday. Hence, the alignment of payday not only significantly reduces the overdue rate bur also advance borrowers' repayments which in turn benefit the lenders' liquidity. To corroborate the payday effect on shifting borrowers' repayment dates, we conduct a two-sample Kolmogorov-Smirnov test for the equality of the distribution functions of the days between repayment date and loan maturity date across borrowers whose loans mature mature before or after their salary payout dates, and find that these two groups differ significantly.

Our further analysis uncovers rich heterogeneous effects of payday alignments with respect to borrower and loan characteristics. Consistent with our hypothesis that payday alignment increases' borrowers' cash adequacy, the treatment effect mentioned above is stronger for small-sized loans, borrowers with low credit ratings, and borrowers with overdue records in the past because for these loans, the borrower's liquidity shock has the strongest effect on the likelihood of loan repayment. We also find suggestive evidence that repeated borrowers who have applied for more loans before more strongly respond to the payday alignment, suggesting that the payday effect will not disseminate as borrowers' experiences accrue.

This paper speaks to three streams of literature. First, we add to the literature on information asymmetries in the credit market (Karlan and Zinman, 2009; Adams, Einav, and Levin, 2009; Dobbie and Skiba, 2013), and how to improve loan repayment. To overcome adverse selection, existing literature focuses on screening mechanisms using borrower information and choice (Hertzberg, Liberman, and Paravisini, 2018; Cespedes, 2019; Berg et al., 2020). To overcome moral hazard, existing literature studies dynamic incentives (Karlan and Zinman, 2009; Giné, Goldberg, and Yang, 2012), peer enforcement (Bryan, Karlan, and Zinman, 2015), information provision (Cadena and Schoar, 2011; Karlan, Morten, and Zinman, 2016; Du et al., 2020). Our paper adds to the literature by studying contract design of flexible loan repayment that align salary payday to loan due day. We find that this alignment effectively mitigates the moral hazard problem.

Second, we contribute to the growing literature on the role of financial innovations on loan

contract design. In particular, we add to the literature on how repayment flexibility affect loan performance (Field et al., 2013; Czura, 2015; Barboni, 2017; Barboni and Agarwal, 2021) . For example, Field et al. (2013) shows that a two-month grace period in microfinance contract increases short-run investment and long-run profits but also increases default rates. Barboni and Agarwal (2021) shows that contracts with repayment flexibility improve business outcomes without deteriorating repayment rates due to a positive self-selection of financially sophisticated borrowers into the flexible contract. Our design is different in two ways. First,we randomly vary loan due day to align with salary payday after the loan approval. In this way, we control for the selection effect and identify the liquidity effect. Second, we focus on the sample of borrowers with salary jobs from FinTech lenders. Although the salary information may already be used by many lenders in the market to screen borrowers, we use it in a novel way to design a flexible loan contract to induce repayment.

Third, we add on to the literature of payday effects on consumption (Huffman and Barenstein, 2005; Mastrobuoni and Weinberg, 2009; Olafsson and Pagel, 2018) and payday loan borrowing (Bertrand and Morse, 2009; Skiba, 2014; Leary and Wang, 2016). For example, Olafsson and Pagel (2018) study the payday effects on consumption and show significant spending responses to the arrival of both regular and irregular income. We complement existing literature by focusing on the payday effects of loan repayment. By incorporating payday into the design of loan contract, our results imply that financial innovation can help FinTech lenders to improve loan repayment.

2 Institutional Backgroud

Our cooperating lender (*Lender*, hereafter) is a leading FinTech company headquarted in Singapore. The *Lender* has around 2,000 employees that operate in most Asean countries as well as India, Hong Kong, and Taiwan, with business lines spanning credit risk analysis and providing alternative credit. The *Lender's* retail business started in Indonesia and by far it is the biggest loan book

within the group. Their mobile application is one of Indonesia's most popular financial services apps with over 20 million downloads, 1.4 million reviews and a 4.8-star rating as of July 2021. The *Lender* has over 3 million borrowers and has disbursed over 16 trillion-rupiah loans since its establishment in 2017. The active loan book as of July 2021 has 1.2 trillion-rupiah outstanding with over 700,000 active users. For first-time applicants, the loan size ranges between $57 and $220 SGD. The loans have fixed maturities of two to four weeks, three months, and six months. The annual percentage rate (APR) is typically between 100% and 300% depending on maturity. The loans are not collateralized. Many of the features of these high-interest rate loans are similar to the payday loans in the U.S. and U.K. However, a distinctive feature of the Indonesian market is that there is no credit agency covering the vast majority of the population. Therefore, it is hard to use external credit history to screen customers. Moreover, personal penalties in the case of default are hard to enforce in such a system. Compared to payday lenders in developed markets, KP faces a greater risk of frauds and losses given default. Borrowers need to provide personal information such as the national ID, bank account, education, employment, home address, and purpose of the loan. The *Lender* has an internal risk assessment system that flags potential fraudulent applicants and calculates a credit score (similar to FICO score in the U.S.) to each borrower. Only borrowers with a credit score above a threshold will have their applications approved.

On average, borrowers are 30 years old with a monthly income of S$40. The proportions of female borrowers, first-time borrowers, and loan approvals are approximately 40%, 50%, and 50%, respectively.

3 Experiment Design

We conduct the experiment across 7 months from March 2021 to October 2021 with 3402 subjects in total. We focus on the sample of borrowers with salary payday in private sectors, with loan tenor for 28 days, and who have received the loan before.

Figure 1 illustrate the experiment timeline. Borrowers apply for the loans through the platform and the FinTech lender approves or rejects loan applications following its usual practice. After the lender approves the loans, we sample approved loan applicants who report their salary payday. In this sample, we randomly extend the loan term by one or two days (with no interest cost) to align the loan due date and borrowers' salary pay day. After loan due day, we compare the loan performance of the treatment groups and the control group. Since we conduct our randomization after loan approvals, we control for the borrowers selection effect and identify the treatment effect of payday alignment.

One/two days loan extension might affect loan repayment through two mechanisms: one is liquidity effect due to payday alignment; the other one is income effect due to loan extension with no interest cost. To distinguish these two channels, we split our sample approved loans into two groups based on the difference between salary payday and loan due day: the match group and the placebo group. The match group is the borrowers whose salary payday is between 3 days before and after the loan due day. The placebo group is the borrowers whose salary payday is at least 10 days away from loan due day.

Figure 2 shows two examples of detailed experimental design on randomization. Panel A shows the design for the match group whose loan due day are one day before salary payday. After we receive the approved loans from the FinTech lender, we randomly allocate these borrowers into three groups: a control group, a one-day treatment group, and a two-day treatment group. The randomization is stratified by the loan size, gender, age and the ceiling of credit granted to achieve the balance of treatment. In the control group, we do not change the loan due day so the loan due day remains one day before the salary payday. In the one-day treatment group, we provide a one-day loan extension with no additional interest cost. In this case, the new loan due day is on the same day of the salary payday and we align the loan due day with salary payday. In the two-day treatment group, we provide a two-day loan extension with no additional interest cost so the new loan due day is one day after the salary payday. Since both treatment groups provide loan extension

with no interest cost and align the loan due day with the salary payday, the treatment effects on loan payment capture both the income effect and the liquidity effect. In order to maintain the same level of communication to the control and treatment groups, the one-day or two-day extension are executed in the system without sending additional message to the borrowers. The lending platform's application will instantly reflect the updated loan maturity following the treatment. All borrowers in the control and treatment groups will receive reminder messages with the same format three days before and on the loan due day.

Panel B shows the design for the placebo group whose loan due day is at least 10 days away from salary payday. Similar to the match group, after we receive the approved loans from the FinTech lender, we randomly allocate these borrowers into three groups: a control group, a one-day treatment group, and a two-day treatment group. Since the loan due day is far away from the salary payday, one-day or two-day extension will not align the loan due day with the salary payday. The treatment effects on loan repayment capture only the income effect to loan extension with no interest cost. Therefore, the differential treatment effects between the match group and the placebo group capture the liquidity effects due to payday alignment. In our analysis, we focus on the difference-in-difference effect between the match group and the placebo.

We conduct the experiment over 7 months so we have many match groups and placebo groups. Table 2 shows the complete design with all 24 treatment arms. We conduct four experiments each month around "targeted payday", i.e. the 5th, 10th, 25th, and 28th or the preceding Friday or business day of the payday When the target payday falls on a weekend or public holiday. "Event Day" refers to loan maturity date (prior to experiment interventions) minus the target payday. For example, "Event Day=-1" refers to approved loans with the loan due day 3 days before borrowers' salary payday. Consider borrowers with the salary payday on the February 5th, the event day we conduct our experiment is 29 (28+1) days before Februray 5th,i.e. January 7. "No. Days Extended" is the number days that the loan due day is randomly extended. "0" refers to the control group, "1" refers to the one-day treatment group, and "2" refers the two-day treatment groups. "Targeted

Payday Minus Maturity Date (Post)" refers to the target payday minus loan maturity date after to experiment interventions. Treatment equals one (zero) if the targeted payday falls before (on or after) the loan maturity date after experiment interventions, and missing if the extension does not change the sequence of payday and maturity date (postpone the maturity date until post-payday). Match equals to one if the salary payday is between 3 days before and after the loan due day. Match equals zero if the salary payday is at least 10 days away from loan due day. Since there are four target paydays in each month, three experimental groups in each target payday, and the match and placebo groups, we have a total of 24 treatment arms in our design. There are 12 treatment arms in the match group and 12 treatment arms in the placebo group.

4 Empirical Analyses

4.1 Data and Summary Statistics

We conduct experiments since Feburary 20th until September 30th, 2021. The loans are disbursed from March 23, 2021 to October 29th, 2021. Our sample sample includes 3402 loans borrowed by 3402 borrowers. Table 1 reports the balance of characteristics across treatments. Table A2 in the Appendix reports the summary statistics for the the loan and borrower characteristics. We also have data on borrowers' past loan records, such as each past loan's disbursement date, size, tenor, maturity, and repayment time etc.

4.2 Payday Effect on Loan Overdue Rates

Our main hypothesis is that the alignment of maturity date with borrowers' payday will increase the cash adequacy and thus increases borrowers' repayment propensity (capability and intention). We first study the payday alignment effect on loan overdue behaviour.

