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Does Microfinance Repayment Flexibility Affect Entrepreneurial Behavior and Loan Default?

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Abstract

Recent evidence suggests heterogenous impacts of microfinance loans, with limited average effects on enterprise growth among the poor. One possibility is that the rigidity of the classic microcredit contract – widely held to be important for reducing default – inhibits investment in microenterprises. To explore these trade-offs, we provide experimental estimates of the consequences for client investment behavior of introducing a grace period before repayment begins. Delaying the onset of repayment by two months significantly increases both business investment and default. Taken together, the results are consistent with clients on the delay cycle choosing investments with more variable returns.

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1   Introduction

Microfinance has been widely hailed as one of the most promising tools for fighting poverty in the developing world (UN Department of Public Information, 2005). A common claim is that, by allowing poor households to finance basic self-employment activities and/or weather shocks to household production, microfinance loans can act as an important catalyst of economic growth (see, for instance, Nobel Peace Prize 2006 citation). These claims have been paralleled by a significant expansion of this sector in recent years. In 2007, microfinance institutions (MFIs) provided 150 million clients across the globe access to small-scale loans through group lending (Daley-Harris, 2006).

Emerging empirical evidence, however, suggests that access to microcredit may have limited impact on the average income growth of the poor (Banerjee et al., 2009; Karlan and Zinman, 2009). One possibility, which we explore in this paper, is that, in a quest to keep default rates to a bare minimum, MFIs are not offering borrowers the optimal financial product from an investment perspective. In particular, the immediate repayment obligations of the classic microcredit contract – widely held to be important for reducing default – may actually inhibit investment in microenterprises by making relatively illiquid entrepreneurial investments too risky for small business owners in the short run.

To examine this hypothesis, we test whether client investment behavior, and therefore the economic impact of microcredit, is sensitive to introducing greater flexibility into loan contracts. We focus on a central feature of the classic "Grameen Bank" contract: repayment in small installments starting immediately after loan disbursement. Using a field experiment we evaluate the effect of relaxing the liquidity demands imposed on households early in the loan cycle by offering a random set of clients a two-month grace period before repayment begins. We then compare business investment behavior and repayment rates across these clients and those required to initiate repayment within two weeks of receiving the loan.

Relaxing short-run liquidity needs should increase the portfolio of investment available to a household by making illiquid investments more viable. This, in turn, should increase the average return on available investments and therefore expected business profits for a house-

hold. While the predictions for average returns are straightforward, the effects of investment choices on default and delinquency are ambiguous as they depend on the variability of returns: If relatively illiquid investments also have more variable returns (or, more generally, increase expected variance of household income by, for instance, reducing short run ability to deal with shocks), then we may observe higher default even as average returns on business investments increase. In contrast, by distorting investment towards less risky choices, immediate repayment obligations may simultaneously limit default *and* income growth.[1] We would also expect this effect to be more pronounced for clients with more growth opportunities, i.e. those with higher returns to capital today and, therefore, a higher discount factor.

The contractual form underlying lending to very small businesses in rich countries provides a good benchmark for comparison. This pool of borrowers is typically perceived to be risky – however, the typical small business loan contract in developed countries is significantly more flexible. Using data from the Small Business Administration lending program in the US, Glennon and Nigro (2005) document default rates between 13-15% for typical small business loans in the US, which often have a significant grace period between loan disbursement and the start of repayment.[2] These rates are much higher than typical MFI default rates (2-5%), consistent with the tradeoffs discussed above.

To the best of our knowledge, there is no prior empirical evidence on whether immediate repayment obligations distort investment in microenterprises financed through microcredit, largely because MFIs almost universally follow this practice.[3] Results from our study

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[1]In theory, early repayment may also discourage risky investments by improving loan officers' ability to monitor borrower activities early on in the loan cycle. We exclude this channel from the analysis since loan officers in our study do not appear to undertake any monitoring activities during loan meetings.

[2]Flexible repayment options are available on SBA loans, and typically negotiated on a loan-by-loan basis. Payments are typically via monthly installments of principal and interest. There are no balloon payments, and borrowers may delay their first payment up to three months with prior arrangement. For details, see for instance https://www.key.com/html/spotlight-quantum-health.html.

[3]Selection issues inhibit causal interpretations of existing non-experimental studies of how greater repayment flexibility affects default, and may explain the mixed findings: Armendariz and Morduch (2005) reports

provide rigorous evidence that both client investment and repayment behavior is sensitive to when repayment obligations start: Microenterprise investment is approximately 8% higher and the likelihood of starting a new business is twice as high among clients who receive a two-month grace period. Strikingly, these clients are also roughly 8% more likely to default on their loan, suggesting that illiquid investments imply greater risk in ability to repay, as is likely to be the case with new business ventures. We also find indirect evidence of this interpretation based on survey data on client's attitudes towards risk and future payoffs: The effect of the grace period increases significantly with a client's discount rate, suggesting that investment choices are most distorted by liquidity demands early on in the loan cycle among clients with a high opportunity cost of capital, and the effect also appears to increase with the client's level of risk aversion, suggesting that risk averse clients are the most deterred by repayment obligations.

Section 2 describes the MFI setting and client characteristics, the experimental intervention and the basic analytical framework. Section 3 describes the data and empirical strategy and Section 4 our findings. Section 5 concludes.

2   Background

2.1   Institutional Details

Our partner MFI, 'Village Welfare Society' (VWS), started operations in the Indian state of West Bengal in 1982 and is among the leading MFIs in the state. It only lends to women, and loan sizes vary from Rs. 4000 to Rs. 12,000 (100-300 US dollars). The typical loan has an implied annual interest rate of 22%, and clients repay these loans through fixed installments usually starting two weeks after the loan has been disbursed. Default is low – in 2006, when we initiated work with VWS, their end-year financial statement reported a repayment rate of 99%.

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that more flexible repayment is associated with higher default in Bangladesh, while McIntosh (2008) finds that Ugandan MFI clients who choose more flexible repayment schedules are less likely to be delinquent.

The average baseline household in our intervention has four members and a monthly income of Rs. 5300 ($590 PPP). The most common occupations are small business owners, cooks/domestic servants, and factory workers. Figure 1 shows the distribution of client businesses at baseline across the entire sample. Seventy-six percent of clients report having a household business, and the most common businesses are clothing (saris), retail, and tailoring.

Shocks to business operations are common. Most of these businesses rely significantly on clients' labor supply for day-to-day operations. At baseline, 35% of clients report a household event in which they missed days of work within the last 30 days.[4] In addition to their direct negative effect on household income, such events are likely to adversely affect the functioning of household businesses by reducing available labor and credit. One way of smoothing such a shock is via the use of credit and savings. In terms of financial access, clients enjoy reasonable access to banking services but undertake limited borrowing from other banks or MFIs. Thirty-one percent of clients have a household savings account, and 28% have some form of formal insurance (26% have life insurance, 5% have health insurance), which is mainly provided through VWS. All clients report at least one loan taken out within the year prior to the experiment, the bulk of which were taken out through VWS.

2.2 Experimental Design

Between March and December 2007 we formed 169 five member groups comprising 845 clients. After group formation and prior to loan disbursement, repayment schedules were randomly assigned in a public lottery. Randomization occurred at the group level after groups had been approved for loans. Treatment status was assigned to batches of 20 groups at a time, and we control for this stratification in all regressions. No clients dropped out of the experiment between randomization and loan disbursement.

Eighty-four groups were assigned the contract with a grace period and 85 groups were assigned to the standard contract with immediate repayment. Other features of the

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[4]Household events include birth, death, flood, crime, and police case.

loan contract were held constant across the two groups, including interest charges. Once repayment began, both groups of clients were required to repay fortnightly over the course of 44 weeks. Loan sizes varied from Rs. 4000 to Rs. 10,000, with the modal loan amount being Rs. 8000. Since clients with a grace period had a total of 55 as opposed to 44 weeks before their full loan amount was due and faced the same total payment amount, they also faced a lower effective interest rate on the loan. Hence, the experiment simultaneously introduced repayment flexibility and increased effective income, although the potential income effect is arguably minimal given that interest rates are relatively low.

