The Impact of Relaxing Liquidity Constraints on Small Firm Performance: Evidence from South Africa *

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[PRELIMINARY AND INCOMPLETE]

Abstract

We examine the extent to which liquidity constraints are a barrier to firm growth in low-income countries, and study the role that credit policies can play in addressing them. We combine novel data on small business owners in South Africa’s informal minibus taxi industry with a program that provided immediate reduction in payments on the outstanding minibus loan. We find that relaxing liquidity constraints led to: (i) higher repayments and lower defaults on minibus loan; (ii) an increase in labor supply; and (iii) better overall financial health. We do not find any evidence of increase in firm misconduct or risk to passenger safety, suggesting an improvement in overall welfare. We rationalize these findings using a framework where penalties arising from late payments under liquidity constraints lead to future debt overhang, thereby, generating moral hazard in effort.

Keywords: Financial Distress, Loan Modification, Labor Supply, Auto Financing.
JEL Classification: D22, G33, G51

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1. Introduction

Small enterprises in low- and middle-income countries (LMICs) operate under high levels of risks, making them especially vulnerable to liquidity shortfalls and insolvency risks (Samphantharak and Townsend 2018). This was evident in the COVID-19 crisis when the slowdown in economic activity led to severe challenges for small and medium-sized enterprises (SMEs) to meet their financial obligations. Over two-thirds of SMEs in Africa and Asia reported falling behind on their loan payments during mid-2020 (World Bank 2020). While COVID-19 was indeed an unprecedented event, insolvencies have typically increased following periods of crises. In response, policymakers and creditors have often intervened in credit markets to provide liquidity support to small firms. In theory, ex-post loan modifications can benefit both borrowers and lenders by completing debt contracts and lowering default rates (Bolton and Rosenthal 2002). However, relatively little is known on how loans modifications impact performance of small firms and their owners, fueling an active debate on whether such interventions are justified.

This lack of empirical evidence likely arises from three challenges faced by a researcher when attempting to address the issue. First, programs that restructure existing debt typically reduce both the immediate payments as well as the principal outstanding. Thus, it is unclear whether the observed effects are driven by alleviating short-run liquidity constraints or changing long-run wealth. Second, a reduction in payments is more likely be demanded by firms that received a negative demand or cost shock, or initiated by lenders looking to keep inefficient firms alive to avoid recognizing losses on loans made to those firms. This negative selection biases any estimates of payment reduction on outcomes of interest. Third, lack of information on firm outcomes and their business owners — especially for small firms in LMICs, majority of which operate in the informal sector — has limited making much progress on the question.

We work with a large creditor of minibus taxis in South Africa (the “financier”) to overcome these challenges. The nation’s minibus industry is populated by small firms where individuals typically finance these taxis secured by the minibuses. These firms

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190% of surveyed SMEs in South Africa, the country analyzed in this paper, expected that they will fall behind on their outstanding liabilities in the next six months. High financial distress was also reported by SMEs in other LMICs including Kenya (75%), Sri Lanka (70%), and India (60%).

2More than 80 countries enacted some form of debt restructuring in response to the COVID-19 crisis (World Bank 2022). These programs were structured either as a one-time debt relief, or extended lines of credit (e.g. Payment Protection Program in the US), or temporary pause in payments (e.g. debt moratorium in India), or extension of loan maturity (considered in this paper), or some combination of them.

3See Acharya, Crosignani, Eisert, and Steffen (2022) for a detailed review of the literature on how credit market distortions generates “zombie” firms and analyze its negative consequences for aggregate productivity in the context of LMICs.
operate in an uncertain environment that generates large month-to-month fluctuations in their income stream. Yet competition within the industry is fierce as it provides one of the few avenues of wealth generation in the nation. As a result, financial distress is common with half of the firms falling behind on their payments at least once during the life of their loan. Our setting exploits a natural experiment where the financier reduced short-term payments without changing the long-term obligations for a subset of its borrowers in late 2021. The restructuring was initiated in response to a sharp increase in its portfolio delinquencies following COVID-19 related travel restrictions and the riots in July 2021 sparked by the imprisonment of the former president.

Our natural experiment allows us to overcome negative selection by exploiting a cutoff rule that determines borrower eligibility to receive the payment reduction offer. Only borrowers that paid at least 50 percent of their previous three months of owed payments got a reduction in their monthly payments. We show that this rule indeed led borrowers above the payment threshold (treated firms) to be 67 percentage points more likely to receive the offer compared to firms below the threshold (control firms), allowing us to use a fuzzy regression discontinuity design to estimate the causal impact of relaxing liquidity constraints. The critical identification assumption for obtaining unbiased estimates for the effects of payment reduction on our outcomes of interest is that the assignment to the treatment is as good as random. This assumption might not hold if, for example, borrowers were aware of the threshold and accordingly adjusted their payments to become eligible for the offer. We address such selection concerns by documenting the absence of any jump in the distribution of borrowers around the treatment threshold. We also support this by documenting that the distribution of baseline characteristics of the borrowers as well as terms of the loan taken display continuity at the treatment threshold.

We combine the natural experiment with four data sources that provide information on borrowers’ loan performance, driving effort, risk-taking behavior, and credit bureau records one year after the program roll-out. The first dataset contains administrative loan data for the universe of loans of the minibus financier. We utilize detailed account-level information to construct various proxies of loan performance including future delinquencies, defaults and amount of late payments. The second dataset provides rich information on driving decisions and performance — including daily information on vehicle’s first ignition, the distance covered, the time driven, the route taken, and total instances of overspeeding — captured using GPS devices installed in all the financed vehicles. The third dataset provides information on the number of accidents that the vehicle was involved in, along with the description of the intensity of the accidents, available to us because the financier requires the minibuses to be insured under their contracted insurance program.
The fourth dataset matches borrowers’ administrative data to their credit bureau records, allowing us to construct measures of financial health including alternative borrowings.

We begin our analysis by documenting that enrollment in the program had meaningful impact on borrowers’ required monthly payments: receiving the restructuring offer reduced monthly payments needed to be made by the borrowers by 6.5 percent. These reductions are not small as they translate into eligible borrowers paying about 2.4 percentage points less annually on the outstanding balance and are equivalent to reducing the number of monthly installments to be made in a year by one month. As the program was structured such that the total outstanding loan principal did not change, it increased the remaining loan maturity for the treated firms by five months (over an average loan maturity of 51 months in our sample). Thus the restructuring offer effectively shifts part of the payments from the present to the future, keeping the interest rate and the loan balance outstanding at the time of enrollment unchanged.

We then estimate the effects of treatment eligibility on the borrower’s performance of financiers’ minibus loan. We find that a reduction in monthly payment reduced the probability of being delinquent or defaulting on the financier’s loan. A 1 percent reduction in payment reduces the probability of delinquency by 5 percent for treated firms relative to control firms.4 We find similar effects if we instead use alternative measures of loan performance including the number of missed payments or number of months of delinquency within the one year after enrollment in the program.

Next, we examine the effects of payment reduction on labor supply by firm owners. We find that a 1 percent payment reduction led to a 3 percent increase in distance covered using the minibus on a daily basis. We also find similar positive effects on the number of hours during the day driving the minibus and number of days in a month the bus was driven. We show evidence that support that the increase in number of hours is not driven by total number of hours spent outside of driving but is rather driven by an increase in the number of hours supplied towards operating the vehicle. This increase in work hours does not translate to an increase in firm’s risk-taking, as evident by no changes in the number of alerts received for over-speeding and in the number of accidents reported. We also find that both treated and non-treated firms behaved similarly in their driving efforts, debt repayments, external borrowing and financial outcomes in the months leading up to the payment reduction. This suggests that the labor market effects are indeed driven by treatment effects rather than selection of borrowers into the program based on pre-treatment labor market performance.

4We define delinquency event using the standard definition in the literature, which is being late on the scheduled payment by 90 days or more.
Finally, we examine the effects of the payment reduction on borrowers’ overall financial health. In theory, relaxing liquidity constraints for borrowers has ambiguous effect on their future borrowings. On the one hand, a payment reduction on one form of debt could improve overall financial health by allowing borrowers to increase repayment on other sources of borrowing. On the other hand, if a reduction in payment leads borrowers to increase their consumption by borrowing from other sources, it crowds in overall debt mitigating any positive effects from the payment reduction. We find a reduction in the number of late payments as well as the amount by which borrowers are behind on their payments on alternative debt sources. We also do not find any evidence of increased borrowings from other sources of debt. Overall, this points to a net improvement in financial health for the owners of the treated firms.

Our findings that labor supply increases in response to alleviation of short-run liquidity constraints appears to be at odds with canonical models on how debt burden affects labor effort, raising questions on the mechanisms. These models can be classified in two areas. The first set of papers, starting with Myers (1977), highlight that high debt levels reduce agents’ effort. As agents are residual claimant on the earnings, high debt levels lowers their incentive to exert more effort. This is static debt overhang. In our context, this implies that the debt restructuring should not have any effect on labor supply because the program intended to keep the debt level unchanged. A second set of papers imply that an increase in debt payments induces households to work more, especially in presence of consumption commitments (Chetty and Szeidl 2007). This would predict that a relaxation of liquidity constraints should lead to lower labor supply.