Under the conjecture that cash adequacy advances the repayment, we expect that the probability

of Overdue (greater than 0 Days Past Due) and other overdue proxies such as DPD1 (1 Day Past Due) and DPD1t7 (1 to 7 Days Past Due) are lower for those loans due after the borrower's actual salary payday conditional on loan disbursements, and more precisely increases in the distance between borrower payday and loan maturity. Figure 3 plots these outcome variables against the distance between the due day and the salary payday for the match group and placebo group respectively. In Panel (a) for the match group, Panel A1 shows that the Overdue rates increases from 12% to 25% from the distance -2 bucket (loans maturing 2 days after payday) to distance 3 bucket (loans maturing 3 days after payday). However, this pattern does not exist in Panel (b) for the placebo group whose actual payday is more than 10 days away from the experiment-targeted payday (5th/10th/25th/28th each month) and thus the loan maturity.

We then formally evaluate the impact of aligning loan maturity date with borrowers' payday by estimating the following Difference-in-Differences regression:

$$y_{l,t} = +\alpha_t + \beta \text{Treatment}_{lt} \times \text{Match}_l + \gamma \text{Treatment}_{lt} + \zeta \text{Match}_l + \text{X'}_l + \epsilon_{l,t}$$

where l and t denote loan and loan disbursement time. $y_{l,t}$ is the loan outcome variables. α_t is the disbursement-date fixed effect. $Treatment_{lt}$ is a binary variable for the treatment—loan maturity date extended after the target payday in the experiment—assigned to loan l. $Match_l$ is a binary variable which equals one if the loan borrower's own payday matches the targeted payday in the experiment and zero if her own payday falls at least 10 days away from the targeted payday. The key independent variable of interest is the interaction term between $Treatment_l$ and $Match_l$. X'_l contains a vector of loan-level controls including the loan size, and borrowers' age, gender, marriage status, income, education background, behaviour score and credit level. Our coefficient of interest if β, which is the differential treatment effect between the match and placebo group.

Table 3 tabulates the DiD estimation results.[1] Panel A includes all treatment arms, and Panel

[1] We report the payday effect for the match and placebo group separately in Appendix Table A3 and A4. Consistent with our hypothesis, the coefficient on Treatment is significantly negative for the match group but insignificant for the placebo group.

B includes treatment arms on event day -1 and 0. The dependent variables in column (1)(2)(3) are respectively *Overdue*, *DPD1* and *DPD1t7*. The significantly positive coefficient on the interaction term between *Treatment* and *Match* across columns and panels support our conjecture. In terms of the economic magnitude, columns (3) in Panel A indicates that the payday alignment lowers the DPD1t7 rate for match group by 5.9% compared to the placebo group, which is a sizeable 57.3% effect relative to the sample mean of 10.3%.[2]

For the control variables, borrowers' income and credit level significantly lowers the overdue rates and the loan size significantly increases the overdue rates, consistent with existing literature on FinTech and traditional lending.

4.3 Heterogeneous Effects

We then study the heterogeneous effects of payday alignment with respect to borrower and loan characteristics. We focus on the match group and interact *Treatment* of payday alignment with the loan size, borrowers' credit level, and their past overdue records. Table 4 reports the results. Across loan outcomes of Overdue, DPD1, and DPD1t7, the payday effect is stronger for smaller loans, and borrowers' with lower credit scores and higher past overdue days. If the payday alignment works through improving borrowers' cash adequacy, then loans of smaller sizes are more easily and likely to be fully repaid on time compared to larger loans. Similarly, borrowers with lower credit rating are more likely to be liquidity-constrained without the salary payout and hence the treatment of payment alignment will especially improve their chances of repayment on time compared to borrowers with higher credit rating and less severe liquidity issues. Along the same line, borrowers who were more severely late for repayment as measured by the average overdue days over past loans tend to benefit from the payday alignment treatment.

In terms of the role of demographic features in moderating the payday alignment effect, Ap-

[2] Adding the full set of controls does not change the coefficient, which is consistent with the random assignment of borrowers to different treatment groups.

pendix Table IA.10 shows that there are no discernible differences across ages, gender, income, and job position seniority except for education background. The payday effect is more salient for more-educated borrowers, possibly due to their awareness about the potential negative consequences of late repayment on future borrowing.

Figure 4 plots the coefficient estimates from regressing *DPD1t7* against the interaction term between *Treatment* and different age buckets (Panel (a)), credit level buckets (Panel (b)), and the number of past loan application buckets (Panel (c)). Consistent with Table 4 and IA.10, the payday effect does not vary significantly across age buckets but is stronger for lower-credit borrowers. In terms of borrowers' past experiences measured by the number of loan application in the past, the payday is weaker for the 2nd quintile compared to the 5th quintile, suggesting that experiences can reinforce the payday effects.

Taken together, these heterogeneous effect results highlight that payday effect plays a more pronounced role for borrowers who are more likely to overdue otherwise (lower credit and higher overdue days in the past).

4.4 Payday Effect on Repayment Distribution

We then examine the effect of payday alignment and repayment in terms of the full distribution. To proceed, we first plot the share of repaid loans as of the total number of loans over the re-centered repayment date relative to the loan maturity date in Figure 5. Panel A focuses on the treatment (red bars) and control group (grey bars) for the match group. For the match group with borrowers actual payday equaling the experiment-targeted payday, the distribution of repaid loans for the treatment group is to the left of control group, suggesting that loans maturing after payday (the treatment group) are repaid earlier than the control group. Panel B focuses on the treatment (red bars) and control group (grey bars) for the placebo group. For the placebo group whose actual payday is distant from the experiment-targeted payday, the difference of the repayment distribution is not detectable between treatment and control group. This evidence is consistent with our conjecture

that payday alignment increases borrowers' repayment propensity.

Figure 6 plots the average overdue days over the distance between Experiment-Targeted payday (5th/10th/25th/28th each month) and loan maturity. Panel (a) focuses on borrowers delinquent before (with overdue loans in the past) and Panel (b) on those never delinquent before (without overdue loans). In Panel A1, we show that loans in the distance -2 bucket (loans maturing two days after payday) are on average repaid 1.5 days before the loan maturity, and on the contrary loans in the distance +3 bucket (loans maturing three days before salary payday) are repaid 2.5 days after maturity. Approximately, the gap between loan repayment date and maturity date increases with the distance in Panel A1. Such pattern is not as pronounced in Panel A2 for the placebo group. The diverging pattern across treatment and control group is absent in Panel (b) for borrowers never deliquent before, which is again consistent with the evidence from Section 4.3 that the payday alignment effect concentrates in borrowers with higher number of average overdue days in the past.

We then formally test the impact of payday alignment on the repayment propensity using a hazard model and report the results in Table 5 and Table 6.

Table 5 tabulates results estimated from the cox hazard model using the match group whose payday matches the targeted payday in the experiment. We define repayment and time-to-maturity as the "failure" event and analysis time in the cox model. The unit of analysis is at loan-calendar-day level. Estimated coefficients are expressed as the natural logarithm of the hazard ratios. In column (1), we include all experiments conducted on 31,30,29,28 days before the targeted payday, which we refer to as event day -3, -2, -1, 0 respectively. Column (2) includes only event day -1 and 0. Column (3) and (4) includes event day -1 and 0 respectively. All columns include disbursement week fixed effects. Figure 7 plots the estimated survival function. Across different columns using different samples, loans randomized to mature after salary payout day are significantly more likely to be repaid.

Table 6 tabulates results estimated from the cox hazard model in the form of a DiD specification. The setup of the table parallels Table 5. The statistically significant positive coefficient estimates on

the the interaction term *Treatment*Match* confirm our main hypothesis. In terms of the economic magnitude, column (2) shows that payment alignment increases the repayment likelihood of match group by 20.7% compared to the placebo group.

Finally, Table 7 tabulates results from a two-sample Kolmogorov-Smirnov test for the equality of the distribution functions of the days between repayment date and loan maturity date across the treatment and control group. Panel A includes all loans. Panel B includes only delinquent loans which are overdue by at least one day. For the match group in Panel A and B, the distribution of days between repayment and loan maturity date is statistically different between the treatment and control group. Placebo group in Panel A and B do not different distribution in the statical sense. This evidence further supports the evidence in Table 5 and 6 that payday alignment effectively changes the repayment distribution.

Overall, this section shows that payday alignment improves loan repayment in terms of the full distribution which corroborates the findings in Section 4.2.

4.5 Robustness

In the robustness test, we first repeat the baseline analyses on the subsample of each event day. Results are reported in Appendix IA.6-IA.9. In these analyses, the independent variables of interest changes are *Extend1D* and *Extend2D* which are binary variables for loan extension by 1 and 2 days respectively. The loan outcome variables are also specifically pinned down to the number of overdue days. The subsample results confirm our main hypothesis that borrowers are more likely to repay loans after receiving salaries. For example for experiments conducted on event day -3 (Table IA.6), 2-day loan extension mean that the loan matures one day after the targeted payday and if match group borrowers repay loans on their salary payout day then the likelihood of their loan overdue by one day will increase compared to the placebo group whose actual payday is distant from the experiment targeted payday and also the loan maturity. Consistent with this reasoning, we observe a positive coefficient estimate on the interaction term between *Extend2D* and *Match*. We

also relax the definition of payday alignment to include cases when the loan matures exactly on the targeted payday, and the results remain.

In terms of the payday alignment effect on loan default, we do not find significant differential effect between match and placebo group, possibly due to the fact that placebo group will receive next salary 10 days after the loan maturity date and thus will be able to repay loans without default. Consistent with this conjecture, we show in Table A5 that the default rate is significantly lower for the placebo group, across different proxies of loan default measured by overdue days exceeding 7, 14, or 30 days.

To mitigate the concern that weekends and holidays introduce other confounding factors to borrowers' repayment behaviour, we also drop those experiments with targeted payday falling on weekends or holidays and repeat the baseline analyses and find similar results. In addition, we use alternative OLS specifications without disbursement date fixed effects, and Probit models with and without disbursement date fixed effects. Results remain qualitatively and quantitatively similar to the baseline estimation.

5 Conclusion

In this paper, we conduct randomized experiments on a representative FinTech lending platform by varying the distance between loan maturity date and borrowers' salary payout date. We show that the flexibility of payday alignment increases the repayment propensity and lowers the overdue rates. Such effects are more salient for liquidity-constrained borrowers. The collective evidence supports the mechanism of payday alignment effect as improving borrowers' cash adequacy. For future research, we hope to randomize other aspects of loan contract flexibility to explore borrowers' potential biases and evaluate how these flexibility affect loan outcomes.