2.3 Predictions

Introducing a grace period and thereby a longer total period over which to repay the same absolute amount should make it easier for clients to accumulate the income needed to repay their loan. This is essentially the income effect implied by the lower interest rate in the grace period credit contract.[5] Further, by reducing liquidity needs in the early phase of a client's loan cycle, the intervention enhanced client ability to take on less liquid investments. This works to increase the investment opportunities available to the client. These factors would suggest that clients assigned to the grace period contract should differ in their business investments, earn higher average business profits and repay their loans at a higher rate. However, this presumes that investing in an illiquid project does not affect client risk. In reality, illiquid investments carry significant risk. For instance, if clients have a sudden need for money they may be forced to sell their investment at a loss. In this case, the grace period will both increase investment and worsen repayment outcomes.

Here we formalize the intuition above with a simple model. There are three periods $t = 0, 1, 2$. Clients are risk-neutral with utility function $u(c_0, c_1, c_2) = c_0 + c_1 + c_2$. Clients have access to a liquid investment which pays off R_L in the following period for each unit invested.

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[5]Differences in implicit interest rates across treatment arms have no direct implication for repayment timing since clients must pay a fixed interest amount regardless of when they repay. Hence, clients offered the standard contract have no added incentive to repay early to avoid higher interest charges.

They also have access to an illiquid investment which pays off R_I after two periods for each unit invested. In period zero clients receive a loan amount X which they must repay in two installments, P_1 in period one and P_2 in period two. Assume that the illiquid investment is lumpy and requires the entire loan amount X to be invested. There is a probability π_S that in period one the client will face an urgent need for money such as sudden sickness and have to pay a cost S. The nature of the illiquid investment is such that selling it before period two yields very low returns.

Here, we take the extreme case in which liquidation net of the liquidity demand (S) is zero. However, it is possible that the client has enough money on hand or emergency sources to borrow from that she will not have to liquidate her investment in the face of the liquidity shock[6]. We denote the probability that a client will be forced to liquidate her investment given she must pay S to be π_L. π_L is a decreasing function of cash on hand in period one and therefore is increasing in the period one loan payment ($\pi'_L(P_1) > 0$). Figure 2 summarizes the model setup. Although we have assumed utility is linear in consumption, the fact that $\pi_L(\cdot)$ is increasing in the first payment amount can be interpreted as concavity of the utility function. A client would prefer to smooth consumption across periods, but if the required loan payment combined with a bad shock causes consumption to fall too far in period one, she may prefer to sell her investment at a loss rather than waiting for it to pay off in the next period.

Clients will invest in the illiquid asset if and only if:

$$(1 - \pi_S)R_I X + \pi_S(1 - \pi_L(P_1))(R_I X - R_L S) - R_L P_1 - P_2 \geq$$
$$R_L^2 X - \pi_S H R_L - R_L P_1 - P_2 \tag{1}$$

where the left hand side denotes the payoff from investing in the illiquid asset and the right hand side denotes the payoff from investing in the liquid asset. We specialize to the case in which $\pi_S = 1$ as it reduces clutter substantially without affecting the results. We also assume that, if successful, the illiquid investment pays off more than the liquid investment

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[6]For simplicity, we assume that borrowing to pay S is at rate R_L.

$(R_I > R_L^2)$ and that the return from liquidation of the illiquid project is less than the return from successfully completing the illiquid project $(R_I X > SR_L)$. Equation (1) will be satisfied as long as:

$$\pi_L(P_1) \leq \min\{\frac{(R_I - R_L^2)}{R_I - (S/X)R_L}, 1\} \tag{2}$$

Equation (2) shows that, in deciding between the illiquid and the liquid investment, clients weigh the risk that they will be forced to sell off their investment before it pays off (higher π_L) with the higher return from the illiquid investment (R_I). In the present context, grace period clients will have a lower P_1 and therefore a lower π_L than clients without a grace period. The model predicts that grace period clients will be more likely to invest in the illiquid investment. Although the illiquid investment affords higher returns on average, the risk of forced liquidation means that grace period clients will also be more likely to enter period two with no cash on hand, which implies they must default on their loan.

In the example above, the risk of liquidation acts as the disincentive to take on the illiquid project. However, an alternative possibility is that clients face an uncertain demand for their product and therefore are reluctant to make large inventory investments. This fear is especially relevant for clients that have to make early repayments on their loan since a grace period allows clients to invest in inventory with less concern over not being able to sell it quickly. In this case, S is zero since clients who invest in the liquid asset do not face any shocks. For clients with a grace period, we can think of π_L as the probability that a client faces low demand in both period one and period two, in which case she would have to sell at a loss. Clients without a grace period face a higher π_L because they do not have the luxury of waiting until period two to sell their product.

3   Data and Empirical Strategy

The data used in this paper come from multiple sources which we describe below. The data appendix covers variable construction in more detail.

To gather information on business investments, we collected detailed baseline and endline survey data from all clients at the time of and approximately one year after loan disbursement. Baseline surveying was conducted between April and August 2007 and endline surveying between January and November 2008. The baseline survey gathered background information on household business activities, socio-economic status and demographic characteristics, along with survey measures of risk aversion and discount rates.

Table 1 presents means of a range of variables collected in the survey separately for clients assigned to the treatment and control group. The majority of clients are literate and married with two children living at home. Consistent with the type of clients targeted by VWS, over three quarters of the households in the sample run some kind of microenterprise. While the group is relatively educated, the rate of shocks experienced by households is high, as is typical in this setting: 78% of households report experiencing a shock to household income over the past month. Although there are statistically significant differences across treatment groups in two of the twelve characteristics (literacy, fraction first time borrowers), the point estimates of the differences are small and a joint test of significance (chi-squared) of mean differences across all variables indicates that our randomization produced a balanced sample. To confirm that small differences in treatment arm balance are not biasing the experimental results, we estimate all regressions with and without all controls.

The endline survey included a detailed loan use module on business expenditure amounts and types. Clients were asked how they spent their VWS loan, and answers were divided into five broad categories (business, health, school, housing, savings, and other). Figure 3 lists average spending in these broad categories. The most significant expenditure is business spending: on average, a client spent 80% of her loan on business related activities. The three most common types of business spending are saris, wood, and sewing materials.

To study delinquency and default, we tracked client repayment behavior using two sources. First, we used VWS administrative data in which repayment date and amount paid were recorded by loan officers on a continuous basis in clients' passbooks and then compiled into a centralized bank database. We have data on all clients through July 1, 2009, by which

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date at least 16 weeks had passed since the loan due date for all clients. As a check on the VWS administrative data, we collected repayment data from loan officers. All loan officers were required to keep log books on meeting activities for the purpose of our experiment that recorded date of meeting, number of clients present, and names of clients who repaid at the meeting. Although the measures differ slightly, this alternative measure gives the same quantitative results and the same default rate in the full sample as the VWS administrative data (5.2% compared with 5.4%).

Since VWS does not make explicit the schedule of penalties according to duration of delinquency (though there is implicit understanding that the degree of delinquency will influence approval rates and amounts of future loans), some clients repay their loans long after the due date. For this reason, we present results for different lengths of delinquency. Our preferred measure is 16 weeks overdue since it is short enough that all clients have passed it.

Randomization of repayment schedule implies that a comparison of the average outcomes across clients on the delay versus no-delay interventions has a causal interpretation. For all outcome variables we estimate regressions of the following form:

$$y_{ig} = \beta D_g + B_g + \delta X_{ig} + \epsilon_{ig} \tag{3}$$

where y_{ig} is the outcome of interest for client i in group g. D_g is an indicator variable which equals one if the group was assigned to the delay intervention. All regressions include batch dummies for stratification (B_g). Throughout, we report regressions with and without the controls (X_{ig}) listed in Table 1 and loan officer fixed effects. All standard errors are corrected for clustering within loan groups. To examine heterogeneity in the treatment effect across subgroups of clients, we estimate a version of the above regression using a baseline client variable Z_{ig} included on its own and interacted with D_g:

$$y_{ig} = \beta D_g + \gamma Z_{ig} + \theta Z_{ig} \times D_g + B_g + \delta X_{ig} + \epsilon_{ig} \tag{4}$$

Table 2 summarizes the first stage results of our experiment in a regression framework. The odd columns report regressions without controls, and even columns report regressions

with controls. Columns (1) and (2) show that clients assigned to the treatment arm that included a grace period made their first loan installment an average of 54.4 days after clients in the control group, or approximately 2 months later. This is reflected in an equivalent delay in time lapsed between disbursement and final loan due date (columns (3) and (4)). In general, clients tend to repay earlier than when the loan is actually due; however, columns (5) and (6) show that the difference in total loan cycle duration persists between clients in treatment and control arms. Finally, columns (7) and (8) show a weak tendency towards early repayment among clients on the delay intervention.