We present a simple model that incorporates a salient features of debt contracts absent in the above papers: the incidence of penalties in the event of late payments. This simple modification to standard models of debt contracting can rationalize our findings. Intuitively, the inclusion of a penalty for late payment in debt contract generates dynamic debt overhang. Borrowers with same initial debt levels but different monthly payments will have different debt obligations in the future when liquidity constraints force borrowers with higher monthly payment to accumulate higher debt balance over time due to accrual of larger penalties. Higher debt balance in turn generates debt overhang, reducing the labor supply.

We present a number of additional results consistent with this framework. First, descriptive evidence suggests that the responses come primarily from deterioration of outcomes among borrowers that did not receive payment reduction (control firms), rather than gains from firms that received payment reduction (treated firms). Second, we find that effects take time to materialize, consistent with the above model where late payments
take time to accumulate into borrowers’ debt balance. Third, we find that delinquent borrowers with lower baseline credit score and revenue, proxies in our data of being more liquidity constrained, are the most responsive to the payment reduction.

Overall, our findings suggest that payment reduction can provide creditors as well as policymakers with a low-cost tool to align borrower’s incentive with those of the creditors and improve credit market efficiency. However, our results should be interpreted as short-run effects of such restructuring programs. The long-run effect will have to take into account both the short-run benefits and the long-run costs incurred by deferring defaults from the present to the future.

**Contribution to the literature.** Our study contributes to a number of literature. First, it relates to the literature analyzing firm growth in LMICs and the important role of credit interventions in this process. Work in this area has been primarily focused on increasing credit supply or access to finance among SMEs (de Mel, McKenzie, and Woodruff 2008; Banerjee and Duflo 2014). Yet, firms in low income countries appear to stay small suggesting they face barriers to their growth (Hsieh and Klenow 2014). Recent work has, therefore, focused on identifying and relieving such constraints (Bloom, Mahajan, McKenzie, and Roberts 2010; Kelley, Lane, and Schonholzer 2021). Our findings point to liquidity constraints as an important barrier to firm growth and highlight the importance of payment reduction programs in alleviating those constraints in an environment with weak credit enforcement.

In doing so, we link to a small but growing literature analyzing repayment flexibility in debt contracts for small firms in the context of LMICs. Work in this area suggest that debt contracts that *ex-ante* provide new borrowers with an option of grace period with no required payments — either right after loan disbursement (Field, Pande, Papp, and Rigol 2013) or at a future period of their choice in the repayment cycle (Battaglia, Gulesci, and Madestam 2023) — can increase investment. While the option of having such flexibility has indeed shown to improve business outcomes, the evidence also suggests that it could foster moral hazard in effort through procrastination (Brune, Gine, and Karlan 2023), change the selection of borrowers (Barboni and Agarwal 2023) and increase default rates (Field, Pande, Papp, and Rigol 2013). As a result, standard rigid contracts are still the most pervasive debt contracts offered by creditors to SMEs. In such settings, *ex-post* contract modifications, such as extension of loan maturity and lowering of payments considered in this paper, could be a promising tool to prevent inefficient firm destruction among financially distressed firms.

Our work also relates to the literature documenting a lack of separation between production and consumption decisions in LMICs. Small enterprises in these countries are
owned by individual households, resulting in propagation of shocks to household spending on their production decisions (LaFave and Thomas 2016; Kinnan, Samphantharak, Townsend, and Vera-Cossio 2023). We show that the relationship goes both ways — liquidity constraints on production side have spillovers on overall financial health of households. This is consistent with recent evidence documenting SMEs’ reliance on personal debt to mitigate adverse impacts of cost shocks in the US (Fonseca and Wang 2023).

Finally, our paper relates to the literature on consumer debt restructuring for distressed borrowers in developed economies. Recently, papers aiming to disentangle the role of liquidity versus debt overhang have arrived at mixed conclusions. Dobbie and Song (2020) find limited impacts of payment reduction of credit card debt on households’ consumption and labor supply in the US. Yet evidence from the secured loan market of US mortgages suggests an important role of liquidity constraints on households’ balance sheet (Ganong and Noel 2020; Indarte 2023). These contrasting results call for more evidence generation across different markets and settings. Our study takes a step in that direction and complements them in two ways. First, we focus on firms rather than households. Second, we document the importance of liquidity effects in secured auto loan markets, where loan duration ranges between that of low-maturity credit card debt to longer-maturity mortgage debt. The granularity of our data also allows us to study actual labor supply decisions, instead of relying on wages as a proxy for labor supply.5

The rest of this paper is organized as follows. Section 2 provides context our study, including the background of the South African informal transit sector, the financier loan portfolio, details on the debt restructuring program that we analyze, and describes the data. Section 3 describes the empirical strategy to analyze the impact of payment reduction on firm outcomes. Section 4 presents the main results. Section 5 presents a model which rationalizes our findings and provides supporting evidence for the model. Section 6 discusses alternative mechanisms and presents robustness, and Section 7 concludes.

2. Background and Data

South Africa’s minibus industry provides an ideal setting to study the impact of liquidity constraints for several reasons. First, it is representative of informal firms that contribute to the majority of employment in the developing world. Second, the loan contract we

5Few recent works have analyzed various consumer debt restructuring programs in LMICs. Fiorin, Hall, and Kanz (2023) analyze a debt moratorium policy in India that paused loan payments for two months and find that it improved repayments rates and borrowers’ trust in the lender. Using experiment evidence from a consumer credit provider in Mexico, Castellanos, Jimenez-Hernandez, Mahajan, Alcaraz Prous, and Seira (2022) find small effects of changes in interest rate and minimum payments on default. Aydin (2023) tests for other forms of debt restructuring in a randomized experiment among Turkish consumers and finds forbearance to be effective at preventing delinquencies among liquidity constrained borrowers.
study is similar to the subprime auto loans in the US, allowing our findings to speak to the broad literature on borrower behavior in the collateralized loan market. Third, the setting allows us to exploit a natural experiment to overcome challenges associated with identifying the effects of payment reduction. Finally, our collaboration with the financier allow us to overcome data constraints that have limited researchers’ ability to study how binding liquidity constraints for small firms affect labor supply decisions and financial health of their owners.

2.1 The Minibus Industry in South Africa

Due to the lack of public transportation in South Africa as a result of Apartheid spatial planning, the minibus taxi industry has grown to become the primary mode of transport for the majority of the population. The industry provides a dense network of services, connecting city centers, suburbs, peri-urban, and rural areas across the country. The primary clientele is the historically disadvantaged population, Black Africans, Indians, and Coloureds, who were systematically excluded from state services during Apartheid. Approximately 40% of the population (15 million individuals) report using the industry daily, and 80% over the course of the year. The industry is privately run without public subsidy for passengers or operators. Estimates suggest that approximately 250,000 minibus taxi vehicles operate in the country, informally employing at least half a million people, generating an estimated R90 billion in annual revenue (2017), accounting for approximately 2-3% of annual GDP.

Each minibus taxi operator is part of a taxi association, which is the industry’s de facto set of governing bodies. Minibus taxis operate an unscheduled service on pre-allocated routes, usually departing from fixed points and stopping anywhere along their route to pick up and drop off passengers. Passengers hail taxis using hand signals along these established routes. The taxi fare is determined by the associations that govern route entry. Taxi fares consider multiple factors, including the route length, time taken to cover the route, projected passengers, commuter affordability, and minimum profitability requirements for owners. Typical fares range from USD 0.5 to USD 4 for shorter routes and could exceed USD 25 for longer routes. The fares are overwhelmingly paid in cash and do not change, irrespective of where or what time a passenger enters the vehicle. As a result the sector has remained information with minibuses comprising less than 2% of registered vehicles in the country.

A common complaint amongst passengers and observers of the industry is that the industry is plagued by violence. There have been many instances of “taxi wars” starting in the late 1970s extending into the present day. Given the lack of oversight of the gov-
ernment, taxi owners and associations regulate entry into the market and resolve disputes by often resorting to violent means. In the last five years, it is estimated that over 500 individuals have been assassinated in taxi-related violence. This self-regulation also leads operators to take excessive risks leading to over 5,000 accidents annually. These challenges make operating a minibus taxi extremely dangerous, yet doing so can be lucrative. In a country with 40% unemployment rate, the minibus taxi industry provides one of the few avenues for income and wealth generation for the disadvantaged population.

The typical minibus taxi is a 16-seater minibus produced by Toyota. About one-third of operators have a single minibus. The remaining operators either operate a small fleet ranging from two to seven minibuses (50% of vehicles) or huge fleets (15% of vehicles). Our sample is more representative of single-owner firms, which comprise 75% of our sample. The remaining 25% are part of mostly smaller fleets. Therefore, our sample is more representative of firm size typical in developing countries, where firms with a labor size of 10 employees or less constitute a significant portion of the labor force.

2.2 The Minibus Financier

The minibus financier provides asset-backed financing for about 35,000 minibuses. The company has been operational since 2006 and makes up approximately 15% of the market for minibus loans in the country as of 2020. Along with providing credit for purchases of new and used minibuses, the financier also provides auxiliary services, including insurance, maintenance, and spare parts. Given the lack of reliable credit ratings on borrowers in South Africa, the financier conducts an extensive financial background check on each applicant. Specifically, the company collects demographic information, driving records, detailed business plans for the use of the taxi, the proposed route, and affiliated taxi association in addition to their credit scores. Once a client’s request for a loan is approved and the client purchases a vehicle, the company installs a global positioning satellite (GPS) telemetric device in the vehicle, which provides the precise location of the vehicle every six seconds. The primary reason for installing these GPS devices is detection of fraudulent events and vehicle reclamation in the event of default.