A Figures

Figure 1: Research Design: Timeline

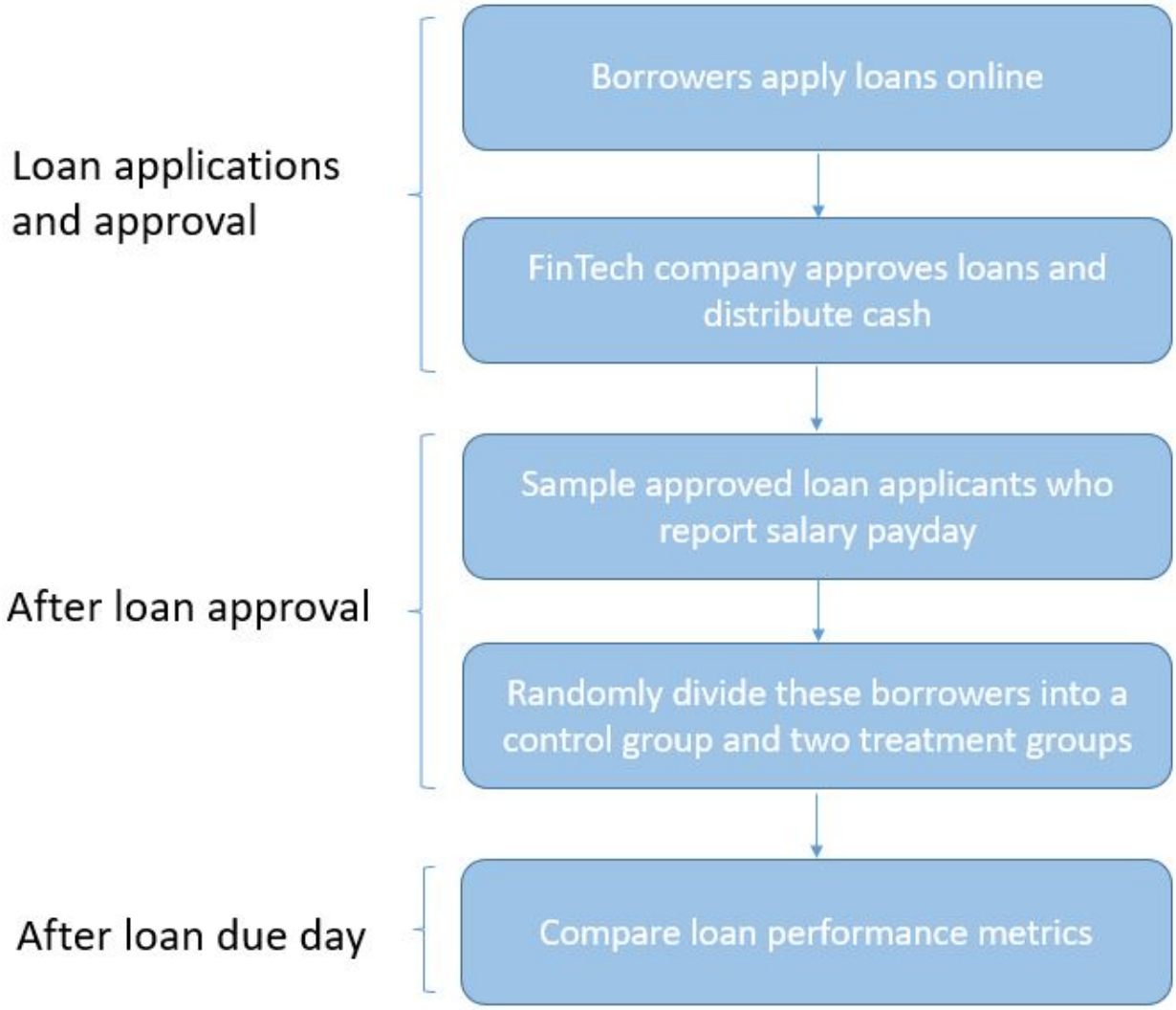
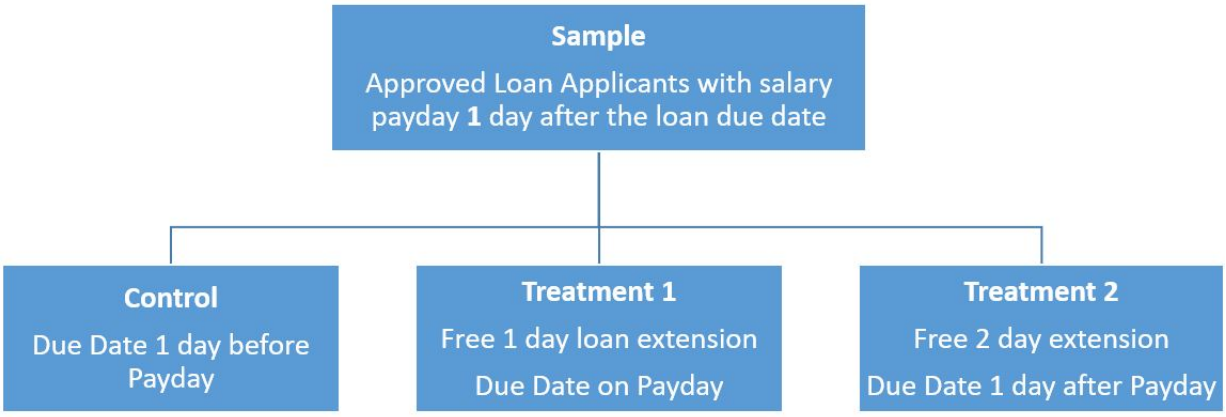
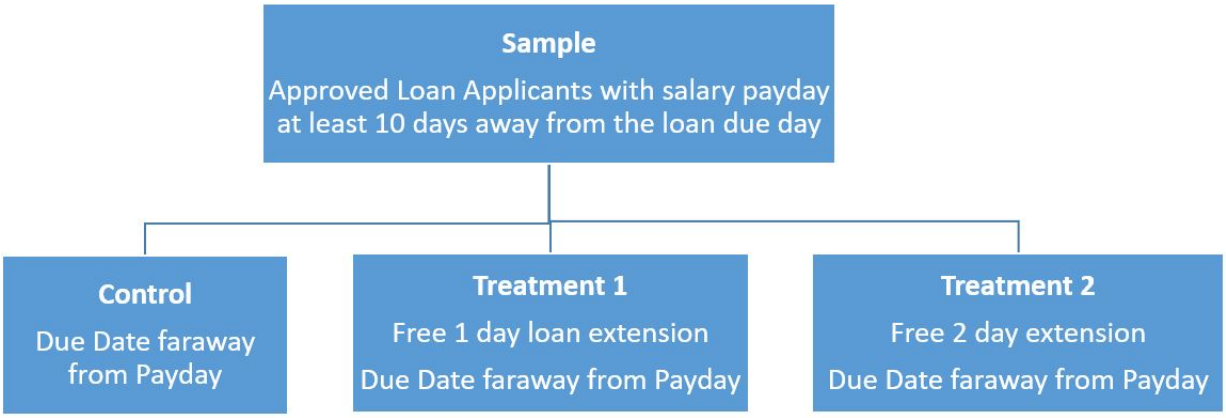


Figure 2: Research Design

Panel A: Match Group



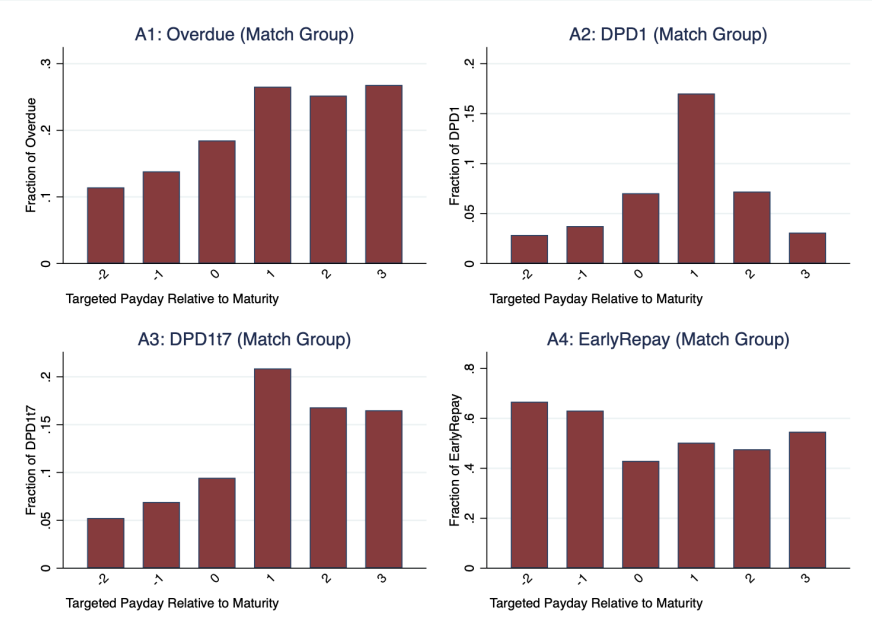
Panel B: Placebo Group



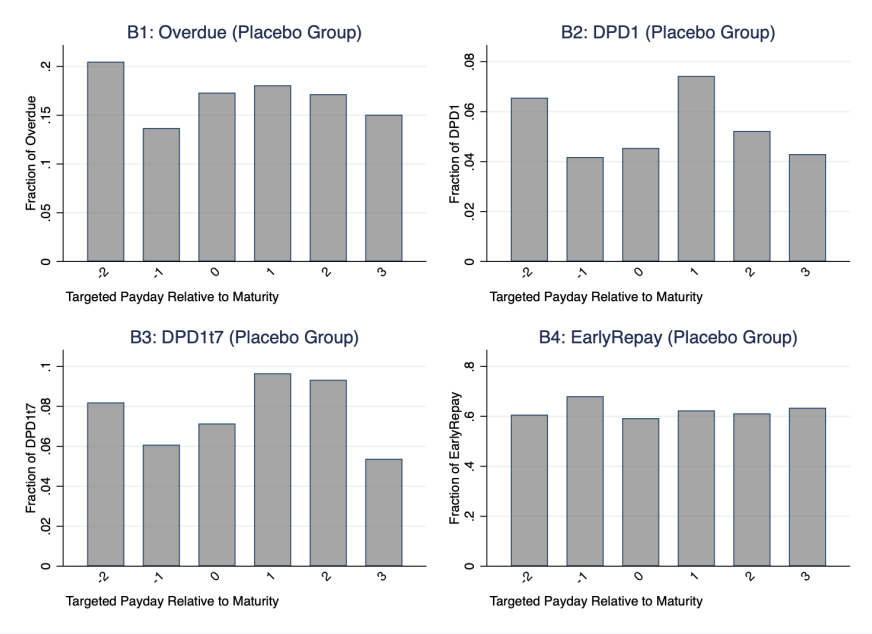
Note: Panel A shows the experimental design for match groups whose salary payday is close to loan due day. Panel B shows the experimental design for placebo groups whose salary payday is at least 10 days away from loan due day.