4 Repayment Flexibility and Client Behavior

4.1 Loan Use and Investment Behavior

We start by presenting the evidence on loan use. Figure 4 presents a bar graph with the average expenditures for the main categories divided between clients with and without a grace period. Business expenditures dominate spending with the average client using eighty percent of her loan for business expenses. The second largest category is house repairs. The graph also suggests a significant difference in spending in these two categories across clients on different loan cycles. In Table 3 we investigate this in a regression framework. We present results from the estimation of equation (3) using different categories of business expenditure as outcomes. Columns (1) and (2) show a significant increase in business spending. The average client on the grace period contract spends roughly 8% (Rs. 421) more on business items. They spend less on house repairs (columns (7) and (8)), but this estimate is statistically insignificant without controls and only weakly significant with controls.

Given the difference in business expenditure and the fact that most loan money is spent on business expenditures, we further break down business spending into inputs, equipment and other business spending in Figure 5. The difference in business spending appears to be driven by differences in spending on inputs – which, in turn, is made up of inventory purchases and raw materials. Table 4 presents results for the corresponding

regressions, and we observe a significant difference in spending on raw materials. These results are consistent with the prediction that grace period clients increase their spending on illiquid investments. Raw materials are valuable if clients can find a market for the finished product, but if demand is uncertain, it may take a while to realize the returns from the investment. Consistent with the uncertain demand story, small vendors and those involved in service work are the most likely to purchase raw materials.

Next, we examine client propensity to start new businesses. We asked clients whether they had started a new business both immediately following loan disbursement and again twelve months later during the endline. Our measure for whether a client started a new business is a dummy that equals one if a client reported starting a new business in either survey. Overall, the rate of new business formation is low - in the control sample only 2% of clients start new businesses. However, Table 5 shows that the likelihood of starting a new business is doubled among the treatment group. Figure 8 shows the breakdown of new business types. All new businesses were either vendors or clothing sellers.

4.2   Loan Repayment Behavior

Having established a link between the more flexible loan contract and business investment, we next investigate client delinquency and default. Recall that our analytical framework suggests that increased investment may come at the cost of increased default. If we find that a grace period is associated with both higher business investment and higher default, it implies that, in this setting, relatively illiquid investments carry greater risk.

We start by providing a graphical illustration of the impact of providing a grace period on client repayment behavior. In Figure 6 we show the densities of days from first meeting in which the client made a payment to when the client finished repaying for clients who repaid in full as of July 1, 2009. The vertical bars indicate the average loan due date and 16 weeks after the loan was due. The figure indicates that, although a significant fraction of clients were late, the vast majority of loans were repaid within 16 weeks of being due. We also observe a significant difference in the repayment patterns of clients who received a

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grace period versus those who did not. While repayment by clients without a grace period is heavily concentrated around the loan date, there is significantly more dispersion in time to repayment among clients who received a grace period. Given that the delay clients, in effect, had a longer period over which to repay the same size loan, it is not surprising that many of them were able to repay early relative to the no delay clients.

To see default more clearly, Figure 7 graphs the fraction of clients who have not repaid in full relative to the date of first installment. As in the previous Figure, the vertical bars indicate the loan due date and 16 weeks after the loan was due. Truncation is not an issue since all clients had reached 600 days past their first loan payment by July 1, 2009. Here we observe a clear difference in the fraction of grace period clients who have repaid in full four months past the due date.

To test for the statistical significance of these patterns, in Table 6 we estimate regressions of experimental assignment on default using three measures of default: whether the client repaid within 8, 12 and 16 weeks of the loan due date (defined as the date when the final installment was due). The fraction of defaulting clients falls by three percentage points between eight weeks after the loan was due and sixteen weeks. However, in all cases we see a robust difference in default patterns between the delay and no-delay clients. Delay clients are, on average, between 6 to 8 percentage points more likely to default than non-delay clients. Sixteen weeks after the loan was due, 3% of the non-delay clients and 11% of the delay clients have failed to repay. Including controls in the regressions has very little impact on the point estimates, providing evidence that the results are not contaminated by treatment imbalance.

4.3   Heterogeneous Treatment Effects

The results outlined in the previous section establish that grace period clients are more likely to start new businesses and invest in existing businesses. Grace period clients are also more likely to default. These results suggest that clients who are offered a grace period invest their loans in riskier though presumably higher expected return business ventures.

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As a consistency check on this interpretation, in Table 7 we look for evidence of differences in the influence of the grace period on the business expenditures of various subgroups of clients.

First, we examine whether the grace period has a larger effect on default for clients who have a higher discount rate, indicating that they have a higher opportunity cost of capital. To determine clients' discount rates, we asked a series of questions about the relative attractiveness of money today compared with a greater sum of money one week or one month from now. We increased the second sum of money until clients reported they would prefer the money at the later date. Using the responses we then computed the net monthly interest rate that would make clients indifferent between the amount of money today and the amount of money a month from now. A higher number therefore corresponds to a higher implied opportunity cost of capital. We report results using the opportunity cost of capital computed using the one-month time period (we get qualitatively similar results if we compute discount rates using the one-week method).

In columns (1) and (2) of Table 7 we present results using total business expenditure as an outcome. The regressor of interest is the measured discount rate interacted with treatment status. These estimates reveal that the grace period had a larger impact on clients with higher discount rates. In the context of the model presented in section 2.3, the discount rate is most naturally associated with a higher return on short-term investments R_L. From equation (2), we can see that an increase in R_L will make clients less likely to invest in the illiquid project, which is consistent with the negative point estimate on the level effect of the discount rate in columns (1) and (2) of Table 7. However, the model's predictions are ambiguous about how the impact of an increase in π_L will change as we move from client's with low to high R_L.

Second, we study the interaction between survey measures of client risk aversion and the influence of grace period on business investment. Presumably, risk-averse clients are the least willing to risk missing a loan installment and facing the associated penalties, and are therefore most constrained by early repayment obligations. In our model, this prediction

corresponds to a higher $\pi'_L(\cdot)$ for risk-averse clients. To elicit risk preferences in the baseline survey, we used the random lottery pairs technique in which subjects were given a sequence of binary lottery choices and had to choose the preferred lottery, allowing us to deduce risk aversion based on their switching point from certainty to uncertainty. [7]

Regression estimates of the coefficient on the interaction term between risk aversion and assignment to the grace period group indicate that more risk averse clients increase business investment by more in response to the grace period contract relative to less risk averse clients. Though the estimate is only weakly significant, this result is especially striking given that the level effect of risk aversion is to decrease business investment. While the coefficient estimates are only weakly significant, this pattern suggests that the standard loan contract without a grace period deters risk averse clients most from taking on illiquid investments.

5   Conclusion

Our findings suggest that introducing flexibility to microfinance contracts presents a trade-off for banks and clients. On the one hand, we find evidence that average levels of default and delinquency rise when clients are offered a grace period before repayment begins. This basic finding supports the predominant view among micro-lenders that rigid repayment schedules are critical to maintaining low rates of default among poor borrowers. On the other hand, our findings are consistent with a model in which delayed repayment encourages more profitable, though riskier, investment.

The pattern of long-run default we observe in the data also sheds light on the investment opportunity set clients face. The fact that a substantial number of grace period clients still have not repaid more than a year after the loan due date suggests that the available higher return, less liquid investments also carry higher risk that leads to more variable

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[7]The lotteries were presented as hypotheticals, and clients were not financially incentivized to answer these questions.

business outcomes. In ongoing work we will look for direct evidence of this by examining differences across experimental groups in long-run business profits.