Column 1 of Table A.1 reports the average characteristics of the firms in our sample. The average minibus loan we analyze shares characteristics with a typical US subprime auto loan: the maturity of the loan varies between 60 to 72 months, and the loan is collateralized by the minibus. The price of a minibus is typically USD 30,000, which is much higher than the income of the average borrower (USD 20,000), according to the World Bank. Borrowers are typically required to pay 10 percent of the amount upfront, making the average principal of a minibus taxi loan of USD 26,000. The borrower’s average credit
A borrower with credit score below 660 is considered as subprime, and hence, the minibus borrowers represent the distribution of population with higher default risk. The average annualized interest rate on the loan is 21 percent and ranges between 14 percent to 26 percent. These numbers reflect the underlying risk of the borrowers’ pool due to both asymmetric information on borrowers’ creditworthiness and inconsistent income streams in the industry. Indeed, at any point, about half of the loans are 90 days delinquent, and the overall default in the financier’s portfolio is close to 30 percent.

2.3 The Debt Restructuring Program

The transportation sector in South Africa witnessed a significant drop in revenue after COVID-19 travel restrictions were enforced through strict lockdowns in the country. Political unrest followed these notoriously draconian lockdowns across major cities in July 2021, nominally ignited by President Zuma’s arrest. As a result of the sustained impact of COVID, riots, and few other high-impact events on travel demand, delinquencies on minibus loans started increasing rapidly. These events led the minibus financier to initiate a debt restructuring program for a subset of its borrowers. The purpose of the restructuring was to limit losses on its portfolio by providing debt relief to the most financially distressed borrowers.

The debt restructuring program was conducted in two phases. The first phase was rolled out in September 2021 and the second phase in March 2022, and targeted borrowers who were late on their monthly payments. To ensure a lack of liquidity, rather than moral hazard, plausibly constrained the targeted borrowers, the program included those borrowers who did not accumulate too much or too few arrears. Moreover, the financier only aimed to reduce the borrowers’ monthly payments without changing their outstanding principal amount owed. As the borrowers became delinquent on their payments, their monthly owed payments increased to amount for any arrears accumulated upto that point. Under the debt restructuring offer, their updated monthly payments were restored to the monthly payment the borrower agreed to at contract origination. The accumulated arrears were added to their principal amount. This financier financed the program by extending the maturity of the original loan and accommodating the accumulated arrears. The financier explicitly decided against any interest rate or insurance payment concessions.

Table I provides an illustrative example of how the schedule for an average borrower

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6The borrowers learned of these delinquencies through the monthly bill statement they received, which showed their outstanding balance, the original contracted payments, and the accumulated late payments. The borrowers also received reminders via text about the late payments.
Table I: Example of the payment reduction offer

<table>
<thead>
<tr>
<th>Principal Outstanding</th>
<th>Accumulated Arrears</th>
<th>Total Amount Outstanding</th>
<th>Interest Rate</th>
<th>Monthly Payment Before</th>
<th>Monthly Payment After</th>
<th>Remaining Months Before</th>
<th>Remaining Months After</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 378,713.7</td>
<td>R 25,143.92</td>
<td>R 403,857.62</td>
<td>20.7%</td>
<td>R 11,970.23</td>
<td>R 11,224.97</td>
<td>51</td>
<td>57</td>
</tr>
</tbody>
</table>

Notes: The table illustrates how enrollment into debt restructuring treatment changes the payment for a hypothetical borrower. Column (1) shows the principal outstanding for an average loan from our sample. Column (2) shows the average accumulated debt for delinquent borrower. Column (3) shows the total amount outstanding which is the sum of original outstanding principal and accumulated arrears. Column (4) shows the annualized interest rate. Column (5) shows the monthly payments based on total amount outstanding. Column (6) is the original contracted monthly payments, which are the also payment post debt restructuring. Column (7) shows the original outstanding maturity and Column (8) shows the new maturity after the debt restructuring.

who received the payment reduction offer changed. In this example, we consider a hypothetical borrower with a monthly contractual payment of ZAR 11,224.97 which is the monthly payment on average loan in our sample. As the borrower has accumulated arrears of ZAR 25,144, her monthly payment increases to ZAR 11,970 (a 6.6 percent increase over the contracted amount). These values correspond to the average principal outstanding, accumulated arrears, and interest rate. Under the debt restructuring, the borrower receives an offer to reduce her monthly payments to the original contracted amount without changing the outstanding principal (including the accumulated arrears) and interest rate. This offer translates to increasing the remaining maturity of the loan by six months (from 51 months to 57 months).

Panel (a) of Figure I shows changes to monthly payments for the borrower. Thus the financier effectively shifts the payments from the present to the future, keeping the interest rate unchanged. This reduction could effectively lower defaults in the short run for liquidity-constrained borrowers but could increase defaults toward the end of the loan cycle. Panel (b) of the figure shows that borrowers received about ZAR 9,000 in payment reduction in the year following enrollment into the program. This reduction is equivalent one month of installments. Importantly, the figure shows that when discounted at average borrower’s interest rate of 20.7% the net present value of debt outstanding does not change for the borrower.

The borrowers eligible to receive these offers had to satisfy a few criteria. First, they had to be active borrowers; that is, their loan must not be undergoing repossession or involved in any legal proceedings initiated by the financier. Second, they could have cumulatively missed more than one and a half months but not more than three months of their installments. The lower limit was to ensure that the reduction amounted to at least a substantial
Figure I: Financial impact of the debt restructuring program

(a) (b)

Change in monthly payment

- R 5,000
R 0
R 5,000
R 10,000

Months since modification

0 20 40 60

1-year payment reduction

R 0
R 2,000
R 4,000
R 6,000
R 8,000
R 10,000

Differences in NPV of payments owed at 20.7% discount rate

R 0
R 2,000
R 4,000
R 6,000
R 8,000
R 10,000

Notes: Panel (a) plots the financial impacts of the debt restructuring on the monthly payments of an average borrower. Panel (b) plots the one year payment reduction through the debt restructuring and the differences in net present value before and after the debt restructuring for the average borrower at 20.7% interest rate.

amount to help those in need. The upper limit was arrived based on financier’s belief that borrowers with more than three month of payments were less likely to respond to its simple debt modification offerings. Based on past experience in dealing with high delinquent borrowers, the financier concluded that borrowers with more than three months of payments in arrears were more likely to response to more aggressive debt relief offers. Third, their loan should have originated at least six months before the roll-out of the program. Fourth, the borrowers should have made at least 50% of their total cumulative payments that were due over the previous three months. We condition our sample of borrowers to satisfy the first three criteria and we exploit the fourth criteria in a regression discontinuity framework to assess the impact of enrollment into the program.

The process to determine eligible accounts based on the above criteria was automated using a computer code that runs daily with updated payment information on borrowers. These criteria would reflect payments by some borrowers that made an off-cycle payment. The accounts that fit the criteria were then passed along to the customer representatives for the financier, who either called or texted the eligible borrowers that they were enrolled in the restructuring. The borrowers then had the option to opt out of the program, but only two borrowers chose to do so. If they did not respond within five working days, their account was automatically enrolled into the program. In total, the offer was received by 2,655 borrowers.
2.4 Data

We use two proprietary datasets. Our first dataset comes from the minibus financier and provides information on borrower characteristics, loan information and monthly performance, driving behavior, and accident reports. Our second dataset comes from the credit bureau, which we link to the financier data to examine the impact of payment reduction on alternative borrowings, credit performance and consumption.

We first obtain information on the (i) list of borrowers that received the payment reduction offers in September 2021; and (ii) characteristics of all borrowers with outstanding loans with the financier for the month before the offers were rolled out. The former provides us information on the firms that the financier eventually enrolled in the program, and the latter provides with the set of both eligible and ineligible borrowers. We combine this list of borrowers with information on baseline characteristics of the loan as well as the borrower, along with their loan performance, driving effort, risk-taking, and credit bureau outcomes. We describe the data sources for these next.

Data on baseline characteristics. Information on baseline characteristics for borrowers comes from a snapshot of the financier’s loan portfolio for the August 2021. This information includes the total sample of firms with active loans with the financier in both these months. First, we obtain the characteristics — duration of the loan since origination, remaining maturity, number of overdue payments, and whether the loan was active — essential to construct the sample of eligible and ineligible firms for the offer. Second, the data provides us with numerous firm characteristics at baseline that we use to verify the identification assumptions of our empirical strategy. These include borrower’s age, credit score, and gender, as well as loan-level information such as the amount of loan originated, the interest rate, the amount of loan outstanding, the cost of the collateralized vehicle, the remaining maturity of the loan, the number of missed payments on the loan, and the number of months spanned since loan origination.