Figure 3: Outcome Variables by the Distance between Targeted Payday and Loan Maturity

This graph plots different outcome variables over the distance between experiment-targeted payday (5th/10th/25th/28th each month) and loan maturity.



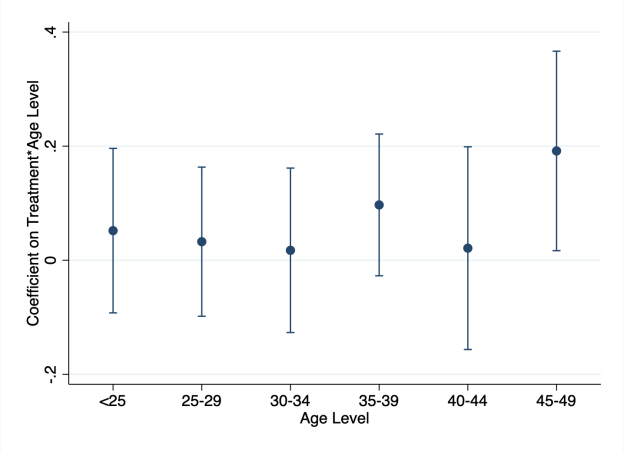
(a) Match Group



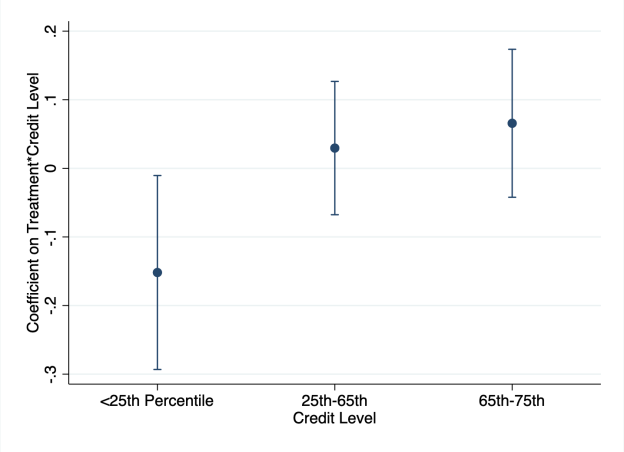
(b) Placebo Group

Figure 4: Heterogeneous Effects

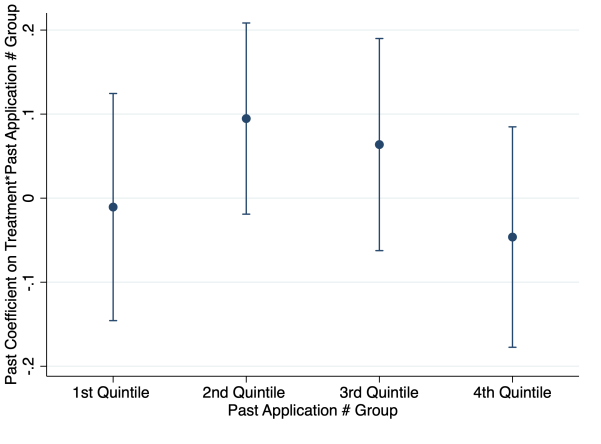
Panel A plots the coefficients on the interaction terms between Treatment and Age Groups. Panel B plots the coefficients on the interaction terms between Treatment and Credit Level Groups. Panel C plots the coefficients on the interaction terms between Treatment and the number of past loan application groups. The dependent variable of the estimated regressions is *DPD1t7*. The dots and caps denote the coefficient magnitude and the 95% confidence interval.



(a) Age



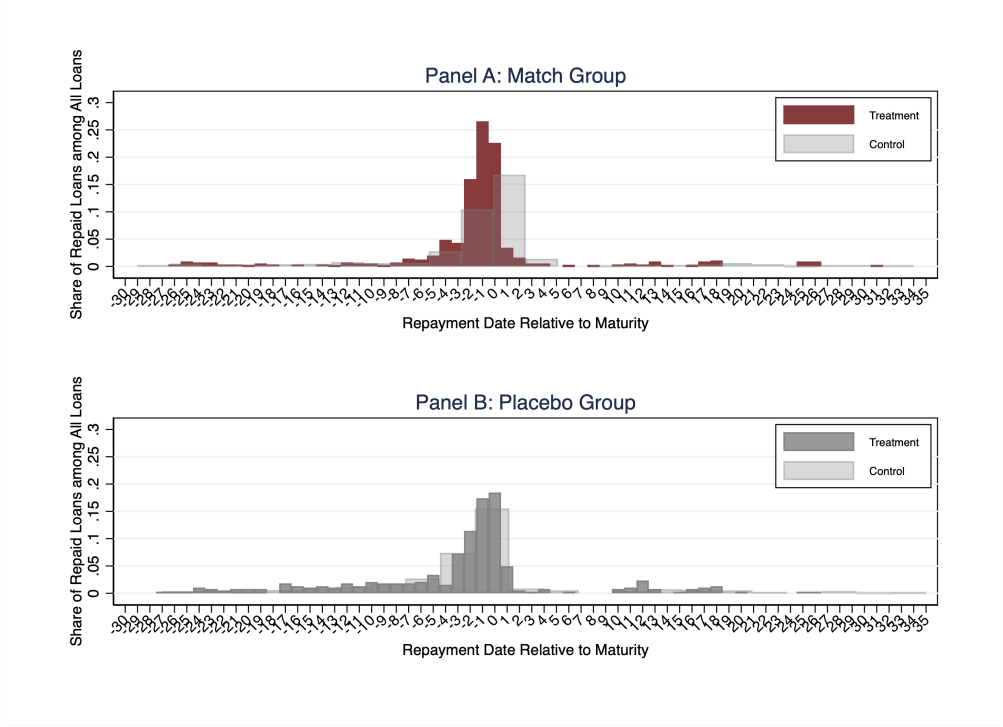
(b) Credit Level



(c) Past Application #

Figure 5: Share of Repaid Loans

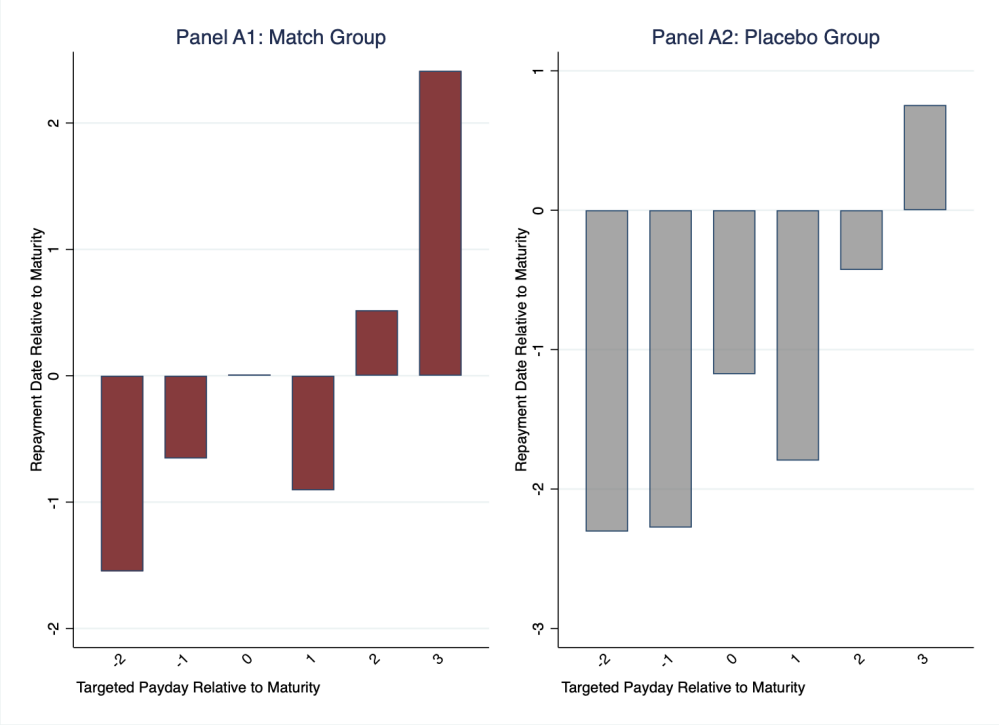
This graph plots the share of repaid loans over the re-centered repayment date relative to the loan maturity.



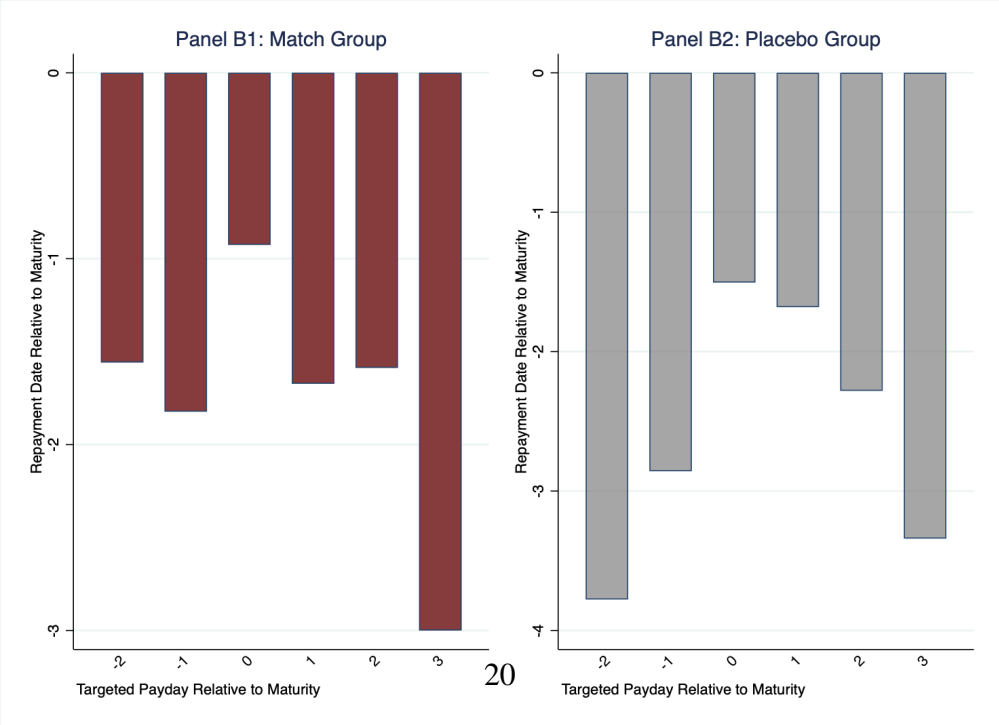
(a) Total loans as the denominator

Figure 6: Overdue Days by the Distance between Targeted Payday and Loan Maturity

This graph plots the number of overdue days over the distance between Experiment-Targeted payday (5th/10th/25th/28th each month) and loan maturity. Full sample includes all experiments conducted on 31,30,29,28 days before the targeted payday, which we refer to as event day -3, -2, -1, 0 respectively. The subsample includes only event day -1 and 0.