Assuming for now that the illiquid investments clients undertook were in fact socially desirable, we perform a back-of-the-envelope calculation to compute the interest rate required to compensate VWS for the additional default. Given a baseline default rate of 3% for clients without a grace period and 11% for clients with a grace period, VWS would have to increase its annualized interest rate from 22% to 33% to cover the additional default. Of course, a higher interest rate may itself cause a yet higher default rate if moral hazard or adverse selection are significant, so the new interest rate should be taken as a minimum.

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6   Data Appendix

6.1   Baseline Survey

Clients were given three different versions of the baseline survey. The breakdown of number of new and existing clients by survey is provided in Panel A of Table A1. Existing clients had already taken out a previous loan with VWS and had taken part in a previous study conducted by the authors. New clients were both new to VWS and had not taken part in any previous studies. We were unable to survey 15 clients (1.7%) at the baseline.

Household Shock Defined as whether households had experienced any of the following events in the last 30 days: birth, death, Heavy rain or flood, guest visit, travel.

Household Savings Defined as whether any member in the household has a savings account.

Employment The borrower is classified as self-employed, wage-employed, or housewife. A self-employed woman is defined as one who owns and works on her own business, a wage-employed woman as one who is either paid a salary or a daily wage by an employer outside of the home, and a housewife as any woman who does not work.

First Time Borrower Defined as someone who is a new client to our partner MFI

Discount Rate To estimate the discount rate, clients were asked to pick between receiving a fixed amount of money now or a larger amount a month later. For example, they were asked if they would prefer receiving 200 rupees now or 250 in a month. In this case, the implied discount rate for a client that decided to choose 250 rupees now in a month is between 0 and 25 percent. To generate a more balanced estimate, we took the average of the implied discount rate at the point at which the client chose to wait (in the previous example this is 25 percent) and the previous lower discount rate which the client did not choose. So, if the previous example had been the first question in the game series, we wouldve estimated the clients discount rate to be 12.5 percent. The higher the discount rate, the more impatient a client is.

Risk Aversion Index Clients were asked a series of question about whether they

would prefer to receive a certain amount of money with certainty or a higher amount with some degree of uncertainty. Based on these questions, we generated and normalized an index of how risk averse a person was. The higher a persons score in the index, the more risk loving they are.

6.2 Endline Survey

Panel B of Table A1 shows the breakdown of clients who were surveyed and who we were unable to survey at the endline. We were unable to survey 45 clients (5.3%).

Loan Use In order to ascertain how the loan was spent, we asked clients to list the purposes for which they had used the loan money. We provided a rubric with six broad categories: Business Expenditures, Health, Schooling, Housing Expenditures, Savings, and Miscellaneous, which were then further subdivided into more narrow sections. For example, business expenditures were divided into different types of inputs (saris, fish, etc) and equipment (sewing machine, rickshaw, etc). Surveyors were instructed to prompt clients if the total expenditure reported differed from the total loan amount. Still, in 93 cases the reported amount differed from the total loan amount. In 59 of these cases, the reported amount matched the amount of a subsequent loan taken by the client and so it is assumed that the client reported loan use for that loan. For these clients we include a dummy in the specification. Misreporting is balanced between grace period and no grace period clients. Since we are unlikely to see differences in loan use between grace period and no grace period clients in spending of subsequent loans (under which their contract did not differ), this misreporting will bias our estimates towards zero. In the remaining 34 cases in which the reported expenditure amount differed from the loan amount, the difference is less than 40% of the loan in all case.

Inputs This is constructed as the sum of Raw Materials and Inventory from the loan use section.

6.3   Variables from Multiple Surveys or Sources

The following variables were constructed using information from more than one survey instrument or data source.

      Delinquency and Default The measure of default reported in the paper comes from the VWS administrative records. Matching between VWS records and study clients was conducted based on branch name, date of loan disbursement, loan disbursement amount, group name, and client name. All 845 clients were matched. We present three measures of default in the paper defined as those clients who have not repaid their loan amount X weeks after the full loan was due, or $42 + X$ weeks after the first payment where X is 8, 12, and 16. Due to holidays and issues outlined below 42 weeks after the first meeting may not correspond to the exact due date. As a check on the VWS administrative records, loan officers were required to keep a record of payments at each group meeting. Based on consulting with loan officers, we also computed a separate measure of default. This measure differs slightly but it is not biased towards more or fewer reported defaults.[8] The results presented in Table 6 are quantitatively similar and remain statistically significant when using the alternative measure.

      We are currently using the actual records kept by loan officers as a third check on the default measure and checking the reason for the few discrepancies between the default measure reported by loan officers and the default measure in the VWS administrative records.

      VWS changed the interest rate that new clients were charged during the study implying that while some clients may repay 8800 Rs on an 8000 Rs loan, others may have to repay a higher amount. Although the total amount that a client has to repay differs by interest rate, VWS still requires that each client with a certain size loan repay the same fixed amount. In other words, regardless of a clients interest rate on the loan, she repays the same amount at each meeting. This means that, by definition, some clients had more meetings to repay the same sized loan. Defining the horizon for loan repayment too narrowly would

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[8]The full sample default rate using the administrative records is 5.2% compared with 5.4% for the measure reported by loan officers.

capture clients who simply needed longer to repay their loans due to their interest rate and not because they were defaulting. The maximum amount of time that any one client was given to repay their full loan was 45 weeks. The measures reported in the paper all fall after this cut-off.

Household Business and New Business All 208 new clients to our study were asked about the businesses that the household owns. They were also asked how long the business had been operating for. Based on the answers to these questions, we were able to determine if a household had started a new business with the loan, where new business is defined as one that was created after the repayment group was formed, or if the household had an existing business before becoming a participant in our study. The 276 clients who took version two of the survey were asked about existing and about new household businesses that were started in the past year. Using the same method as for new clients, we were able to categorize businesses as either existing at the time of the baseline or newly formed after disbursement of the new loan. The remaining 346 clients, who took version one and were existing clients, were only asked about whether they had started a new business in the last year but not about an existing business. Because they had been in a previous study, we used their responses from a previous baseline and endline to obtain information about businesses that existed at the beginning of the second intervention. For all clients, we used the endline to determine if a new business had been started between the baseline and endline.

Table 1: Grace Period vs. No Grace Period Randomization Check

	Client-level variable	No Grace Period (1)	Grace Period (2)	Diff (2) - (1) (3)	Full Sample (4)
1	Age	34.228	33.394	-0.8762	33.816
		(0.408)	(0.414)	(0.5677)	(0.291)
2	Married	0.901	0.875	-0.0269	0.888
		(0.015)	(0.016)	(0.0213)	(0.011)
3	Literate	0.849	0.792	-0.0561*	0.821
		(0.017)	(0.02)	(0.0326)	(0.013)
4	Muslim	0.007	0.019	0.0108	0.013
		(0.004)	(0.007)	(0.0106)	(0.004)
5	Self-Employed	0.501	0.471	-0.0276	0.486
		(0.024)	(0.025)	(0.0398)	(0.017)
6	Waged Work	0.2	0.204	0.0041	0.202
		(0.019)	(0.02)	(0.0336)	(0.014)
7	Housewife	0.299	0.325	0.0234	0.312
		(0.022)	(0.023)	(0.0336)	(0.016)
8	Household Size	3.685	3.797	0.1088	3.74
		(0.08)	(0.078)	(0.1303)	(0.056)
9	Household Shock	0.769	0.766	-0.0056	0.767
		(0.021)	(0.021)	(0.0468)	(0.015)
10	Household Savings	0.32	0.342	0.0214	0.331
		(0.023)	(0.023)	(0.0405)	(0.016)
11	Household Business	0.766	0.766	0.0013	0.766
		(0.021)	(0.021)	(0.0412)	(0.015)
12	Fraction of First Time Borrowers	0.285	0.212	-0.0691*	0.249
		(0.013)	(0.012)	(0.0398)	(0.009)
	N	425	420	845	845

Notes:

* significant at 5% level ** significant at 1% level *** significant at .1% level

(1) Standard errors adjusted for within loan group correlation in parenthesis.