Minibus loan performance data. Information on account performance comes from the financier. We obtain details on the payment history for all the loans from January 2021 to August 2023. The data includes both the monthly payment owed as well as the actual payment made by the borrower. It also provides information on accumulated arrears by each month. We use this information to construct the primary running variable used in the analysis, that is, the percent of the past three months owed payments by the borrower. In addition to using the pre-treatment information, the data is also used to construct a measure of loan performance in the year following borrower’s enrollment in the restructuring program. We use the information on the number of on-time payments, the share of past
payments due made, whether the borrower was ever 90 days delinquent, the number of months the borrower was 90 days delinquent, and whether the borrower had the vehicle repossessed by the financier.

**Labor supply and driving behavior data.** Information on driving performance comes from the data recorded through GPS devices installed by the financier in all loaned vehicles. The GPS is able to provide daily information on time of first and the last ignition of the vehicle, the total distance covered by the driver, and the total time vehicle was operational. These data allow us to construct measures of borrowers’ daily labor supply. We also use a more detailed version of the GPS data that provides us information on the route taken by the driver. Given the routes for the minibuses are pre-allocated, we are able to use the information to determine total number of trips made and also construct measures of the efficiency of each trip by calculating the deviation from the pre-allocated routes.

We also construct two measures of risk-taking. For our first measure of risk-taking, we use the information on the number of daily warnings issued by the GPS for over-speeding, defined as driving above the national legal limit of 120 kilometers per hour. Information on the number of accidents, our second measure of risk-taking, comes from the insurance claims filed with the insurance arm of the financier. As part of its lending philosophy, the financier insures all the vehicles present in our sample. The monthly premiums for the insurance are added to the monthly installment paid by the borrowers, an average of USD 70 per month. The insurance claims in the data capture claims of varying intensities, along with the date on which the claim was filed. These filings range from small repairs such as windscreen damage or minor dents (USD 50 to USD 150) to significant repairs resulting from major accidents, collisions, and violence against the owner (USD 2500 and above). The richness of the data allows us to capture each of these occurrences separately.

**Credit Bureau Data.** Lastly, information on borrowings from alternative sources comes from individual-level credit bureau data. The financier sources information on its borrowers’ borrowings and payments from other sources using these credit reports. The data contain information on new borrowing, including new credit card, debit card, auto loan, home loan, or personal loan. The data also report whether the borrower had a negative flag reported on her credit report during a month. These negative flags include events such as previous defaults or overdue loans. We also see borrowers’ accumulated late payments across these credit lines. Finally, the credit report data allows us to construct a measure of

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7Insurance claims are prevalent in the industry given the intensity and frequency of violence described above.

8There are other types of borrowings in the data, such as student loans, but those constitute less than 5% of observations.
net borrowings based on borrowings made on credit cards. In particular, we calculate net borrowings in a month as the difference between the end of monthly balances between the current and the past month.⁹

3. Empirical Strategy

A cutoff rule determines borrowers’ eligibility to receive the maturity extension: borrowers that made at least 50 percent of their owed installments during the last three months were eligible for the debt restructuring. Our empirical strategy exploits the quasi-experimental variation generated by the assignment rule using a regression discontinuity framework. Specifically, the treatment effect of receiving a 1 percent payment reduction is determined by the jump in the outcome of interest divided by the jump in the percent payment reduction at the cutoff. Let $Y$ be the outcome of interest (such as default) and $\Delta Pay$ be the percent payment reduction. The fuzzy RD estimator is

$$
\beta_1 = \lim_{p \downarrow 0.5} E[Y|P = p] - \lim_{p \uparrow 0.5} E[Y|P = p] \over \lim_{p \downarrow 0.5} E[\Delta Pay|P = p] - \lim_{p \uparrow 0.5} E[\Delta Pay|P = p]
$$

Under the assumption of continuity of borrower characteristics at the treatment threshold, the fuzzy RD estimator identifies the local average treatment effect of relaxing liquidity constraints of borrowers near the cutoff. We follow RD design recommendations from Lee and Lemieux (2010) and Imbens and Kalyanaraman (2011) to estimate $\beta_1$ using a local linear regression within a given bandwidth of the treatment threshold, while controlling for the running variable on either side of the threshold. Specifically, we use the following two-stage instrumental variables specification:

\begin{align}
\Delta Pay_i &= \alpha_0 + \alpha_1 \cdot 1(P_i \geq 0.5) + \alpha_2 \cdot (P_i - 0.5) \\
& \quad + \alpha_3 \cdot 1(P_i \geq 0.5) \times (P_i - 0.5) + \gamma X_i + \nu_i + \eta_i \quad (1)
\end{align}

\begin{align}
Y_i &= \beta_0 + \beta_1 \cdot \Delta Pay_i + \beta_2 \cdot (P_i - 0.5) \\
& \quad + \beta_3 \cdot 1(P_i \geq 0.5) \times (P_i - 0.5) + \eta X_i + \nu_i + \epsilon_i \quad (2)
\end{align}

$Y_i$ is the outcome of interest for firm $i$ enrolled in the maturity extension program, $P_i$ is the percent of the past three months’ payment made by the firm (the running variable), and $X_i$ is a vector of firm controls measured at baseline. We include region-fixed, denoted

⁹Let $b_t$ denote the outstanding balance, $p_t$ be the payments made and $e_t$ be the expenditure at the end of the month on the credit card. We define the net borrowings $nb_t$ as $nb_t = e_t - p_t = b_t - b_{t-1}$. Similarly, we define the consumption by borrower as: $e_t = b_t - b_{t-1} + p_t$. 

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by $v_j$, in all specifications. Including region-fixed effects absorbs any aggregate changes within the region and ensures that we compare the outcomes (such as driving behavior) within the same region. The inclusion of cohort fixed effects implies that we compare the treated and non-treated firms within the same restructuring months. Firm-level controls include age, credit score, the amount of loan originated, interest rate, the amount of loan outstanding, probability of male firm owner, the remaining maturity of the loan, and the number of months since loan origination. While the inclusion of firm controls is not essential for identification, it improves the precision of estimates. Standard errors are clustered at the firm-level.

Two conditions must hold for the estimates of $\beta_1$ to be unbiased. First, the density of the running variable $P$ should be continuous around the treatment threshold. Panel (a) of Figure II plots the distribution of the share of the last three months of payments made by borrowers when the value of the variable lies between 0 and 1. We focus our analysis on the 1,522 firms that fit the criteria described above and had made at least 20 percent and at most 80 percent of their last three months of owed payments. Panel (b) plots the distribution of the running variable in our final sample. The distribution is smooth around the threshold with no evidence of a jump. The McCrary test statistic testing for discontinuity in the distribution around the threshold in our main sample is -0.0049 with a standard error of 0.184 (McCrary 2008). The absence of any discontinuity in the distribution of running variable rules out any sorting into the treatment.

The second identifying assumption that needs to hold is that the baseline covariates should be balanced across the treatment threshold. Panel (a) of Figure III (and Figure A.2) presents the graphical versions of balanced tests for variable borrower characteristics, including borrower’s age, credit score, amount of loan originated, interest rate, amount of loan outstanding, probability of male firm owner, the remaining maturity of the loan, number of months since loan origination, and the number of missed installments, conditional on fixed effects and controls. For ease of interpretation, we normalize each variable to have mean zero and standard deviation of one. Columns 2 and 3 of Table A.1 show the average characteristics of firms above and below the treatment threshold, respectively. Columns 4 and 5 show the difference in the averages and their associated $p$-values. It is clear that while borrowers above and below the treatment threshold are similar across

\footnote{Discontinuity in running variable around the threshold could arise if borrowers sort into the treatment. Intuitively, this is unlikely for a few reasons. First, the debt restructuring program was a new initiative the financier took, and borrowers were unlikely to be aware of the program’s existence or its logistics. Second, the lender provided the restructuring program to all the borrowers who met the eligibility criteria, and borrowers were then given the option to opt out of the offer. This approach differs from opt-in offers wherein the borrowers initiate or request restructuring and generate selection into treatment.}
Figure II: Distribution of running variable

Notes: Panel (a) plots the distribution of running variable around a wider threshold between 0% and 100% of last three months payments made. Panel (b) plots the distribution of running variable around the treatment threshold of final sample used in our analysis which are borrowers that made more than 20% but less than 80% of last three months payments.

most characteristics, they still differ in the amount of loan outstanding with the firm and month on book. However, as Columns 6 and 7 of Table A.1 present, the RD estimate of the cross-treatment threshold on baseline characteristics is not statistically different from zero. Consistent with the figure, we find that none of the baseline characteristics indicate a jump at the threshold.

Finally, a potential concern with our identification strategy is that the financier could have targeted the treatment offer to firms based on non-traditional information such as driving effort, risk-taking behavior, or financial information from the credit bureau. Even if the financier did not use this information for targeting the offer, one might still be concerned that borrowers around the threshold differ in their recent driving behavior or performance on the job. Panel (b) of Figure III (and Figure A.3) shows evidence inconsistent with the presence of pre-trends around the treatment threshold. We compute the averages across various covariates in the three months before the debt restructuring offer. Panel (a) of the figure shows that the average daily driving performance, as measure by the driving distance and duration for which vehicle was driven, before the offer roll-out does not differ at the treatment threshold. Similarly, there is no evidence of risky driving or passenger safety — there is no discontinuity in reported accidents or speeding alters at the treatment threshold (Panel (b)). We also do not find evidence that borrowers above and below the treatment threshold differ in their borrowings and payment behavior from other credit sources (Panel (c)).