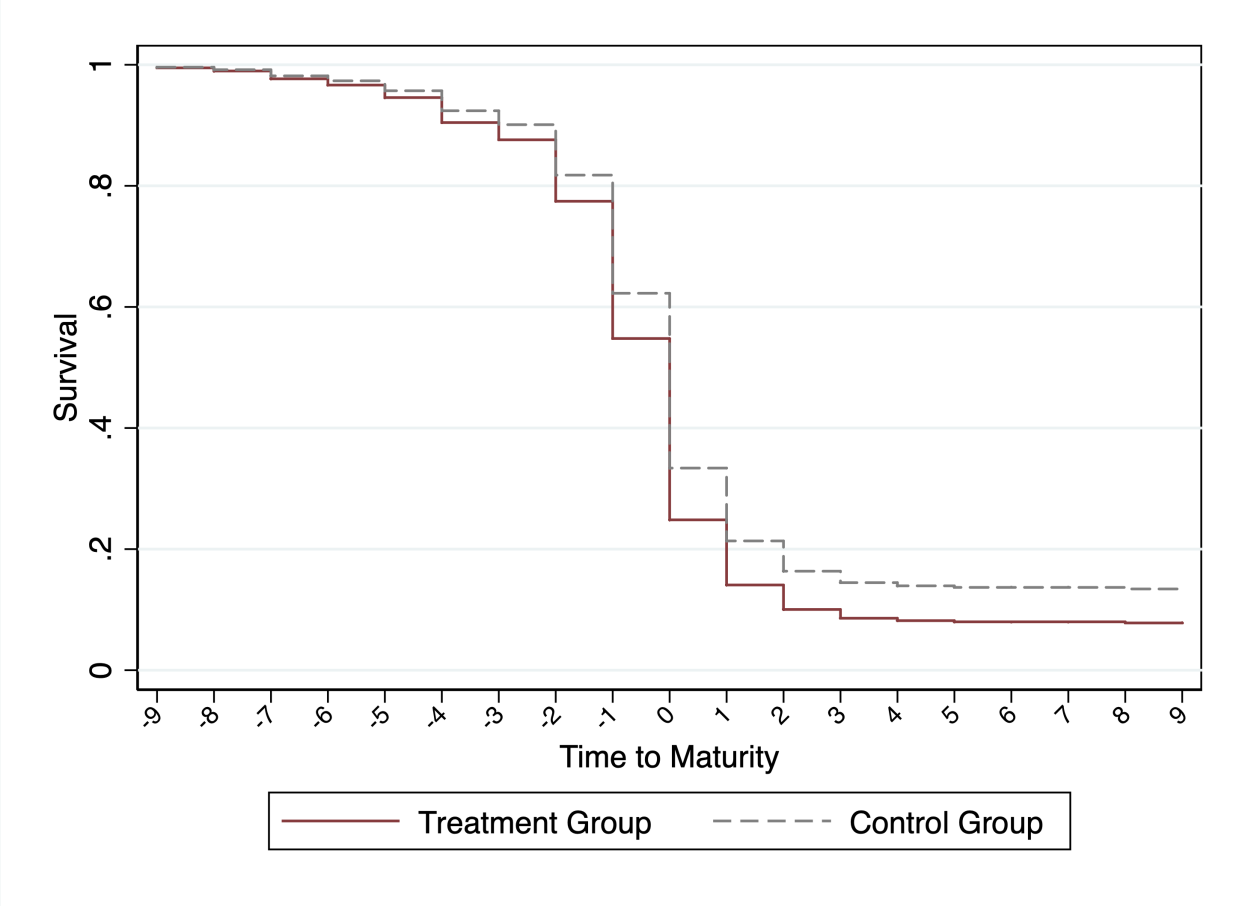
(a) Borrowers Delinquent Before



(b) Borrowers Never Delinquent Before

Figure 7: Survival Function after Cox Regression.

This graph plots the survival function estimated from the cox regression in Table 5.



B Tables

Table 1: The Balance of Characteristics across Treatments

This table tabulates the balance of characteristics across treatments. Variable definitions are listed in Appendix Table A1. Standard deviation is in the parentheses. P-value is the significance level of the difference in the mean across treatments.

	Extend 0 day	Extend 1 Day	Extend 2 Days	P-value
Young	0.38	0.37	0.38	0.84
	(0.49)	(0.48)	(0.48)	
Female	0.43	0.40	0.41	0.47
	(0.50)	(0.49)	(0.49)	
Income	5.11	4.99	5.01	0.70
	(3.71)	(3.31)	(3.55)	
High Education	0.52	0.48	0.51	0.15
	(0.50)	(0.50)	(0.50)	
Married	0.53	0.55	0.55	0.35
	(0.50)	(0.50)	(0.50)	
Senior Position	0.17	0.17	0.15	0.54
	(0.37)	(0.38)	(0.36)	
Size	1.30	1.32	1.32	0.46
	(0.44)	(0.44)	(0.44)	
Credit	6.39	6.47	6.46	0.88
	(4.05)	(4.05)	(3.95)	
Behaviour	0.55	0.55	0.54	0.32
	(0.05)	(0.05)	(0.05)	
Past Overdue Days	0.37	0.38	0.35	0.68
	(0.66)	(0.73)	(0.77)	
Past Loan Size	12.93	12.99	13.29	0.13
	(4.32)	(4.13)	(5.02)	
Past Tenor	34.35	33.79	33.92	0.64
	(13.67)	(13.09)	(16.89)	
Past Application #	15.07	15.74	15.18	0.25
	(10.03)	(10.64)	(10.44)	
Observations	1104	1186	1112	

Table 2: Experiment Design

This table describes our experiment design with 24 treatment arms. We conduct four experiments each month around "targeted payday", i.e. the 5th, 10th, 25th, and 28th or the preceding business day of the payday When the target payday falls on a weekend or public holiday. "Event Day" refers to loan maturity date (prior to experiment interventions) minus the target payday. "No. Days Extended" is the number days that the loan due day is randomly extended. "Targeted Payday Minus Maturity (Post)" refers to the target payday minus loan maturity date after to experiment interventions. Treatment equals one (zero) if the targeted payday falls before (on or after) the loan maturity after experiment interventions, and missing if the extension does not change the sequence of payday and maturity date. Match equals to one if the salary payday is between 3 days before and after the loan due day. Match equals zero if the salary payday is at least 10 days away from loan due day.

Treatment Arms	Event Day	No. Days Extended	New Maturity Date Minus Targeted Payday (Post)	Treatment	Match
1	-3	0	-3	0	1
2	-3	1	-2	.	1
3	-3	2	-1	.	1
4	-2	0	-2	0	1
5	-2	1	-1	.	1
6	-2	2	0	0	1
7	-1	0	-1	0	1
8	-1	1	0	0	1
9	-1	2	1	1	1
10	0	0	0	0	1
11	0	1	1	1	1
12	0	2	2	1	1
13	-3	0	-3	0	0
14	-3	1	-2	.	0
15	-3	2	-1	.	0
16	-2	0	-2	0	0
17	-2	1	-1	.	0
18	-2	2	0	0	0
19	-1	0	-1	0	0
20	-1	1	0	0	0
21	-1	2	1	1	0
22	0	0	0	0	0
23	0	1	1	1	0
24	0	2	2	1	0

Table 3: DiD OLS

This table tabulates results estimated from the OLS model in the form of a difference-in-difference test. Panel A includes all treatment arms, and Panel B includes treatment arms on event day -1 and 0. The unit of observation is at loan level. Borrowers in the match group have their payday matching the targeted payday in the experiment and the payday of the placebo group falls at least 10 days away from the targeted payday. *Treatment* equals one for loans maturing before the borrower's payday and zero otherwise. The key independent variable of interest is the interaction term *Treatment*Match*. The dependent variables in column (1)(2)(3) are respectively *Overdue*, *DPD1* and *DPD1t7*. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are Standard errors are heteroskedasticity-consistent. Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	Panel A: All Event Days		
	(1)	(2)	(3)
	Overdue	*DPD1*	*DPD1t7*
*Treatment*Match*	-0.056*	-0.043**	-0.059**
	(-1.77)	(-1.99)	(-2.33)
Treatment	-0.027	-0.035**	-0.034
	(-0.98)	(-1.96)	(-1.60)
Match	0.022	0.027	0.052***
	(0.93)	(1.63)	(2.64)
Young	0.022	0.021	0.030*
	(1.10)	(1.61)	(1.87)
Female	-0.010	0.003	0.000
	(-0.60)	(0.25)	(0.03)
Size	0.154***	0.023*	0.077***
	(8.17)	(1.91)	(4.78)
High Education	0.006	0.017	0.021
	(0.35)	(1.51)	(1.54)
Married	-0.009	0.010	0.006
	(-0.50)	(0.80)	(0.44)
Credit	-0.107***	-0.019***	-0.072***
	(-14.97)	(-3.87)	(-10.26)
Income	-0.004*	-0.001	-0.003*
	(-1.78)	(-1.14)	(-1.78)
Behaviour	-0.164	0.014	0.368**
	(-0.84)	(0.11)	(2.33)
Disburse Day FE	Yes	Yes	Yes
Observations	2038	2038	2038
R2	0.222	0.063	0.169
	Panel B: Event Day -1 and 0		
	(1)	(2)	(3)
	Overdue	*DPD1*	*DPD1t7*
*Treatment*Match*	-0.038	-0.074**	-0.049*
	(-1.82)	(-3.03)	(-1.84)
Treatment	-0.038*	-0.018	-0.040**
	(-2.04)	(-1.16)	(-2.49)
Disburse Day FE	Yes	Yes	Yes
Observations	1521	1521	1521
R2	0.178	0.066	0.126