(2) Column (3) is the coefficient on a dummy for grace period in a regression of the client-level variable on stratification of group formation and loan officer fixed effects.

(3) Overall Effect: Chi-Sq. Stat and p value are computed by jointly estimating a system of seemingly unrelated regressions consisting of a dummy for no delay/delay with standard errors adjusted for within loan group correlation.

(4) Rows 1-7 reflect answers about the individual client. Rows 8-12 refer to the household.

(5) Refer to the data appendix for a full description of the variables

Table 2: First Stage between Grace Period and No Grace Period

	Disbursement to first meeting		Disbursement to due date		Disbursement to full loan repaid		First meeting to full loan repaid	
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)
Grace Period	54.16***	53.49***	54.16***	53.49***	45.41***	43.74***	-8.642	-9.810**
	(1.521)	(1.446)	(1.521)	(1.446)	(5.369)	(4.344)	(5.261)	(4.606)
Controls Used	No	Yes	No	Yes	No	Yes	No	Yes
Observations	845	845	845	845	799	799	799	799
Mean for	14.57	14.57	308.6	308.6	326.4	326.4	311.7	311.7
No Delay	(0.637)	(0.637)	(0.637)	(0.637)	(2.594)	(2.594)	(2.516)	(2.516)

Notes:
* significant at 5% level ** significant at 1% level *** significant at .1% level
(1) Standard errors adjusted for within loan group correlation in parenthesis.
(2) Controls used can be found in Table 1
(3) All regressions include stratification of group formation fixed effects. Control equations also include loan officer fixed effects.
(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
(5) Refer to the data appendix for a full description of the variables

Table 3: Loan Use-All Categories

	Health		Savings		Education		Other		Home Repairs		Business	
	(3)	(4)	(9)	(10)	(5)	(6)	(11)	(12)	(7)	(8)	(1)	(2)
Grace Period	18.08	12.46	-12.19	5.891	-50.47	-54.34	-28.02	-62.24	-207.5	-268.1*	517.6***	421.2**
	(67.21)	(64.89)	(44.45)	(45.50)	(47.46)	(50.19)	(109.8)	(113.1)	(134.8)	(145.8)	(197.9)	(201.6)
Controls Used	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	845	845	845	845	845	845	845	845	845	845	845	845
Mean for No Delay and Matches	107.2	107.2	122.9	122.9	127.7	127.7	402.0	402.0	570.3	570.3	6142.7	6142.7
	(52.07)	(52.07)	(32.86)	(32.86)	(53.29)	(53.29)	(88.67)	(88.67)	(115.4)	(115.4)	(162.4)	(162.4)

Notes:

* significant at 5% level ** significant at 1% level *** significant at .1% level

(1) Standard errors adjusted for within loan group correlation in parenthesis.

(2) Controls used can be found in Table 1

(3) All regressions include stratification of group formation fixed effects. Control equations also include loan officer fixed effects.

(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.

(5) Clients were asked about the loan they received in this intervention. Some of the clients who went on to the next intervention answered about the next loan. So all regressions include a dummy for whether the sum of loan use expenditures matched the 3rd intervention loan instead of the 2nd intervention loan

(6) Refer to the data appendix for a full description of the variables

Table 4: Loan Use-Business Expenditures Break Down

	Inventory		Raw Materials		Inputs		Equipment		Other Business Expenditures	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Grace Period	126.8	165.2	410.6*	347.4	537.5*	512.6*	-47.44	-123.9	27.53	32.46
	(294.1)	(297.0)	(222.0)	(227.7)	(282.4)	(281.9)	(240.3)	(243.5)	(45.90)	(46.60)
Controls Used	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	845	845	845	845	845	845	845	845	845	845
Mean for No Delay and	3241.2	3241.2	1272	1272	4513.2	4513.2	1552.4	1552.4	77.12	77.12
Matches	(230.3)	(230.3)	(144.9)	(144.9)	(225.4)	(225.4)	(172.0)	(172.0)	(34.24)	(34.24)

Notes:
* significant at 5% level ** significant at 1% level *** significant at .1% level
(1) Standard errors adjusted for within loan group correlation in parenthesis.
(2) Controls used can be found in Table 1
(3) All regressions include stratification of group formation fixed effects. Control equations also include loan officer fixed effects.
(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
(5) Clients were asked about the loan they received in this intervention. Some of the clients who went on to the next intervention answered about the next loan. So all regressions include a dummy for whether the sum of loan use expenditures matched the 3rd intervention loan instead of the 2nd intervention loan
(6) Refer to the data appendix for a full description of the variables

Table 5: New Business Creation

	New Business	New Business
	(1)	(2)
Grace Period	0.0248*	0.0267*
	(0.0145)	(0.0156)
Controls Used	No	Yes
Observations	830	830
Mean for No Delay	0.0254	0.0254
	(0.00842)	(0.00842)

Notes:

* significant at 5% level ** significant at 1% level *** significant at .1% level
(1) Standard errors adjusted for within loan group correlation in parenthesis.
(2) Controls used can be found in Table 1
(3) All regressions include stratification of group formation fixed effects. Control equations also include loan officer fixed effects.
(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
(5) Clients were asked about the loan they received in this intervention. Some of the clients who went on to the next intervention answered about the next loan. So all regressions include a dummy for whether the sum of loan use expenditures matched the 3rd intervention loan instead of the 2nd intervention loan
(6) Refer to the data appendix for a full description of the variables

Table 6: Default between Grace Period and No Grace Period

	Full loan not repaid within 8 weeks of due date		Full loan not repaid within 12 weeks of due date		Full loan not repaid within 16 weeks of due date	
	(1)	(2)	(3)	(4)	(5)	(6)
Grace Period	0.0758**	0.0630*	0.0904***	0.0788**	0.0880**	0.0773**
	(0.0375)	(0.0347)	(0.0341)	(0.0319)	(0.0340)	(0.0319)
Controls Used	No	Yes	No	Yes	No	Yes
Observations	845	845	845	845	845	845
Mean for	0.0659	0.0659	0.0376	0.0376	0.0376	0.0376
No Delay	(0.0190)	(0.0190)	(0.0132)	(0.0132)	(0.0132)	(0.0132)

Notes:
* significant at 5% level ** significant at 1% level *** significant at .1% level
(1) Standard errors adjusted for within loan group
(2) Controls used can be found in Table 1
(3) All regressions include stratification of group formation fixed effects. Control equations also include loan officer fixed effects.
(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
(5) Refer to the data appendix for a full description of the variables

Table 7: Heterogenous Effects for Business Expenditures
Dependent Variable: Business Expenditures

	Discount Rate	Discount Rate	Risk Index	Risk Index
	(1)	(2)	(3)	(4)
Regressor x Grace Period	27.85*	28.70*	-133.0*	-91.92
	(16.02)	(15.85)	(75.92)	(77.34)
Grace Period	52.61	-112.2	565.8***	430.1**
	(365.9)	(373.4)	(205.7)	(210.5)
Regressor	-12.36	-12.22	50.39	26.72
	(10.58)	(10.27)	(55.44)	(55.93)
Controls Used	No	Yes	No	Yes
Observations	845	845	845	845
Mean for No Delay	6282.7	6282.7	6282.7	6282.7
	(163.0)	(163.0)	(163.0)	(163.0)