Panel (a) of Figure IV shows the probability of receiving the payment reduction offer
Figure III: Balance of baseline loan characteristics, borrower characteristics and pre-program outcomes

(a) borrower and loan characteristics

- Age
- Gender
- Credit Score
- Has Permit
- Rem. Maturity
- Interest Rate
- Month on book
- Vehicle Cost
- Loan Amount (Origination)
- Loan Amount (Outstanding)
- Monthly Installment (Contract)
- Current Market Value of Vehicle
- Arrears on Loan

(b) pre-program outcomes

- 1(Delinquent)
- Distance Covered
- Operational Time
- Total Trips
- Time Spent on job
- Share of days driven
- Absenteeism
- Average Route Deviation
- # Speeding Alerts
- # Accidents
- Share of amount due
- Amount due
- Total credit card debt
- Total alternative debt

Notes: The figure plots the RD estimate of baseline loan and borrower characteristics (panel (a)) and pre-program outcomes (panel (b)) around the cut-off we have constructed described in detail above.

across each band of running variable. The figure shows a significant discontinuity in the probability of receiving payment reduction at the threshold. Consistent with the structure
of the offer, Panel (b) of the figure shows that getting the offer led to a discontinuity in the monthly payments for the borrowers. Panel (c) of the figure shows that the payment reduction is associated with an increase in loan maturity right at the treatment threshold. The graphical evidence in the figure provides evidence for a strong first-stage treatment upon crossing the treatment threshold. Table II presents the first-stage estimates using equation 1 to better assess the magnitudes underlying the payment reduction offer. Consistent with the figure, Column (1) shows that borrowers making at least 50 percent of payment are 67 percentage points more likely to receive the debt restructuring offer. Column (2) shows that crossing the payment threshold leads to an increase in maturity of about 8 months. The maturity extension effectively reduces payments for treated firms by 6.4 percent more than control firms (Column (3)), which is effectively a reduction of 2 percentage points in the share of monthly payments as total balance (Column (4)). Thus, for the firms receiving the offer this equates to making on less monthly payment annually on the loan.

**Table II: First stage: effect of eligibility on receiving payment reduction**

<table>
<thead>
<tr>
<th></th>
<th>Prob(treated)</th>
<th>Δ Maturity</th>
<th>Δ Payments (%)</th>
<th>Δ Payments Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>1[(P \geq 0.5)]</td>
<td>0.662***</td>
<td>7.660***</td>
<td>-0.064***</td>
<td>-0.002***</td>
</tr>
<tr>
<td></td>
<td>[0.037]</td>
<td>[0.516]</td>
<td>[0.004]</td>
<td>[0.000]</td>
</tr>
<tr>
<td>Control mean</td>
<td>0.000</td>
<td>0.000</td>
<td>0.076</td>
<td>-0.000</td>
</tr>
<tr>
<td>Observations</td>
<td>1,522</td>
<td>1,522</td>
<td>1,522</td>
<td>1,522</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.218</td>
<td>0.241</td>
<td>0.286</td>
<td>0.213</td>
</tr>
<tr>
<td>Region f.e.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Firm controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Notes:** The table presents first stage estimates of the effects of being above the treatment threshold on the firm’s probability to receive the debt restructuring offer. Column 1 shows the effect on probability on being treated; Column 2 shows the effect on change in loan maturity; Column 3 shows the effect on reduction in monthly payments; Column 4 shows the effect on reduction in share of payments out of outstanding balance. All columns include region fixed effects and firm baseline controls as described in the main text. Standard errors clustered by district level are reported in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

As Panel (a) of Figure IV shows, the estimate of receiving the treatment does not jump to one above the threshold. The reason driving the non-compliance is the way the offer was implemented. As the process of determining eligible borrowers was automated, the data finally used to run the code was the one that was updated a day before the implementation date. However, the data that we received and eventually use was the one processed on the
**Figure IV: First stage treatment**

(a) probability to get term extension

(b) % reduction in monthly payments

(c) change in loan maturity

**Notes:** The figure plots the probability of receiving treatment across each band of the running variable. Panel (a) shows there is a large discontinuity in receiving the term extension, Panel (b) shows that receiving the offer led to a discontinuity in monthly payments for the borrowers around the threshold, and Panel (c) shows there is a large discontinuity in loan maturity.

last date of August 2021. For these reasons, some borrowers who should be classified as eligible based on our data did not get the offer due to a change in their payment profile. Therefore, our empirical strategy uses a fuzzy regression discontinuity rather than a sharp regression discontinuity design.

4. Results

4.1 Main results

In this section, we examine the effects of the payment reduction program using the empirical strategy outlined above. We start by analyzing the effect of payment reduction on
the loan outcomes with the taxi financier. We then discuss the impact on driving effort, risk-taking, and overall financial outcomes.

**Debt Repayment.** Figure V shows the effects of payment reduction on loan performance around the treatment threshold using various proxies of debt repayment. Panel (a) shows the number of delinquent months one year after the loan modification. However, because we define delinquent months as months in which the borrower was at least three months behind their payment, part of this effect is mechanically induced due to the payment reduction offer. This inducement resulted as enrollment into the offer meant that current arrears were transferred towards future balance, making any late payments immediately zero. We, therefore, study various other measures of loan performance. Panel (b) evaluates the effect on whether the borrowers were ever delinquent in the one year following the reduction. As the figure shows, loan performance measured through all these measures indicates that payment reduction increased repayment for the treated firms.

**Figure V: Reduced-form: effect on loan performance**

![Figure V](image)

Notes: The figure plots the effect of payment reduction on loan performance around the treatment threshold. Panel (a) shows the number of delinquent months in one year after the loan modification. Panel (b) shows the impact on whether borrowers were ever delinquent in one year following the program.

Table III provides parametric effects of payment reduction on various measures of loan performance. Column 1 shows that a 1 percent reduction in payment reduces the number of missed payments by 0.3 months. This reduction is significant in magnitude — it is 5.2 percent lower than the control mean. Columns 2 and 3 show that the short-run payment reduction reduces the financial distress in the year following the reduction — it lowers the number of months the borrower was 90-days delinquent by 0.46 (about 5 percent reduction relative to the non-treated group) and reduces the chances of ever being 90-days late...
on the payments by 0.02 percentage point. While 90-day delinquency is the most reliable and standard proxy of financial distress used in the literature (Ganong and Noel 2020), we also examine the effects on the formal definition of default. We find no significant effects on the alternative measures of default. This result is most likely driven by the fact that we are only studying the outcomes one year after the program rather than longer-term default.

Overall, our results suggest that liquidity constraints are an important driver of financial distress in our sample. However, the results above do not speak on the channels driving these effects. We next provide evidence on two channels- effort and overall financial outcomes- through which payment reduction affects debt repayment.

### Table III: Effect of payment reduction on debt repayment

<table>
<thead>
<tr>
<th></th>
<th># Missed Installments</th>
<th># months Delinquent</th>
<th>Ever Delinquent</th>
<th>Vehicle Repossessed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>Δ Payment (%)</td>
<td>-0.333***</td>
<td>-0.459***</td>
<td>-0.021***</td>
<td>-0.000</td>
</tr>
<tr>
<td></td>
<td>[0.066]</td>
<td>[0.087]</td>
<td>[0.008]</td>
<td>[0.009]</td>
</tr>
<tr>
<td>F-stat</td>
<td></td>
<td></td>
<td></td>
<td>204.82</td>
</tr>
<tr>
<td>Control mean</td>
<td>6.352</td>
<td>9.40</td>
<td>0.47</td>
<td>0.291</td>
</tr>
<tr>
<td>Observations</td>
<td>1,522</td>
<td>1,522</td>
<td>1,522</td>
<td>1,522</td>
</tr>
<tr>
<td>Region f.e.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Firm controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Notes: The table presents the regression discontinuity estimates from the main estimating equation of the effect of payment reduction on debt repayment one year after the treatment. Column 1 shows the effect on number of missed installment; Column 2 shows the effect on number of 90-days delinquent months; Column 3 shows the effect on whether the firm was ever 90-day delinquent in the one-year period; Column 4 effect on probability of a liquidation event (i.e, vehicle repossession). All columns include region fixed effects and firm baseline controls as described in the main text. Standard errors clustered by district level are reported in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

**Labor Supply.** Figure VI presents results for driving effort and firm performance. In Panel (a), we find that owners that received payment reduction have vehicles that drive more (i.e., covering more distance daily). In Panel (b), we also find their vehicles drive longer hours, although the effects here are imprecise. Panel (c) shows that the number of days in a month the drivers miss their jobs reduces upon receiving the payment reduction. Table IV shows the magnitudes of these effects. A 1 percent reduction in payments increases distance covered by treated firms by 4.5 km. This is a 3% increase relative to the control group.
Figure VI: Reduced form: effect on labor supply (intensive margin)

(a) daily distance driven  (b) number of daily trips

Notes: This figure plots the results for driving effort and firm performance. Panel (a) shows that those receiving debt relief drive longer distances, Panel (b) shows that they drive more hours, and Panel (c) shows they are less likely to miss days of work. These results suggest operators increase effort in response to a reduction in financial distress.