Table 4: Heterogeneous Tests

This table tabulates the heterogenous effect of payday alignment with respect to the current loan size, borrowers' credit level and borrowers' past overdue records. The sample includes treatment arms on event day -1 and 0. The unit of observation is at loan level. Variables are defined in Appendix Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-consistent. Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Overdue	*Overdue*	*Overdue*	*DPD1*	*DPD1*	*DPD1*	*DPD1t7*	*DPD1t7*	*DPD1t7*
*Treatment*Size*	0.076			0.082*			0.087*		
	(1.29)			(1.69)			(1.68)		
*Treatment*Credit Low*		-0.102**			-0.046			-0.059	
		(-2.10)			(-1.18)			(-1.40)	
*Treatment*Past Overdue*			-0.090***			-0.073**			-0.069*
			(-2.82)			(-2.10)			(-1.91)
Treatment	-0.171**	-0.003	-0.029	-0.198***	-0.057*	-0.055***	-0.202***	-0.045	-0.053**
	(-2.05)	(-0.08)	(-1.16)	(-2.83)	(-1.96)	(-2.74)	(-2.67)	(-1.42)	(-2.41)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disburse Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	880	880	880	880	880	880	880	880	880
R2	0.220	0.223	0.231	0.123	0.122	0.137	0.181	0.182	0.187

Table 5: Hazard Model of the effect of Treatment on Repayment (Match Group)

This table tabulates results estimated from the cox hazard model using the match group whose payday matches the targeted payday in the experiment. The unit of observation is at loan-calendar-day level. We define repayment and time-to-maturity as the "failure" event and analysis time in the cox model. Estimated coefficients are expressed as the natural logarithm of the hazard ratios. The key independent variable of interest is *Treatment* which equals one for loans maturing before the borrower's payday. In column (1), we include all experiments conducted on 31,30,29,28 days before the targeted payday, which we refer to as event day -3, -2, -1, 0 respectively. Column (2) includes only event day -1 and 0. Column (3) and (4) includes event day -1 and 0 respectively. All variables are defined in Table A1. All columns include disbursement week fixed effects. Standard errors are clustered at the date level. Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Full	Event-1&0	Event-1	Event 0
Treatment	0.252***	0.215***	0.226*	0.252***
	(4.04)	(3.00)	(1.83)	(2.72)
Young	-0.091	-0.034	-0.009	-0.041
	(-1.26)	(-0.39)	(-0.06)	(-0.42)
Female	0.100	0.065	-0.265*	0.189**
	(1.61)	(0.84)	(-1.75)	(2.05)
Size	-0.078	-0.105	0.046	-0.155
	(-1.05)	(-1.11)	(0.24)	(-1.43)
High Education	0.037	0.029	-0.066	0.079
	(0.66)	(0.49)	(-0.57)	(1.12)
Married	-0.033	-0.061	-0.137	-0.025
	(-0.49)	(-0.79)	(-1.10)	(-0.24)
Credit	0.154***	0.129***	0.123*	0.122***
	(5.45)	(3.74)	(1.83)	(2.93)
Income	0.012	0.014	0.004	0.014
	(1.39)	(1.32)	(0.16)	(1.21)
Behaviour	-0.727	0.194	-0.293	0.799
	(-0.99)	(0.22)	(-0.21)	(0.65)
Disbursement Week FE	Yes	Yes	Yes	Yes
Observations	11836	9036	2659	6377

Table 6: Hazard Model of the effect of Treatment on Repayment (DiD)

This table tabulates results estimated from the cox hazard model in the form of a difference-in-difference test. The unit of observation is at loan-calendar-day level. We define repayment and time-to-maturity as the "failure" event and analysis time in the cox model. Estimated coefficients are expressed as the natural logarithm of the hazard ratios. Borrowers in the match group have their payday matching the targeted payday in the experiment and the payday of the placebo group falls at least 10 days away from the targeted payday. *Treatment* equals one for loans maturing before the borrower's payday and zero otherwise. The key independent variable of interest is the interaction term *Treatment*Match*. In column (1), we include all experiments conducted 31,30,29,28 days before the targeted payday, which we refer to as event day -3, -2, -1, 0 respectively. Column (2) includes only event day -1 and 0. Column (3) and (4) includes event day -1 and 0 respectively. All variables are defined in Table A1. All columns include disbursement week fixed effects. Standard errors are clustered at the date level. Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Full	Event-1&0	Event-1	Event 0
*Treatment*Match*	0.270***	0.207*	0.136	0.235
	(3.00)	(1.75)	(0.84)	(1.50)
Treatment	-0.035	-0.006	0.045	0.001
	(-0.48)	(-0.06)	(0.39)	(0.01)
Match	0.009	0.061	-0.057	0.147
	(0.14)	(0.62)	(-0.46)	(1.11)
Young	-0.137***	-0.105*	-0.123	-0.093
	(-2.61)	(-1.73)	(-1.05)	(-1.41)
Female	0.088**	0.140***	0.063	0.200***
	(2.01)	(2.63)	(0.70)	(3.11)
Size	-0.030	-0.010	0.017	-0.005
	(-0.54)	(-0.15)	(0.14)	(-0.06)
High Education	0.006	0.034	-0.008	0.068
	(0.13)	(0.70)	(-0.10)	(1.09)
Married	-0.005	-0.016	0.008	-0.036
	(-0.10)	(-0.27)	(0.07)	(-0.49)
Credit	0.145***	0.125***	0.127***	0.121***
	(7.30)	(5.45)	(3.04)	(3.99)
Income	-0.001	0.001	0.001	-0.003
	(-0.17)	(0.18)	(0.10)	(-0.27)
Behaviour	-0.585	-0.040	-0.847	0.481
	(-1.17)	(-0.07)	(-0.96)	(0.57)
Disbursement Week FE	Yes	Yes	Yes	Yes
Observations	21653	16066	5467	10599

Table 7: Two-sample Kolmogorov-Smirnov Test for Equality of the Distribution Functions of Days between Repayment Day and Maturity

This table tabulates results from a two-sample Kolmogorov-Smirnov test for the equality of the distribution functions of the days between repayment date and loan maturity across the treatment and control group. Panel A includes all loans. Panel B includes only delinquent loans which are overdue by at least one day. Borrowers in the match group have their payday matching the targeted payday in the experiment and the payday of the placebo group falls at least 10 days away from the targeted payday. *Treatment* (*Control*) equals one (zero) for loans maturing before the borrower's payday and zero (one) otherwise.

Panel A: All Loans					
Match Group			Placebo Group		
	D	P-value		D	P-value
Control	0.018	0.825	Control	0.0038	0.994
Treatment	-0.188	0.000	Treatment	-0.0624	0.176
Combine K-S	0.188	0.000	Combine K-S	0.0624	0.350
Panel B: Delinquent Loans					
Match Group			Placebo Group		
	D	P-value		D	P-value
Control	0.246	0.003	Control	0.127	0.290
Treatment	-0.045	0.824	Treatment	-0.145	0.200
Combine K-S	0.246	0.007	Combine K-S	-0.145	0.396

References

Adams, William, Liran Einav, and Jonathan Levin. 2009. "Liquidity constraints and imperfect information in subprime lending." *American Economic Review* 99 (1):49–84.

Barboni, Giorgia. 2017. "Repayment flexibility in microfinance contracts: Theory and experimental evidence on take up and selection." *Journal of Economic Behavior & Organization* 142:425–450.

Barboni, Giorgia and Parul Agarwal. 2021. "How do flexible microfinance contracts improve repayment rates and business outcomes? Experimental Evidence from India." .

Berg, Tobias, Valentin Burg, Ana Gombović, and Manju Puri. 2020. "On the rise of fintechs: Credit scoring using digital footprints." *The Review of Financial Studies* 33 (7):2845–2897.

Bertrand, Marianne and Adair Morse. 2009. "What do high-interest borrowers do with their tax rebate?" *American Economic Review* 99 (2):418–423.

Bryan, Gharad, Dean Karlan, and Jonathan Zinman. 2015. "Referrals: Peer Screening and Enforcement in a Consumer Credit Field Experiment." *American Economic Journal: Microeconomics* 7 (3):174–204.

Cadena, Ximena and Antoinette Schoar. 2011. "Remembering to pay? Reminders vs. financial incentives for loan payments." NBER Working Papers 17020, National Bureau of Economic Research, Inc.

Cespedes, Jacelly. 2019. "Heterogeneous sensitivities to interest rate changes: Evidence from consumer loans." *Available at SSRN 3022332* .

Czura, Kristina. 2015. "Do flexible repayment schedules improve the impact of microcredit? Evidence from a randomized evaluation in rural India." Tech. rep., Munich Discussion Paper.

Dobbie, Will and Paige Marta Skiba. 2013. "Information asymmetries in consumer credit markets: Evidence from payday lending." *American Economic Journal: Applied Economics* 5 (4):256–282.

Du, Ninghua, Lingfang Li, Tian Lu, and Xianghua Lu. 2020. "Prosocial compliance in P2P lending: A natural field experiment." *Management Science* 66 (1):315–333.

Field, Erica, Rohini Pande, John Papp, and Natalia Rigol. 2013. "Does the Classic Microfinance Model Discourage Entrepreneurship among the Poor? Experimental Evidence from India." *American Economic Review* 103 (6):2196–2226.

Giné, Xavier, Jessica Goldberg, and Dean Yang. 2012. "Credit market consequences of improved

personal identification: Field experimental evidence from Malawi." *American Economic Review* 102 (6):2923–2954.

Hertzberg, Andrew, Andres Liberman, and Daniel Paravisini. 2018. "Screening on loan terms: evidence from maturity choice in consumer credit." *The Review of Financial Studies* 31 (9):3532–3567.

Huffman, David and Matias Barenstein. 2005. "A monthly struggle for self-control? Hyperbolic discounting, mental accounting, and the fall in consumption between paydays." *Institute for the Study of Labor (IZA) Discussion Paper* 1430.

Karlan, Dean, Melanie Morten, and Jonathan Zinman. 2016. "A personal touch in text messaging can improve microloan repayment." *Behavioral Science & Policy* 1 (2):25–31.