Notes:
* significant at 5% level ** significant at 1% level *** significant at .1% level
(1) Standard errors adjusted for within loan group correlation in parenthesis.
(2) Controls used can be found in Table 1
(3) All regressions include stratification of group formation and loan officer fixed effects.
(4) In cases when a control variable is missing, its value is set to zero and a dummy is included for whether the variable is missing.
(5) Clients were asked about the loan they received in this intervention. Some of the clients who went on to the next intervention answered about the next loan. So all regressions include a dummy for whether the sum of loan use expenditures matched the 3rd intervention loan instead of the 2nd intervention loan
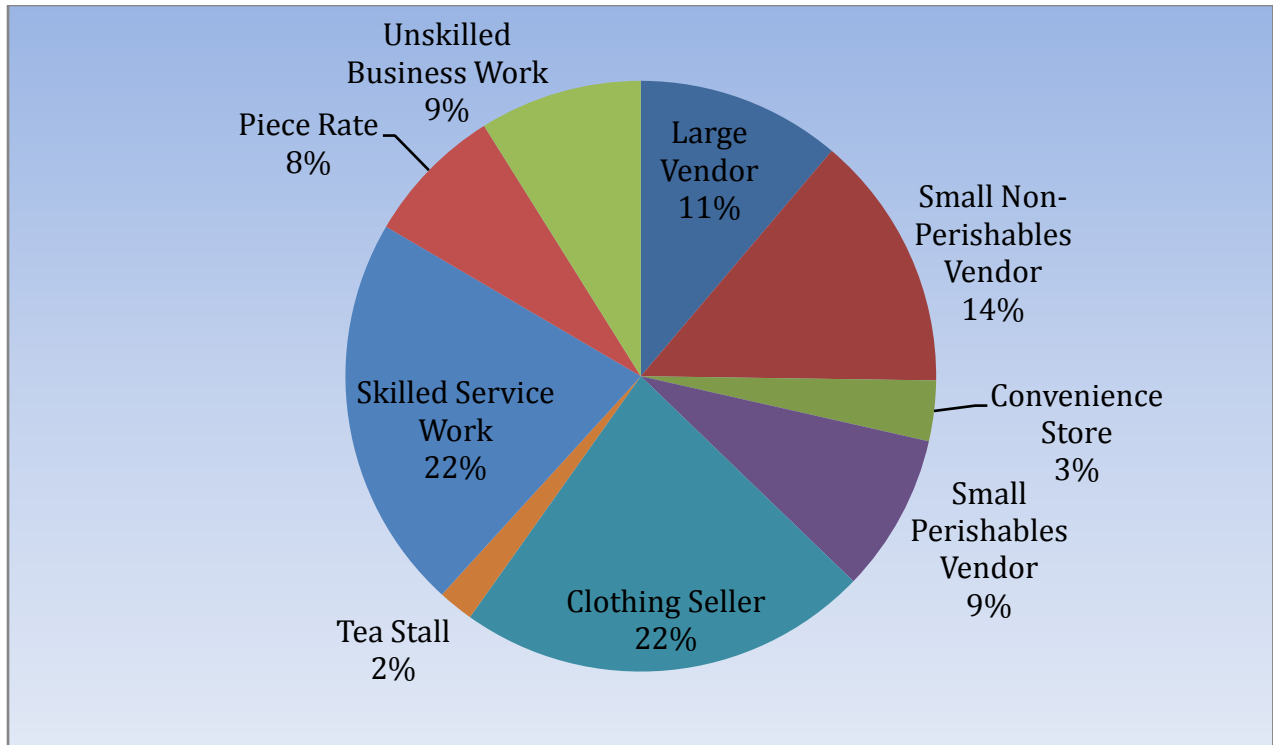(6) Refer to the data appendix for a full description of the variables

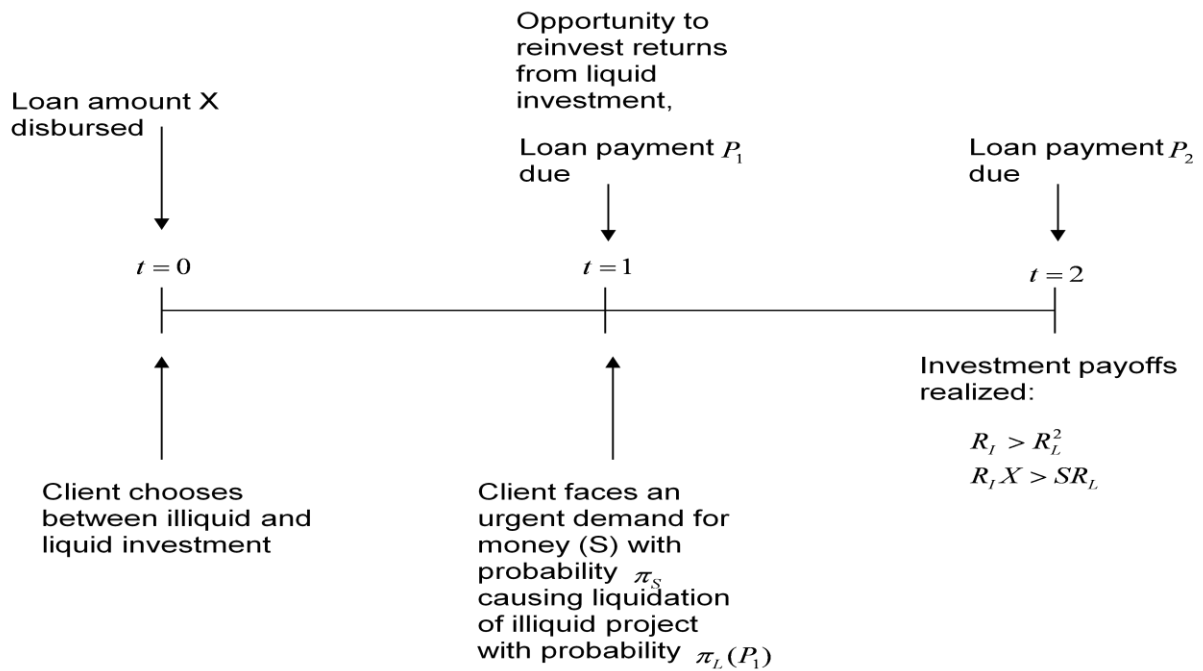Figure 1: Distribution of Household Business Types
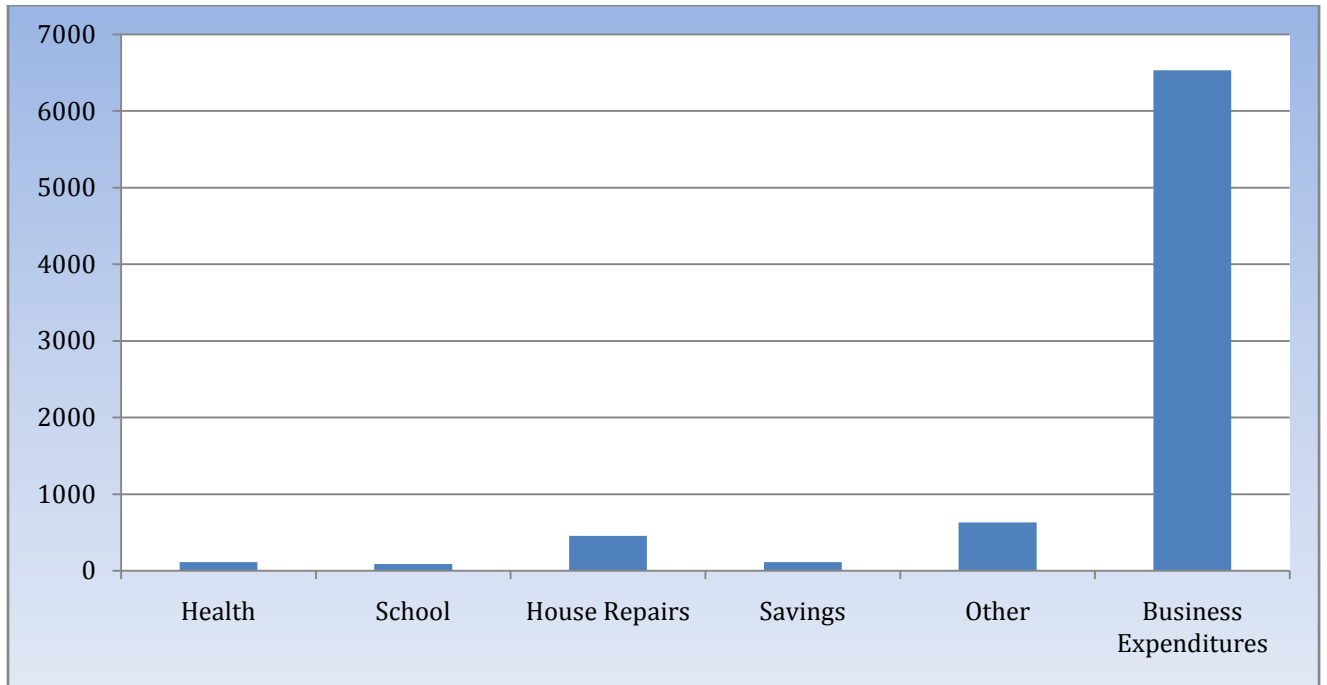