Taken together, the evidence suggests that borrowers are increasing their efforts in response to a reduction in their financial distress. Panel (b) suggests further support for this mechanism. It shows that the number of trips made by firms increases in response to payment reduction. Similar effects are observed in the time for which the vehicle was in operation (Panel (c)), and the time spent between the first and last ignition of the vehicle (Panel (d)). The results above suggest that the drivers are putting in more effort and undertaking this investment in response to a relaxation of their financial constraints.

In Appendix Figure A.4, we also test whether borrowers are increasing the overall time they are out with their vehicle versus only changing their driving time. Drivers usually
### Table IV: Effect of payment reduction on labor supply and risk-taking

<table>
<thead>
<tr>
<th>Distance Covered (in kms)</th>
<th>Time Driven (in mins)</th>
<th>Total Trips</th>
<th>Time spent on job (in mins)</th>
<th>Share of Days Missed</th>
<th>Months with no drive</th>
<th># speeding alerts in past year</th>
<th># accidents reported in past year</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
</tr>
<tr>
<td>Δ Payment (%)</td>
<td>4.528***</td>
<td>6.970**</td>
<td>0.213**</td>
<td>12.529***</td>
<td>0.017**</td>
<td>-0.021*</td>
<td>0.498</td>
</tr>
<tr>
<td>[1.443]</td>
<td>[2.991]</td>
<td>[0.102]</td>
<td>[3.082]</td>
<td>[0.008]</td>
<td>[0.011]</td>
<td>[0.813]</td>
<td>[0.007]</td>
</tr>
<tr>
<td>Control mean</td>
<td>168.85</td>
<td>417.54</td>
<td>12.68</td>
<td>737.23</td>
<td>0.513</td>
<td>0.647</td>
<td>14.26</td>
</tr>
<tr>
<td>Observations</td>
<td>1,399</td>
<td>1,399</td>
<td>1,399</td>
<td>1,399</td>
<td>1,527</td>
<td>1,527</td>
<td>1,527</td>
</tr>
<tr>
<td>Region f.e.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Firm controls</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Notes:** The table presents the regression discontinuity estimates from the main estimating equation of the effect of payment reduction on effort and risk-taking by firms. Column 1 shows the effect on average total daily distance covered; Column 2 shows the effect on total daily operational time; Column 3 shows the effect on total trips made in a day; Column 4 shows the effect on total time spent between the first and last ignition of the vehicle; Column 5 shows the effects on share of days in a month the vehicle was not operated; Column 6 shows the effects on number of months the vehicle was not driven; Column 7 shows the effect on number of over-speeding (i.e. driving at greater than 120 km/hr) alerts received; and Column 8 shows the effect on number of reported accidents. All columns include region fixed effects and firm baseline controls as described in the main text. Standard errors clustered by district level are reported in parentheses. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

Head out for a passenger station in the morning. Over the day, however, they spend time in alternative activities, including leisure, waiting for their minibus to fill up with passengers. Our data captures the first time the vehicle ignition was switched daily and the last time it was switched off, allowing us to capture the total time the borrower was out on the job that day. There is a strong effect on the total time spent between the vehicle’s first and last ignition of the day, with effects coming before from an earlier start and later end to the day. These results suggest that the owners of treated firms spend more time driving during peak hours with the objective to complete more trips during the data. This is consistent with the effects documented on total trips.

An increase in distance traveled and hours in operation could be driven by greater firm destruction for firms that did not receive debt restructuring. If more delinquencies among the firms not receiving restructuring, as discussed above, led to a higher rate of vehicle repossession, then our estimates on distance and time driven might be biased upwards. Two results show that this is unlikely to be the case. First, we re-estimate the effects using only the sample of active accounts. We find that the effects persist even among the firms that are operating. Second, we calculate the effects of payment reduction on vehicle repossession. Appendix Figure A.6 shows that while the number of vehicle repossessions was lower in the treated group, there was no apparent discontinuity near the treatment threshold. Together, these results suggest that payment reduction led to increased effort...
Figure VII: Reduced form: effect on labor supply (extensive margin)

(a) # days driven

(b) monthly absenteeism

Notes: This figure plots the results for driving effort and firm performance. Panel (a) shows that those receiving debt relief drive longer distances, Panel (b) shows that they drive more hours, and Panel (c) shows they are less likely to miss days of work. These results suggest operators increase effort in response to a reduction in financial distress.

and firm performance

Misconduct and risk-taking. The increase in daily distance documented above might result from faster driving, which generates negative externalities for passengers and pedestrians. Consistently driving the minibus at a fast speed also leads to higher maintenance costs and reduces the vehicle’s lifespan. In Panel (a) of Figure VIII, we measure whether the treatment is associated with rash driving by analyzing whether the treated firms receive more warnings for driving greater than 120 kilometers per hour. We do not find any evidence that treatment led to faster driving. This evidence is also consistent with the previous finding, which shows that an increase in driving distance is also associated with an increase in the number of hours driven.

The results in the driven time above, although imprecisely estimated, suggest that drivers are working an additional half-hour over the already long work day of 12 hours before receiving the offer. This result might raise concerns about the negative consequences for passenger and road safety. We examine whether drivers are trading off safety by working longer hours by analyzing the number of accidents. Panel (b) of Figure VIII documents the findings. We find evidence inconsistent with worse safety outcomes following the payment reduction.

Alternative Borrowings. Figure IX presents results on alternative financial outcomes in the first year following the payment reduction. In theory, relaxing liquidity constraints for borrowers has an ambiguous effect on their future borrowings. On the one hand, a pay-
Notes: This figure examines the impact of reduction of financial constraints on different measures of risk-taking. Panel (a) and (b) demonstrate that there is no appreciable change in the number of accidents or speeding alerts as a result of the debt rehabilitation program.

We start by analyzing how borrowers fare on their payments made on other credit lines. For this, we consider two proxies of their credit performance that excludes the debt with the financier. First, we consider the total amount outstanding in late payments in the year following the payment reduction (Panel a of Figure IX). Second, we consider the number of late payments reported on the borrower’s credit file during the year (Panel b). We find that borrowers receiving the payment reduction have a significant decline in both the total amount in arrears and the number of late payments reported. Next, we start by examining the effects on new borrowing. We consider the amount of total borrowings (Panel c) and the borrowings on credit cards (Panel d). As both figures show, borrowers do not seem to increase their borrowing from other sources of credit. The difference in both total borrowings and credit card debt above and below the treatment threshold is precisely estimated zero.

Together the evidence strongly suggests that the payments reduction on the minibus loan generated spillovers on other forms of debt and improved borrowers’ financial health. These results are driven by borrowers lowering their delinquencies and defaults on other loans rather than a decrease in their borrowings.
Figure IX: Reduced form: effects on alternative debt performance and borrowings

(a) share of balance overdue

(b) # of late payments

(c) borrowings (total)

(d) borrowings (card)

Notes: The figure plots the results of alternative financial outcomes in the first year following the debt rehabilitation program. Panel (a) shows that borrowers with lower financial distress have a significant decline in arrears. Panel (b) similarly shows that they decline in number of late payments. Panels (c) and (d) show that borrowers do not seem to increase borrowing from other sources of credit.

5. Model and Supporting Evidence

Our main findings, particularly that the relaxation of short-run liquidity constraints increases effort, may seem surprising. This particular result is inconsistent with canonical models in the literature that study the effect of debt payments on labor supply. These models can be classified in two areas. The first set of papers, starting with Myers (1977), highlight that high debt levels reduce agents’ effort. As agents are residual claimant on the earnings, high debt levels lowers their incentive to exert more effort. This is static debt overhang. In our context, this implies that the debt restructuring should not have any ef-
Table V: Effect of payment reduction on alternative borrowings

<table>
<thead>
<tr>
<th></th>
<th>(log) overdue amount</th>
<th>% of balance overdue</th>
<th># late payments</th>
<th>(log) total borrowings</th>
<th>(log) card debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Δ Payment (%)</td>
<td>-0.101</td>
<td>-0.021**</td>
<td>-0.067**</td>
<td>0.055</td>
<td>-0.057</td>
</tr>
<tr>
<td></td>
<td>[0.099]</td>
<td>[0.009]</td>
<td>[0.034]</td>
<td>[0.055]</td>
<td>[0.103]</td>
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<td>Control mean</td>
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<td>1,137</td>
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<td>Region f.e.</td>
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<td>✓</td>
</tr>
</tbody>
</table>

Notes: The table presents the regression discontinuity estimates from the main estimating equation of the effect of payment reduction on financial outcomes from other credit sources. Column 1 shows the effect on (log) total amount of late payments; Column 2 shows the share of balance that is classified as late; Column 3 shows the effect on number of late payments; Column 4 shows the effect on (log) total borrowings; and Column 5 shows the effect on (log) borrowings on credit card and store cards. All columns include region fixed effects and firm baseline controls as described in the main text. Standard errors clustered by district level are reported in parentheses. Significance levels: *** p < 0.01, ** p < 0.05, * p < 0.1.

Effect on labor supply because the program intended to keep the debt level unchanged. A second set of papers imply that an increase in debt payments induces households to work more, especially in presence of consumption commitments (Chetty and Szeidl 2007). This would predict that a relaxation of liquidity constraints should lead to lower labor supply.