Karlan, Dean and Jonathan Zinman. 2009. "Observing unobservables: Identifying information asymmetries with a consumer credit field experiment." *Econometrica* 77 (6):1993–2008.

Leary, Jesse and Jialan Wang. 2016. "Liquidity constraints and budgeting mistakes: Evidence from social security recipients." *Unpublished* .

Mastrobuoni, Giovanni and Matthew Weinberg. 2009. "Heterogeneity in intra-monthly consumption patterns, self-control, and savings at retirement." *American Economic Journal: Economic Policy* 1 (2):163–189.

Olafsson, Arna and Michaela Pagel. 2018. "The liquid hand-to-mouth: Evidence from personal finance management software." *The Review of Financial Studies* 31 (11):4398–4446.

Skiba, Paige Marta. 2014. "Tax rebates and the cycle of payday borrowing." *American Law and Economics Review* 16 (2):550–576.

A Appendix

Table A1: Variable Definition

This table tabulates definitions of key variables.

Variable	Definition
Dependent Variables	
DPD1	A binary variable indicating that the number of days past due day equals 1
DPD2	A binary variable indicating that the number of days past due day equals 2
DPD1t7	A binary variable indicating that the number of days past due day ranges from 1 to 7
Overdue	A binary variable indicating that the number of days past due day is greater than 0
DPD>7	A binary variable indicating that the number of days past due day is greater than 7
DPD>14	A binary variable indicating that the number of days past due day is greater than 14
DPD>30	A binary variable indicating that the number of days past due day is greater than 30
ER1	A binary variable indicating early repayment by 1 day
ER2	A binary variable indicating early repayment by 2 days
Early Repay	A binary variable indicating early repayment by at least 1 day
Independent Variables	
Treatment	A binary variable indicating that the targeted payday falls before the loan maturity
Control	A binary variable indicating that the targeted payday falls on or after the loan maturity
Match	A binary variable indicating that borrowers' payday matches the payday targeted in the experiment
Extend1D	A binary variable indicating that the loan maturity is extended by one day in the experiment
Extend2D	A binary variable indicating that the loan maturity is extended by two days in the experiment
Extend	A binary variable indicating that the loan maturity is extended by one or two days in the experiment
Repay Minus Maturity	Repayment date minus the maturity
Control Variables	
Young	A binary variable indicating that the borrower is younger than 31 at the time of borrowing
Female	A binary variable indicating that the borrower is a female
Size	Loan size (1million IDR)
High Education	A binary variable indicating that the borrower obtains a technical college, undergraduate or master degree
Married	A binary variable indicating that the borrower is married
Credit	Borrowers' last credit level assigned by the lender
Credit Low	A binary variable indicating that the borrower's last credit level is lower than the sample median
Income	Borrowers' monthly income (1million IDR)
High Income	A binary variable indicating that the borrower's monthly income higher than the sample median
Senior Position	A binary variable indicating that the borrower's job position is director, manager, or supervisor
Behaviour	Borrowers' behaviour score assigned by the lender
Past Overdue Days	The average number of overdue days over a given borrower's past loans
Past Size	The average loan size over a given borrower's past loans
Past Tenor	The average loan tenor over a given borrower's past loans

Table A2: Summary Statistics at Loan Level

This table reports the summary statistics at the loan level.

	count	mean	sd	p10	p25	p50	p75	p90
DPD1	3402	0.067	0.251	0.000	0.000	0.000	0.000	0.000
DPD1t7	3402	0.103	0.303	0.000	0.000	0.000	0.000	1.000
Overdue	3402	0.185	0.389	0.000	0.000	0.000	0.000	1.000
EarlyRepay	3402	0.571	0.495	0.000	0.000	1.000	1.000	1.000
DPD>7	3402	0.082	0.274	0.000	0.000	0.000	0.000	0.000
DPD>14	3402	0.055	0.228	0.000	0.000	0.000	0.000	0.000
DPD>30	3402	0.006	0.078	0.000	0.000	0.000	0.000	0.000
Repayment Minus Maturity	3402	-1.274	8.324	-10.000	-3.000	-1.000	0.000	3.000
Treatment	2046	0.460	0.499	0.000	0.000	0.000	1.000	1.000
Exend	3402	1.002	0.807	0.000	0.000	1.000	2.000	2.000
Match	3402	0.526	0.499	0.000	0.000	1.000	1.000	1.000
Young	3402	0.377	0.485	0.000	0.000	0.000	1.000	1.000
Female	3402	0.415	0.493	0.000	0.000	0.000	1.000	1.000
Size	3402	1.312	0.439	0.600	0.900	1.200	1.800	1.800
High Education	3402	0.503	0.500	0.000	0.000	1.000	1.000	1.000
Married	3402	0.543	0.498	0.000	0.000	1.000	1.000	1.000
Credit	3401	6.443	4.018	3.200	5.205	5.550	5.570	15.130
Income	3402	5.035	3.523	2.500	3.140	4.000	5.500	8.000
Behaviour	3393	0.546	0.049	0.480	0.514	0.551	0.581	0.606
Past Overdue	3402	0.364	0.723	0.000	0.000	0.080	0.455	1.000
Past Size	3402	13.067	4.501	6.000	10.286	12.908	15.750	18.000
Past Tenor	3402	34.013	14.613	24.333	28.000	28.000	37.130	51.231
High Position	3402	0.164	0.370	0.000	0.000	0.000	0.000	1.000
Experienced	3402	0.524	0.499	0.000	0.000	1.000	1.000	1.000
Past Application	3402	11.673	8.184	2.000	4.000	10.000	17.000	23.000
Observations	3402							

Table A3: Match Group OLS

This table tabulates results estimated from the OLS regression connecting loan outcome variables with *Treatment*. This table focuses on the match group whose payday matches the targeted payday in the experiment. The unit of observation is at loan level. The key independent variable is *Treatment* which equals one for loans maturing before the borrower's payday and zero otherwise. The dependent variables in column (1)(2)(3)(4) are respectively *DPD1*, *DPD1t7*, *Overdue*, and *Early Repay*. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)
	Overdue	*DPD1*	*DPD1t7*	*EarlyRepay*
Treatment	-0.068***	-0.086***	-0.083***	0.203***
	(-2.83)	(-4.50)	(-4.00)	(6.05)
Young	-0.013	0.018	0.012	0.023
	(-0.44)	(0.84)	(0.54)	(0.53)
Female	-0.016	0.013	0.002	0.017
	(-0.70)	(0.73)	(0.08)	(0.49)
Size	0.132***	0.029	0.060**	-0.197***
	(4.63)	(1.50)	(2.44)	(-4.75)
High Education	0.025	0.015	0.032*	-0.035
	(1.09)	(0.85)	(1.65)	(-1.05)
Married	-0.037	0.005	0.007	-0.002
	(-1.38)	(0.27)	(0.31)	(-0.06)
Credit	-0.107***	-0.029***	-0.073***	0.083***
	(-9.17)	(-3.66)	(-6.43)	(6.16)
Income	-0.006**	-0.001	-0.004**	0.007
	(-2.04)	(-0.58)	(-1.98)	(1.49)
Behaviour	0.374	0.362**	0.778***	0.425
	(1.29)	(2.06)	(3.40)	(1.09)
Disburse Day FE	Yes	Yes	Yes	Yes
Observations	880	880	880	880
R2	0.218	0.118	0.177	0.149

Table A4: Placebo Group OLS

This table tabulates results estimated from the OLS regression connecting loan outcome variables with *Treatment*. This table focuses on the placebo group whose payday falls at least 10 days away from the targeted payday in the experiment. The unit of observation is at loan level. The key independent variable is *Treatment* which equals one for loans maturing before the borrower's payday and zero otherwise. The dependent variables in column (1)(2)(3)(4) are respectively *DPD1*, *DPD1t7*, *Overdue*, and *Early Repay*. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively

	(1)	(2)	(3)	(4)
	Overdue	*DPD1*	*DPD1t7*	*EarlyRepay*
Treatment	-0.039	-0.024	-0.047**	0.100***
	(-1.30)	(-1.19)	(-1.99)	(2.62)
Young	0.015	0.021	0.034	0.038
	(0.43)	(1.03)	(1.29)	(0.78)
Female	-0.049	-0.027	-0.023	0.003
	(-1.60)	(-1.30)	(-0.96)	(0.07)
Size	0.073**	-0.018	0.019	-0.153***
	(2.15)	(-0.86)	(0.68)	(-3.39)
High Education	-0.036	0.028	0.027	-0.059
	(-1.17)	(1.36)	(1.10)	(-1.51)
Married	0.012	0.012	0.019	0.002
	(0.37)	(0.58)	(0.77)	(0.05)
Credit	-0.093***	-0.015	-0.055***	0.053***
	(-7.14)	(-1.57)	(-4.28)	(3.84)
Income	-0.002	-0.003*	-0.004*	0.011**
	(-0.55)	(-1.83)	(-1.76)	(2.40)
Behaviour	-0.606*	-0.211	0.042	1.612***
	(-1.75)	(-0.95)	(0.15)	(3.84)
Disburse Day FE	Yes	Yes	Yes	Yes
Observations	639.000	639.000	639.000	639.000
R2	0.203	0.064	0.126	0.164

Table A5: Loan Default

This table reports results on loan default. The sample includes treatment arms on event day -1 and 0. The unit of observation is at loan level. The dependent variables DPD>7, DPD>14, and DPD>30 in column (1)(2)(3) are binary variables for overdue days greater than 7, 14, and 30. *Match* equals one for borrowers with their payday matching the targeted payday in the experiment and 0 for the placebo group whose actual payday falls at least 10 days away from the targeted payday. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
	DPD>7	*DPD>14*	*DPD>30*
Match	-0.035**	-0.009	-0.002
	(-2.92)	(-0.74)	(-1.76)
Young	-0.013	-0.014	-0.001
	(-0.77)	(-0.97)	(-1.06)
Female	-0.011	-0.002	0.004
	(-0.87)	(-0.24)	(1.79)
Size	0.058***	0.041***	0.001
	(4.28)	(4.79)	(0.92)
High Education	-0.029**	-0.022	0.001
	(-2.41)	(-1.77)	(0.89)
Married	-0.012	-0.005	0.003*
	(-0.46)	(-0.27)	(1.81)
Credit	-0.042***	-0.020***	-0.000
	(-6.86)	(-5.25)	(-0.30)
Income	-0.000	-0.001	-0.000**
	(-0.10)	(-0.88)	(-2.34)
Behaviour	-0.366**	-0.273**	-0.024
	(-2.52)	(-2.79)	(-0.57)
Disburse Day FE	Yes	Yes	Yes
Observations	1819	1819	1819
R2	0.099	0.083	0.060