Figure 2: Model Timing
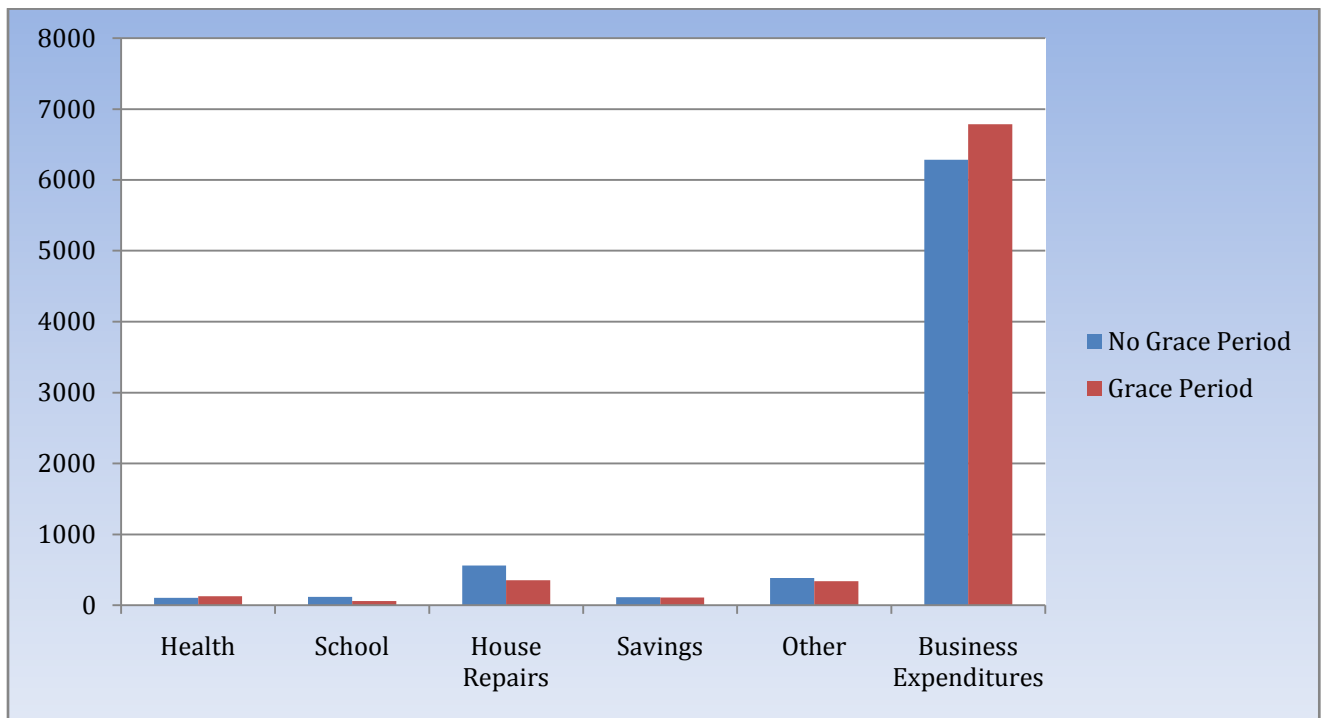
Figure 3: Loan Expenditure Categories

Figure 4: Loan Expenditure Categories by Grace Period and No Grace Period Clients
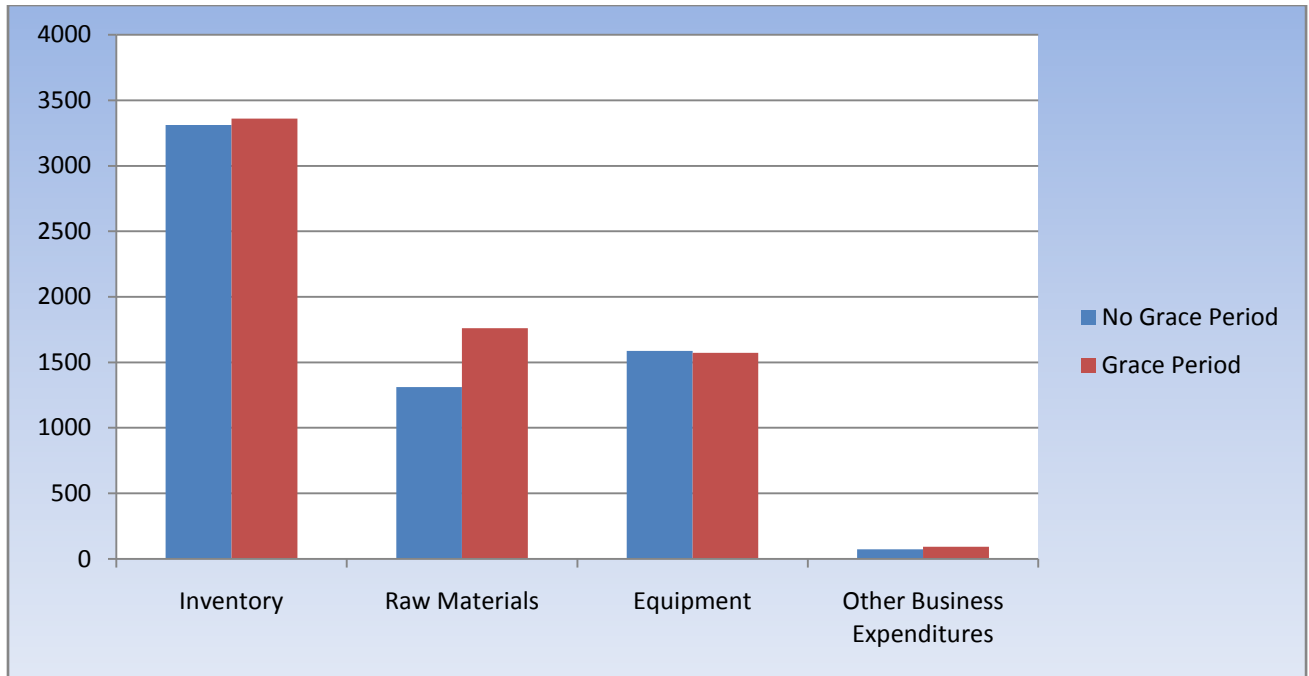
Figure 5: Business Expenditure Categories by Grace Period and No Grace Period Clients
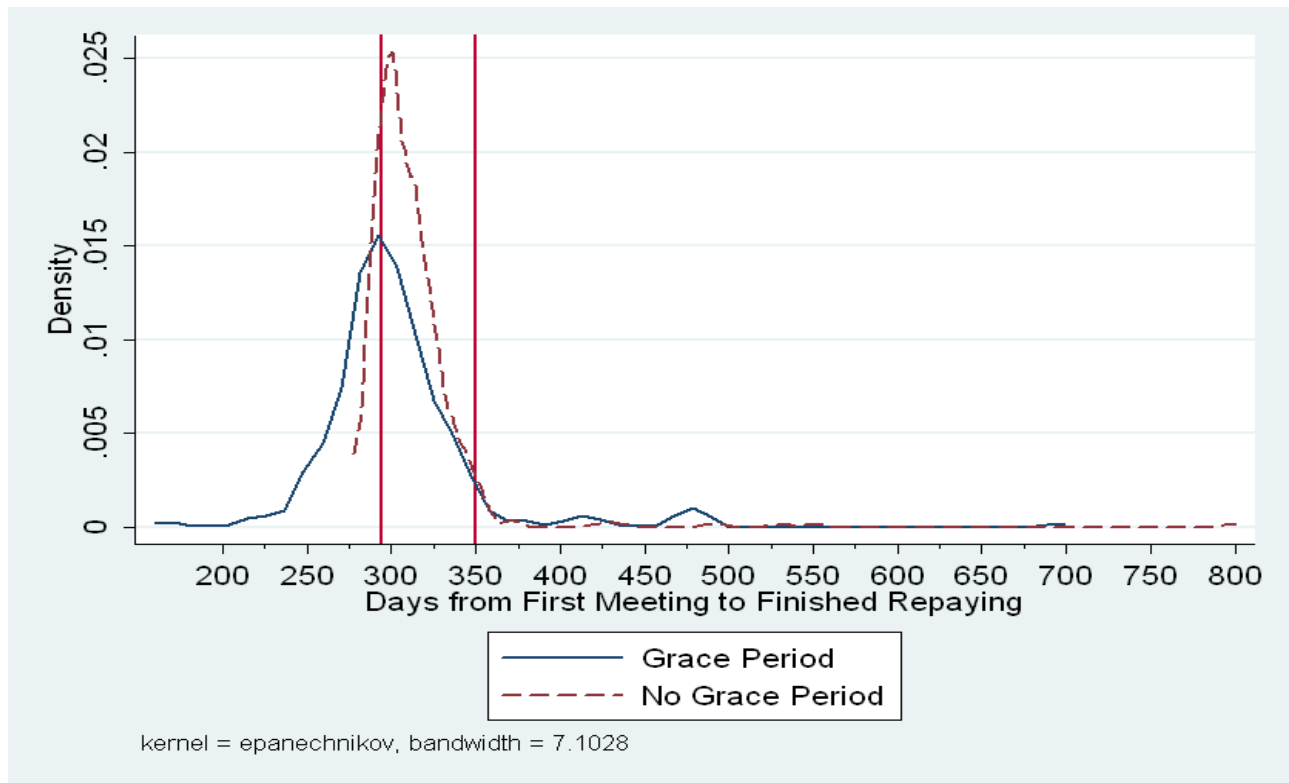