In this section we argue that our results are in line with these models when we combine two reasonable assumptions: (i) imposition of late fees in the event of incomplete payment; (ii) binding liquidity constraints. This simple modification to standard models of debt contracting can rationalize our findings. Intuitively, the inclusion of a penalty for late payment in debt contract generates dynamic debt overhang. Borrowers with same initial debt levels but different monthly payments will have different debt obligations in the future when liquidity constraints force borrowers with higher monthly payment to accumulate higher debt balance over time due to accrual of larger penalties. Higher debt balance in turn generates debt overhang, reducing the labor supply. Because late fees are a feature of most real-world contracts, we believe that our findings are likely to hold broadly.

5.1 Model

We now describe a model of debt contracting. The main distinction of this model to the existing framework is the presence of a late fees/penalties imposed on the borrower in the case of a late payment. The presence of late fees allows the borrower to keep ownership
of the asset and operate it for another period, instead of lender repossessing the asset and liquidating it. This defining feature of debt contract is not unique to our setting — in fact, most borrowing contracts incorporate the late fees feature and allow the borrower to keep possession of the asset for a while instead of resorting to liquidation. The model allows us to derive specific empirical predictions about the effect of liquidity constraints on labor market effort for the borrowers. We describe the model next.

More formally, let the risk-neutral agent owe the lender a total amount of $D$ and is required to make the payment over two time periods. She is required to make a payment of $D_1$ at time 1, and the remainder amount, $D_2 = D - D_1$ at time 2. She discounts the future with $\beta$. We model liquidity constraints in a simple form — through their effect on $\beta$. Intuitively, we follow the literature and assume that the liquidity constraints make agents myopic and they discount the future more. The agent chooses labor $l_1$ and $l_2$ across the two periods, which has a disutility $c(l)$. For simplicity, we assume that effort across the periods are independently chosen to one another. On the basis of labor supply, nature draws revenue $y_t$ from the revenue distribution $F(y_t, l_t)$ with probability density $f(y_t, l_t)$. We assume first-order stochastic dominance for $F(., .)$ i.e. $F(y, l'') < F(y, l')$ for $l'' > l'$ (which implies that $F_l(., l) < 0$).

In period 1, if $y_1 \geq D_1$ the agent makes the payment. However, if $y_1 < D_1$ the lender does not repossess the vehicle but rather imposes a penalty on the borrower. Specifically, if $y_1 < D_1$ the borrower pays $y_1$ to the lender at time 1 but is required to pay $\gamma(D_1 - y_1)$, where $\gamma > 1$, to the lender at time period 2. In return, she is allowed to keep operating the asset for another period. In period 2, the agent is allowed to keep the vehicle if $y_2 \geq D_2$, otherwise the vehicle is repossessed by the lender. The agents selects effort that maximizes the the expected sum of current profits, which is the expected sum of cash flow today and future discounted value of contract minus the cost of effort:

$$G(D_1, l_1) = \left[ \int_0^{D_1} \beta(V_2 - \gamma(D_1 - y_1))f(y_1, l_1)dy_1 + \int_{D_1}^{\infty} (y_1 - D_1 + \beta V_2)f(y_1, l_1)dy_1 \right] - c(l_1)$$

where $V_2$ is the continuation value given by:

$$V_2(D_2) = \max_{l_2} \int_{D_2}^{\infty} (y_2 - D_2)f(y_2, l_2) - c(l_2)$$

The objective is to analyze how the agent changes her effort $l_1$ in response to initial debt payment $D_1$. We utilize the robust comparative statics which implies:
\[
\text{sign} \left( \frac{dl_1'(D_1)}{dD_1} \right) = \text{sign} \left( \frac{d^2 G(D_1, l_1)}{dl_1 \, dD_1} \right)
\]

where
\[
\frac{d^2 G(D_1, l_1)}{dl_1 \, dD_1} = (1 - \gamma \beta) F_e(D_1, l_1) - F_e(D_2, l_2) \frac{dl_2^*}{dl'_1}
\]

Because the efforts across the two periods are assumed to be independent, the sign of the first term on the right hand side of the above equation depends on discount rate \( \beta^{-1} \). If \( \beta < \frac{1}{\gamma} \), i.e. for high discount rate, effort decreases in the initial amount of payment \( D_1 \). Thus liquidity constrained borrowers, that is those with high discount rate, will reduce their effort when facing more upfront payment \( D_1 \) because the presence of late fees in the contracts increases their future debt levels and generates dynamic debt overhang.

### 5.2 Additional supporting evidence

This simple model described above is consistent with the main empirical results presented in the previous section. In this section, we present additional supporting evidence for the model described above. First, we show that indeed the borrowers that did not receive payment reduction have higher debt levels and have missed more payments a year after the program initiation. This increase in debt levels is generated as a result of the accumulation of late fees. Second, we show treatment effects by each month and find that both labor market and credit market effects materialize after two to three quarter after enrollment into the program. Third, we show that the effects are primarily from the deterioration of outcomes among non-treated borrowers, and not from gains for the borrowers that received payment reduction. Fourth, we show that the effects are more prominent in borrowers that face stronger liquidity constraints as proxied by their credit scores and past driving performance.

**Results on debt levels.** We start by analyzing whether the level of debt is affected by the payment reduction offer. Panel (a) of Figure X shows that the treated firms had less accumulated interest on their debt, which translates in lower level of outstanding debt (panel (b)). This affirms well our setup outlined in the model above that the payment reduction reduces the likelihood that firms will be late on their payments and incur additional penalties on those late payments. This is reflected in the lower total balance outstanding for the borrowers that received payment reduction, even when both the treated and control firms had the same total balance outstanding at the program initiation (as documented in Figure III and panel (d) of Figure A.2). Table VI shows the IV-2SLS estimates of the 1 percentage payment reduction on both accrued interest and total debt outstanding at the end of one year, conditional on account not repossessed by the financier.
Figure X: Reduced form: effects on accrued interest and debt outstanding

(a) accrued interest (after 1 year)

(b) loan outstanding (after 1 year)

Notes: This figure examines the impact of payment reduction on debt outstanding one year after the payment reduction offer. Panel (a) shows the effect on accrued interest on the debt and Panel (b) shows the effect on total debt outstanding for the borrowers.

Table VI: Effect on accrued interest and debt outstanding

<table>
<thead>
<tr>
<th></th>
<th>accrued interest</th>
<th>total debt outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Δ Payment (%)</td>
<td>-0.078***</td>
<td>-0.058**</td>
</tr>
<tr>
<td></td>
<td>[0.021]</td>
<td>[0.027]</td>
</tr>
<tr>
<td>F-stat</td>
<td>166.83</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>1,178</td>
<td>1,178</td>
</tr>
<tr>
<td>Control mean</td>
<td>2.13</td>
<td>44.64</td>
</tr>
<tr>
<td>Region f.e.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Firm controls</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Notes: The table presents the IV estimates of the impact of payment reduction on debt outstanding one year after the payment reduction offer. Column (1) shows the effect on accrued interest on the debt and Column (2) shows the effect on total debt outstanding for the borrowers. All columns include region fixed effects and firm baseline controls as described in the main text. Standard errors clustered by district level are reported in parentheses. Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Effects over time. The model suggests that payment reduction reduces moral hazard in effort once the benefits of avoiding the accrual of late fees are realized. This implies that we should see most of the effects on efforts as well as alternative borrowings which would materialize after few months into program enrollment. We test for this by analyzing the regression discontinuity estimate by every month following program roll-out in Appendix Figure A.7. The results corroborate this hypothesis and the differences in effort.
and alternative debt repayment arises only after eight months of program initiation.

6. Alternative Mechanisms and Robustness

6.1 Alternative Mechanisms

A reduction in short-run payments could affect labor market effort through several different channels. In this section, we first discuss whether other potential mechanisms put forward in the existing work could explain our findings.

Effects on credit score. First, the reduction could impact effort through its effects on credit scores (Bos, Breza, and Liberman 2018). Improved credit scores could provide a better signal to employers about the employees’ ability. For borrowers in our sample, enrollment in the restructuring program also comes with the advantage of not getting a default flag reported on their report. However, driving buses is the primary occupation for these borrowers, so an increase in credit score being considered a signal in the job market is an unlikely scenario.

Cognitive channels. Second, it could be that reduction in financial distress could reduce cognitive costs for performing a job. For example, Kaur, Mullainathan, Oh, and Schilbach (2021) find that providing wages early to workers in a factory during a financially constrained period increased their consumption and productivity. If these results were the case here, we would expect the effects to materialize in the months following the restructuring. However, as Appendix Figure A.7 shows, the effects on efforts do not materialize until three quarters after the change in payments. We also do not find any effects on borrowings and consumption in the either short- or long-run. While we cannot completely rule out this channel, primarily due to data limitations, these evidence suggests limited role of reduction in cognitive costs in our setting.

Wage garnishment. Third, the payment reduction could affect labor supply by reducing the amount of wages that court orders under a bankruptcy filing could have garnished. We do not think this is the channel behind increasing effort in the informal sector we study. The minibus sector largely relies on cash payments for revenue, making any income non-verifiable and not subject to legal garnishment.