Table IA.6: Event Day -3

This table reports results on for treatment arms on event day -3. The unit of observation is at loan level. The dependent variables *DPD1*, *DPD2*, and *DPD1t7* are binary variables for overdue days equaling 1, equaling 2, and between 1 and 7 in columns (1)(2)(3) respectively. The independent variable *Extend1D* and *Extend2D* are binary variables for loan extension by 1 and 2 days. *Match* equals one for borrowers with their payday matching the targeted payday in the experiment and 0 for the placebo group whose actual payday falls at least 10 days away from the targeted payday. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
	DPD1	*DPD2*	*DPD1t7*
*Extend2D*Match*	0.133**	-0.0403**	0.0465
	(2.20)	(-2.57)	(0.85)
*Extend1D*Match*	0.0440	-0.00635	-0.0282
	(1.39)	(-0.28)	(-0.54)
Extend2D	0.00842	-0.00477	-0.0147
	(0.19)	(-0.86)	(-0.32)
Extend1D	-0.0250	0.0293**	0.00462
	(-1.18)	(2.10)	(0.13)
Match	-0.00966	0.0300**	0.0714***
	(-0.51)	(2.47)	(3.63)
Young	0.0437**	-0.000861	0.0361
	(2.70)	(-0.10)	(1.38)
Female	0.0241	0.00729	0.0232
	(1.70)	(0.48)	(1.32)
Size	0.0188	-0.00884	0.0485*
	(0.71)	(-0.47)	(1.80)
High Education	-0.0299	-0.0100	-0.0476**
	(-1.22)	(-1.44)	(-2.39)
Married	0.00292	-0.0149*	-0.0101
	(0.10)	(-1.87)	(-0.26)
Credit	-0.0000148	-0.00000688	-0.0000686**
	(-1.33)	(-1.68)	(-2.83)
Income	-0.00212	0.00402**	0.00268
	(-1.24)	(2.19)	(1.34)
Behaviour	-0.000129	-0.0000290	0.000405
	(-0.44)	(-0.38)	(1.44)
Disbursement Day FE	Yes	Yes	Yes
Observations	549	549	549

Table IA.7: Event Day -2

This table reports results on for treatment arms on event day -2. The unit of observation is at loan level. The dependent variables *DPD1*, *DPD2*, and *DPD1t7* are binary variables for overdue days equaling 1, equaling 2, and between 1 and 7 in columns (1)(2)(3) respectively. The independent variable *Extend1D* and *Extend2D* are binary variables for loan extension by 1 and 2 days. *Match* equals one for borrowers with their payday matching the targeted payday in the experiment and 0 for the placebo group whose actual payday falls at least 10 days away from the targeted payday. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
	DPD1	*DPD2*	*DPD1t7*
*Extend2D*Match*	0.008	-0.038	-0.050
	(0.24)	(-1.47)	(-1.09)
*Extend1D*Match*	0.075***	-0.033**	0.029
	(5.67)	(-2.59)	(0.90)
Extend2D	-0.031	-0.017*	-0.063**
	(-1.41)	(-1.92)	(-2.39)
Extend1D	0.003	-0.008*	-0.015
	(0.28)	(-1.95)	(-0.97)
Match	-0.003	0.049**	0.069*
	(-0.18)	(2.74)	(1.88)
Young	0.024	0.006	0.019
	(1.38)	(1.29)	(1.15)
Female	0.010	0.002	0.003
	(0.61)	(0.36)	(0.15)
Size	0.053**	-0.001	0.108***
	(2.38)	(-0.08)	(4.98)
High Education	0.040***	-0.007	0.042**
	(3.86)	(-0.71)	(2.24)
Married	0.008	-0.009	-0.000
	(0.45)	(-1.05)	(-0.02)
Credit	-0.023***	-0.008**	-0.071***
	(-3.92)	(-2.28)	(-6.55)
Income	-0.000	-0.001	-0.002
	(-0.50)	(-0.80)	(-1.61)
Behaviour	-0.275	-0.239**	-0.141
	(-1.41)	(-2.12)	(-0.88)
Disbursement Day FE	Yes	Yes	Yes
Observations	1024	1024	1024

Table IA.8: Event Day -1 Early Repayment

This table reports results on for treatment arms on event day -1. The unit of observation is at loan level. The dependent variables *Early Repay*, *ER1* and *ER2* are binary variables for repayment earlier than maturity, 1 day before maturity and 2 days before maturity. The independent variable *Extend1D* and *Extend2D* are binary variables for loan extension by 1 and 2 days. *Match* equals one for borrowers with their payday matching the targeted payday in the experiment and 0 for the placebo group whose actual payday falls at least 10 days away from the targeted payday. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
	Early Repay	*ER1*	*ER2*
*Extend2D*Match*	0.0100	0.0569	0.0200
	(0.09)	(0.94)	(0.64)
*Extend1D*Match*	-0.0197	0.0288	-0.00832
	(-0.23)	(0.47)	(-0.22)
Extend2D	0.0868*	0.0120	0.0150
	(1.79)	(0.30)	(0.51)
Extend1D	0.0273	-0.0394	0.00624
	(0.44)	(-1.35)	(0.17)
Match	-0.101	0.0228	-0.0481*
	(-1.42)	(0.62)	(-1.82)
Young	-0.0312	0.0386	-0.0156
	(-1.17)	(1.64)	(-0.57)
Female	-0.0271	-0.0426***	0.0400
	(-0.95)	(-3.36)	(1.36)
Size	-0.169***	0.0621	0.0131
	(-5.57)	(1.46)	(1.06)
High Education	-0.0266*	0.00481	-0.00328
	(-1.77)	(0.15)	(-0.13)
Married	-0.0263	0.0333	0.0147
	(-0.65)	(1.32)	(0.50)
Credit	0.0000738***	0.0000177	0.00000717
	(6.73)	(1.38)	(0.77)
Income	0.00826**	0.00222	0.00261
	(2.79)	(0.50)	(1.19)
Behaviour	0.000378	-0.000556**	-0.000135
	(0.98)	(-2.46)	(-0.46)
Disbursement Day FE	Yes	Yes	Yes
Observations	831	831	831

Table IA.9: Event Day 0

This table reports results on for treatment arms on event day 0. The unit of observation is at loan level. The dependent variables *Early Repay*, *ER1* and *ER2* are binary variables for repayment earlier than maturity, 1 day before maturity and 2 days before maturity. The independent variable *Extend1D* and *Extend2D* are binary variables for loan extension by 1 and 2 days. *Match* equals one for borrowers with their payday matching the targeted payday in the experiment and 0 for the placebo group whose actual payday falls at least 10 days away from the targeted payday. All variables are defined in Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-robust . Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)
	Early Repay	*ER1*	*ER2*
*Extend2D*Match*	0.182***	0.00905	0.144***
	(3.49)	(0.17)	(5.25)
*Extend1D*Match*	0.136**	0.0427	0.0536
	(2.25)	(0.81)	(1.23)
Extend2D	0.0943**	-0.0280	0.0280
	(2.21)	(-0.71)	(0.88)
Extend1D	0.120**	0.0685**	0.0288
	(2.54)	(2.80)	(0.74)
Match	-0.117**	0.0569	-0.0230
	(-2.52)	(1.57)	(-1.11)
Young	0.0481*	0.0180	-0.0110
	(1.95)	(0.57)	(-0.37)
Female	0.0425*	0.0258*	0.0269
	(1.98)	(1.93)	(1.71)
Size	-0.164***	0.110***	-0.0320*
	(-4.92)	(4.18)	(-1.81)
High Education	-0.0349	0.0253	-0.0214
	(-1.26)	(1.23)	(-1.51)
Married	-0.00592	0.00460	-0.00161
	(-0.35)	(0.14)	(-0.08)
Credit	0.0000736***	0.00000297	0.0000189***
	(6.74)	(0.33)	(4.95)
Income	0.0107**	0.00294	0.000848
	(2.59)	(0.67)	(0.67)
Behaviour	0.00106***	0.0000464	0.000241
	(3.91)	(0.25)	(1.07)
Disbursement Day FE	Yes	Yes	Yes
Observations	988	988	988

Table IA.10: Heterogeneous Tests wrt Demographic Features

This table tabulates the heterogenous effect of payday alignment with respect to borrowers' age, gender, education, income and job position. The unit of observation is at loan level. Variables are defined in Appendix Table A1. All columns include disbursement day fixed effects. Standard errors are heteroskedasticity-consistent. Numbers in parentheses are t-statistics. *, **, *** represent statistical significance at 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
	Overdue	*Overdue*	*Overdue*	*Overdue*	*Overdue*	*DPD1*	*DPD1*	*DPD1*	*DPD1*	*DPD1*	*DPD1t7*	*DPD1t7*	*DPD1t7*	*DPD1t7*	*DPD1t7*
*Treatment*Age*	-0.001					0.001					0.001				
	(-0.19)					(0.49)					(0.28)				
*Treatment*Female*		-0.005					0.013					0.021			
		(-0.10)					(0.33)					(0.50)			
*Treatment*High Education*			-0.063					-0.096**					-0.113***		
			(-1.33)					(-2.58)					(-2.79)		
*Treatment*High Income*				-0.053					-0.056					-0.070	
				(-1.07)					(-1.43)					(-1.63)	
*Treatment*Senior Position*					-0.059					-0.047					-0.022
					(-0.95)					(-0.82)					(-0.37)
Treatment	-0.038	-0.066**	-0.034	-0.040	-0.059**	-0.108	-0.092***	-0.035	-0.056**	-0.079***	-0.095	-0.091***	-0.021	-0.045	-0.079***
	(-0.38)	(-2.04)	(-0.98)	(-1.12)	(-2.21)	(-1.42)	(-3.70)	(-1.40)	(-2.12)	(-3.87)	(-1.10)	(-3.35)	(-0.77)	(-1.49)	(-3.53)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Disburse Day FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	880	880	880	880	880	880	880	880	880	880	880	880	880	880	880
R2	0.231	0.218	0.220	0.217	0.219	0.112	0.118	0.126	0.122	0.123	0.189	0.178	0.185	0.178	0.179