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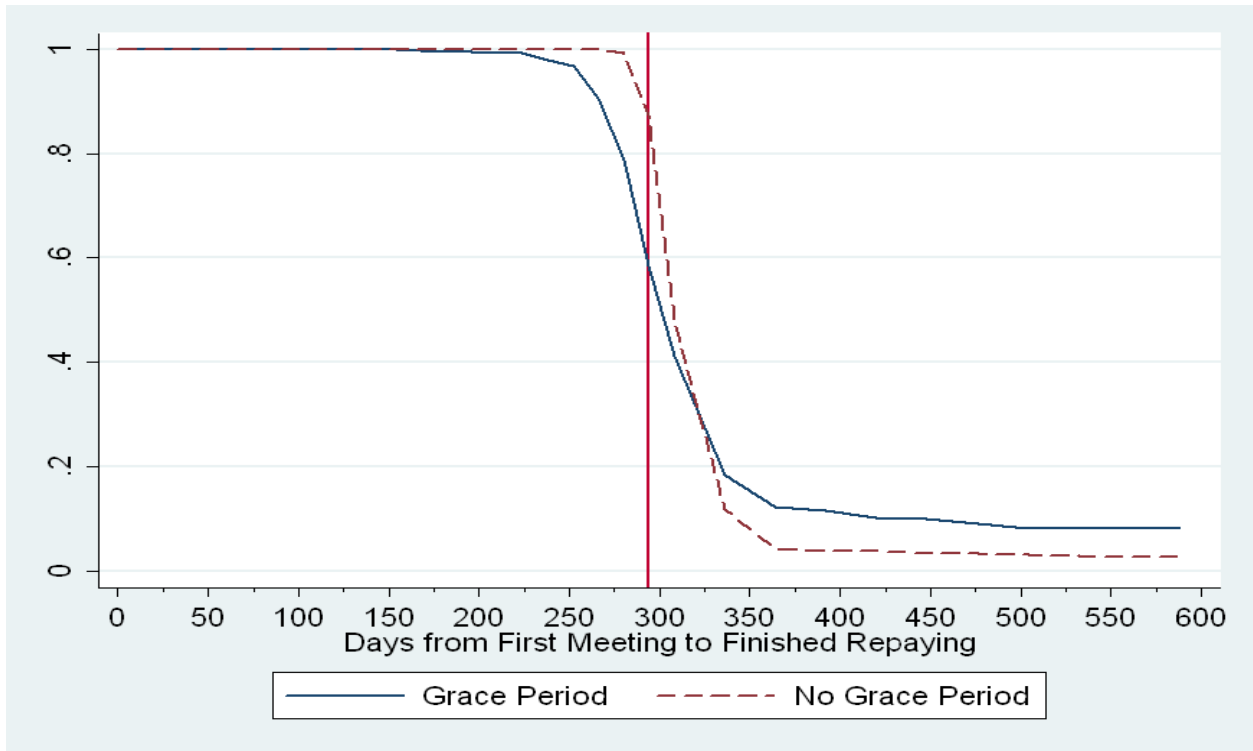Figure 6: Kernel Density of Days Taken to Repay

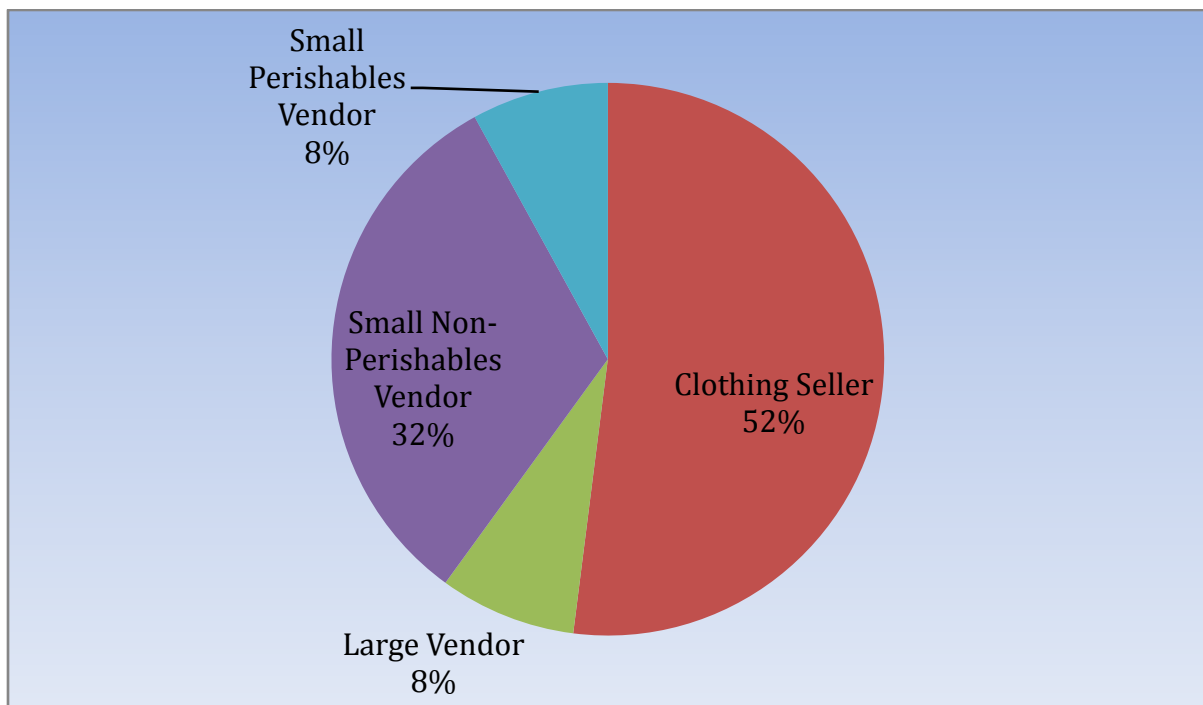Figure 7: Fraction of Clients Who Have Not Repaid

Figure 8: Distribution of New Household Business Types

Table A1: Baseline and Endline Taken by First Time and Existing Clients and by Grace and No Grace Period

	First Time Client	Existing Client	Total	Grace Period	No Grace Period	Total
Panel A: Baseline Survey						
Version 1	109	346	455	200	255	455
Version 2	0	276	276	162	114	276
Version 3	99	0	99	48	51	99
Not Surveyed	2	13	15	10	5	15
Panel B: Endline Survey						
Surveyed	196	604	800	392	408	800
Not Surveyed	14	31	45	28	17	45
Total	210	635	845	420	425	845