7. Conclusion

This paper uses information from a debt rehabilitation program to estimate the effects of short-run liquidity constraints on firm performance. Employing a fuzzy regression discontinuity design, we find that short-term financial relief improves firm performance one year later. Firms receiving short-term relief have higher repayments and lower defaults on
debt, drive for longer distances and more hours, and have better financial outcomes one year later. Using quantitative and qualitative analysis to examine potential mechanisms, we find that temporary debt relief can alleviate moral hazard and assist in overcoming high-impact events that small firms in volatile and uncertain markets regularly experience. We overcome previous estimation challenges by leveraging a comprehensive proprietary dataset from a minibus taxi financier in South Africa.

Our results are significant in light of the ongoing debate on the relative merits of different types of debt relief for SMEs. For example, it is unclear whether providing comprehensive debt relief (reducing principal, term, and payments) increases firm performance by reducing short-run liquidity constraints or changing long-run wealth. Our evidence suggests that alleviating short-run liquidity constraints might improve firm performance for SMEs, thereby service delivery for more marginalized communities, employment outcomes, and the financial performance of the loan provider. Based on our findings, policymakers interested in improving SME performance should consider encouraging short-run debt relief as a potential lower-cost tool than more comprehensive relief. The evidence we document on spillover effects is particularly instructive. It seems targeted debt relief might generally improve firm repayment over a variety of loans beyond the focal financier.

Our findings must be interpreted with few limitations in mind. Our experiment provided immediate debt relief and thus the findings only primarily speak to the short-run effects of the program. The long-run effect will have to take into account both the short-run benefits and the long-run costs incurred by deferring potential defaults from the present to the future. Another potential limitation is that any perennial roll-out of such targeted debt relief program could affect ex-ante borrower behavior. These factors limit our capability to derive any welfare implications arising from our findings.
References


The World Bank


The World Bank


### Table A.1: Summary Statistics and balancedness

#### Panel A. Loan and borrower characteristics

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Below Threshold</th>
<th>Above Threshold</th>
<th>Δ (means)</th>
<th>p-value on Δ</th>
<th>RD estimate</th>
<th>p-value on RD estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loan amount ('1000)</td>
<td>45.54</td>
<td>45.65</td>
<td>45.47</td>
<td>-0.181</td>
<td>0.625</td>
<td>0.630</td>
<td>0.331</td>
</tr>
<tr>
<td>Amount outstanding ('1000)</td>
<td>41.87</td>
<td>42.67</td>
<td>41.4</td>
<td>-1.274</td>
<td>0.050</td>
<td>0.293</td>
<td>0.753</td>
</tr>
<tr>
<td>Cost of Vehicle (R '1000)</td>
<td>46.89</td>
<td>47.04</td>
<td>46.81</td>
<td>-0.239</td>
<td>0.512</td>
<td>0.706</td>
<td>0.275</td>
</tr>
<tr>
<td>Credit Score</td>
<td>636.11</td>
<td>632.11</td>
<td>638.44</td>
<td>6.328</td>
<td>0.165</td>
<td>3.291</td>
<td>0.681</td>
</tr>
<tr>
<td>Interest Rate</td>
<td>0.21</td>
<td>0.21</td>
<td>0.21</td>
<td>0.001</td>
<td>0.643</td>
<td>0.002</td>
<td>0.545</td>
</tr>
<tr>
<td># Missed Installments</td>
<td>2.18</td>
<td>2.22</td>
<td>2.16</td>
<td>-0.054</td>
<td>0.012</td>
<td>-0.007</td>
<td>0.894</td>
</tr>
<tr>
<td>Month on Book</td>
<td>22.3</td>
<td>21.57</td>
<td>22.72</td>
<td>1.150</td>
<td>0.199</td>
<td>-1.097</td>
<td>0.328</td>
</tr>
<tr>
<td>Remaining Term</td>
<td>52.57</td>
<td>53.98</td>
<td>51.75</td>
<td>-2.227</td>
<td>0.011</td>
<td>0.505</td>
<td>0.683</td>
</tr>
<tr>
<td>Age</td>
<td>49.58</td>
<td>49.19</td>
<td>49.8</td>
<td>0.613</td>
<td>0.283</td>
<td>-1.718</td>
<td>0.146</td>
</tr>
<tr>
<td>1(male)</td>
<td>0.77</td>
<td>0.76</td>
<td>0.78</td>
<td>0.012</td>
<td>0.605</td>
<td>-0.022</td>
<td>0.641</td>
</tr>
</tbody>
</table>

#### Panel B. Pre-program outcomes

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Below Threshold</th>
<th>Above Threshold</th>
<th>Δ (means)</th>
<th>p-value on Δ</th>
<th>RD estimate</th>
<th>p-value on RD estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Distance (kms)</td>
<td>197.26</td>
<td>192.37</td>
<td>200.11</td>
<td>7.747</td>
<td>0.048</td>
<td>10.112</td>
<td>0.180</td>
</tr>
<tr>
<td>Daily Drive Time (mins)</td>
<td>456.55</td>
<td>447.74</td>
<td>461.7</td>
<td>13.956</td>
<td>0.072</td>
<td>8.530</td>
<td>0.571</td>
</tr>
<tr>
<td># speeding alerts</td>
<td>30.7</td>
<td>32.68</td>
<td>29.54</td>
<td>-3.137</td>
<td>0.530</td>
<td>-10.303</td>
<td>0.322</td>
</tr>
<tr>
<td># accidents</td>
<td>0.08</td>
<td>0.1</td>
<td>0.07</td>
<td>-0.032</td>
<td>0.039</td>
<td>-0.015</td>
<td>0.630</td>
</tr>
<tr>
<td>% balance overdue</td>
<td>0.28</td>
<td>0.27</td>
<td>0.29</td>
<td>0.015</td>
<td>0.482</td>
<td>-0.024</td>
<td>0.588</td>
</tr>
<tr>
<td>Total amount overdue</td>
<td>5.77</td>
<td>5.74</td>
<td>5.79</td>
<td>0.048</td>
<td>0.842</td>
<td>-0.043</td>
<td>0.930</td>
</tr>
<tr>
<td>Borrowings (Card)</td>
<td>7.55</td>
<td>7.43</td>
<td>7.62</td>
<td>0.181</td>
<td>0.452</td>
<td>0.713</td>
<td>0.149</td>
</tr>
<tr>
<td>Borrowing (Total)</td>
<td>9.79</td>
<td>9.78</td>
<td>9.8</td>
<td>0.018</td>
<td>0.884</td>
<td>0.133</td>
<td>0.613</td>
</tr>
</tbody>
</table>

**Notes:** The table presents the mean values for borrower characteristics as measured in the month before debt restructuring (September 2021). Columns (1) shows the unconditional mean for the sample; Column (2) shows the unconditional mean for borrowers below the treatment threshold; Column (3) shows the unconditional mean for borrowers above the treatment threshold. Column (4) shows the differences in mean between the sample above and below the threshold. Column (5) shows the p-value on the threshold. Column (6) shows the effect of crossing the treatment threshold on the covariate using the regression discontinuity estimate from the main estimating equation. Column (7) shows the p-value on the estimate.
Figure A.1: Actual v/s implied remaining maturity of new loan

Notes: Panel (a) plots the financial impacts of the debt restructuring on the monthly payments of an average borrower. Panel (b) plots the one year payment reduction through the debt restructuring and the differences in net present value before and after the debt restructuring for the average borrower at 20.7% interest rate.
Figure A.2: Balance of baseline loan characteristics

Notes: The figure plots the distribution of baseline loan characteristics around the cut-off we have constructed described in detail above.
Figure A.3: Reduced form: effect on pre-period outcomes

Notes: This figure plots pre-trends around the threshold for our primary outcome variables. The various panel demonstrate no trends over the treatment threshold.
Figure A.4: Effect on total time between taxi’s daily first and last ignition

(a) time of first ignition  
(b) time of last ignition

Notes: The figure plots the effect of average number of daily time spent on the job (defined as the total daily time between the vehicle’s first ignition time and the time when the last ignition was turned off) around the treatment threshold.

Figure A.5: Reduced-form: effect on loan performance

Notes: The figure plots the effect of payment reduction on total number of missed installment around the treatment threshold after a year of program roll-out.
Figure A.6: Effect on vehicle repossession

**Notes:** The figure plots the effect on the probability of vehicle possession by the financier around the treatment threshold one year after the payment reduction.
Figure A.7: Effect on outcomes over time

Notes: The figure plots the RD effects of payment reduction on the outcomes of interest in six months before and twelve months after the payment reduction. Panel (a) shows the effect on daily distance driven; Panel (b) shows the effect on borrowings on credit and store cards; Panel (c) shows the effect on share of balance overdue on alternative borrowings reported on the credit reports.
Figure A.7 (Continued): Effect on outcomes over time

Notes: The figure plots the RD effects of payment reduction on the outcomes of interest in six months before and twelve months after the payment reduction. Panel (a) shows the effect on daily distance driven; Panel (b) shows the effect on borrowings on credit and store cards; Panel (c) shows the effect on share of balance overdue on alternative borrowings reported on the credit reports.
Figure A.7 (Continued): Effect on outcomes over time

Notes: The figure plots the RD effects of payment reduction on the outcomes of interest in six months before and twelve months after the payment reduction. Panel (a) shows the effect on daily distance driven; Panel (b) shows the effect on borrowings on credit and store cards; Panel (c) shows the effect on share of balance overdue on alternative borrowings reported on the credit reports.